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COMPILED FOR GOVERNMENT

VOLUME III

ECONOMIC

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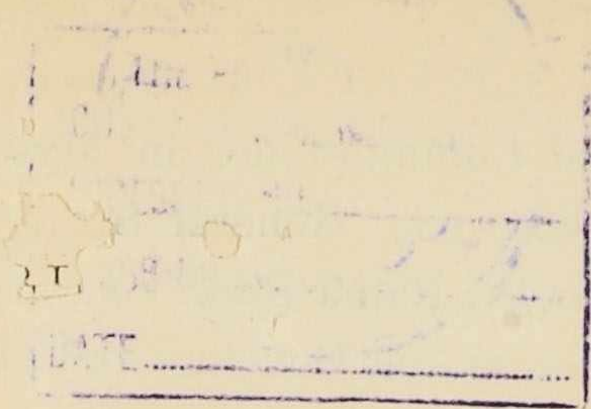
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PREFACE

THIS Volume, which forms *Volume III Economic* of the *Mysore Gazetteer*, is, as its title indicates, devoted to matters affecting the Economic welfare of the people of the State. In the preparation of the chapters included in it, valuable assistance has been rendered by a number of Officers and Departmental heads to whom thanks are due for answering enquiries made or supplying the requisite information. Special acknowledgments are due to the following:—Dr. L. C. Coleman, M.A., PH.D., Director of Agriculture; Mr. A. K. Yegnanarayana Iyer, M.A., N.D.D., F.C.S., Deputy Director of Agriculture; Mr. John Bhore, A.M.I.C.E., Chief Engineer for Mysore; Mr. B. V. Ramiengar, B.A., Chief Conservator of Forests in Mysore; Mr. B. Jayaram, F.G.S., formerly Director of Geology; Mr. A. M. Sen, M.Sc., M.I.M.E., F.G.S., Deputy Director of Geology in Mysore; Mr. S. G. Forbes, E.E., B.Sc. (E. & M.E.), A.M.I.E.E., Chief Electrical Engineer in Mysore; Mr. P. G. D'Souza, B.A., B.L., formerly Director of Industries and Commerce,

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C. HAYAVADANA RAO,
Editor.

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THE MYSORE GAZETTEER

VOLUME III

ECONOMIC

CHAPTER I.

ECONOMIC CONFERENCE.

THE Conference was established in June 1911 with the following objects:—

Objects of the
Economic
Conference.

(a) to associate men of enlightenment, public spirited citizens, prominent agriculturists, merchants, etc., with the officers of Government in deliberations connected with Economic Progress in Mysore;

(b) to keep alive public interest in the numerous questions claiming attention, by constant interchange of views and discussions among those competent to deal with them;

(c) to stimulate the capacity for effort among the people by a series of conferences and to suggest the adoption of practical measures by Government where the Government can render assistance;

(d) to hold an annual Conference to discuss the more important questions that affect the material prosperity of the State.

The lines on which the Conference should work was thus outlined by His Highness the Maharaja in the inaugural address delivered to the Conference in 1911:—

Lines of
Work.

“The conditions affecting Economic progress in this State should be compared with those in other progressive countries

and the lessons drawn from such comparison should be spread broadcast till the public become familiar and learn to act on them. If the people are kept thinking and working in this way, some of them will become leaders and experts and all who are interested in a subject will have the opportunity of forming sound opinions on it. If the leaders are convinced of the necessity of an improvement, they will induce the people concerned to take action. If they think that Government assistance is necessary, they will apply for it. The Committees and officials will spread useful information in the shape of bulletins and monographs from time to time. In this way, we shall gradually accumulate a mass of statistics and descriptive literature of the highest value to the local economic student. The aim we have in view, namely, the economic security and vital efficiency of the people must appeal to every right-thinking person."

The
Functions
of the
Economic
Conference.

The functions of the Conference do not overlap those of the Representative Assembly. Questions concerning the prerogatives of His Highness the Maharaja, the constitution of the State, its relations with the Government of India or the policy of supreme Government are excluded from discussion.

Agency for
Work.

The agency for work comprises of—

- (i) Three Central Boards with head-quarters at Bangalore, one for Agriculture including Sericulture, one for Education and one for Industries and Commerce ;
- (ii) District Boards.

Annual
Meeting.

The Conference ordinarily meets once a year under the presidency of the Dewan in June at Mysore during the Birthday festivities of His Highness the Maharaja, to consider the reports of work done by the Central Boards and the District Boards and recommendations made by them. Such of the Resolutions of the Conference as have the support of the majority of the members are submitted to Government for final orders.

The deliberations of the Conference, other than those on confidential subjects, are open to the Press and the public.

All the members of the Boards, the Deputy Commissioners of Districts, and such other persons as may be specially selected by Government are summoned for the Conference. The total number of members of the Conference does not exceed 100.

The constitution of the three Boards as ordered by Government in their order dated 10th March 1924 is as follows :—

Constitution
of the Central
Boards.

Board of Education.—The Board consists of :—

- (1) The Inspector-General of Education (*ex-officio*).
- (2) A representative of the Mysore University to be elected by the Senate of the University.
- (3) A representative of High School teachers ; pending the formation of some constituency, the member to be nominated by Government.
- (4) A representative of Missionary Schools; the election of the representative to be entrusted to a representative body of Mission Schools in Bangalore, if there is one; otherwise the representative to be nominated by Government.
- (5) A representative of private schools, aided and unaided—to be nominated by Government.
- (6) A woman representative of female education to be nominated by Government.
- (7) A representative of science teaching, to be nominated by Government.
- (8) A representative of industrial and technical education to be nominated by Government.
- (9) A representative of physical education—to be nominated by Government.
- (10) A representative of Mahomedan education—to be nominated by Government.
- (11) A representative of the education of backward classes—to be nominated by Government.
- (12) A representative of the depressed classes—to be nominated by Government.

(13) A representative of primary education—to be nominated by Government.

(14) & (15) Two members of the Representative Assembly to be elected by the members of the Assembly.

(16) & (17) Two representatives of the Legislative Council to be elected by the members of the Legislative Council.

(18) & (19) Two members to be nominated by Government.

The Vice-Chancellor of the Mysore University to be the Chairman of the Board.

Board of Agriculture.—The Board consists of:—

(1) The Director of Agriculture (*ex-officio*).

(2) The Chief Engineer in Mysore (*ex-officio*).

(3) The Revenue Commissioner in Mysore (*ex-officio*).

(4) The Live-Stock Expert (*ex-officio*).

(5) The Superintendent of Sericulture (*ex-officio*).

(6) The Superintendent, Government Gardens (*ex-officio*).

(7) The Registrar of Co-operative Societies (*ex-officio*).

(8) The Deputy Commissioner, Bangalore District (*ex-officio*).

(9) A representative of the Agricultural Union to be elected by the Union by a majority of the members present at a general meeting.

(10) A representative of the European Planting Interest—to be elected by the European Planters' Association recognised by Government for purposes of returning a member to the Representative Assembly.

(11) A representative of the Indian Planting Interest—to be elected by the Indian Planters' Association recognised by Government for purposes of returning a member to the Representative Assembly.

(12) The Agricultural Chemist (*ex-officio*).

(13) The Conservator of Forests (*ex-officio*).

(14) & (15) Two members of the Representative Assembly to be elected by the members of the Assembly.

(16) & (17) Two representatives of the Legislative Council to be elected by the members of the Legislative Council.

(18) & (19) Two members representing horticulture and sericulture to be nominated by Government.

(20), (21) & (22) Three members representing agriculture

who are large growers of sugar-cane, cotton, etc., to be nominated by Government.

The First Member of Council to be the Chairman of the Board.

Board of Industries and Commerce.—The Board consists of :—

- (1) The Director of Industries and Commerce (*ex-officio*).
- (2) The Conservator of Forests (*ex-officio*).
- (3) The Director of Geology (*ex-officio*).
- (4) The Chief Electrical Engineer (*ex-officio*).
- (5) The Agent, Mysore Railways (*ex-officio*).
- (6) & (7) Two members of the Representative Assembly to be elected by the members of the Assembly.
- (8) & (9) Two representatives of the Legislative Council to be elected by the members of the Legislative Council.
- (10) A representative of the Chamber of Commerce to be elected by the Chamber of Commerce.
- (11) A representative of Banking to be nominated by Government.
- (12) A representative of Mining and Factory Labour to be nominated by Government.
- (13) The Industrial Chemist (*ex-officio*).
- (14) The Government Director, Mysore Iron Works (*ex-officio*).
- (15), (16) & (17) Three representatives of Provincial Industries (*i*) one for mining, (*ii*) one for textiles and (*iii*) one for tanning—the mining representative to be elected by the Kolar Gold Fields Mining Board and the other representatives to be nominated by Government.
- (18) A representative of Industrial and Commercial Education to be nominated by Government.
- (19) & (20) to be nominated by Government to represent other interests.

In addition to the several sub-committees that may be formed from time to time for working out the details of the several schemes, a separate sub-committee will be formed to continue the work carried on by the Board of Scientific Advice. This Sub-Committee will consist of

not more than seven members of the Industries and Commerce Board and such scientific experts from outside as may be co-opted by the Board.

The Second Member of Council to be the Chairman of the Board.

Functions of
the Central
Boards.

The functions of the Central Boards are :—

- (i) to investigate questions of economic interest,
- (ii) to collect correct and valuable information on every question considered by the Board and to prepare a note or monograph embodying the same in an assimilable form;
- (iii) to compare conditions in Mysore with those in other countries or localities;
- (iv) to stimulate public discussion by issuing monographs to the public and the Press;
- (v) to consult expert opinion, if necessary, both within and outside Mysore;
- (vi) to report their opinions and recommendations to the Conference once a year before the end of April;
- (vii) to initiate and carry on experiments in special cases;
- (viii) to formulate practical improvement schemes;
- (ix) to spread information and enlightenment among the people by bulletins and other means;
- (x) to advise the people in respect of measures needed for their material prosperity;
- (xi) to undertake, in special cases, with the aid of experts or executive officers, the execution of schemes prepared by them and duly approved by Government;
- (xii) to encourage the formation of Local Associations, Chambers of Commerce, Local Committees, etc., for the investigation and development of individual or minor questions and for stimulating co-operative effort and private initiative, so that, as far as possible, the services of every person in the State who has capacity or enthusiasm for work or for spreading information or who has capital for investment in productive enterprises, may be enlisted in the work of the people;
- (xiii) to recommend to Government financial aid to deserving bodies, committees or individuals where necessary;
- (xiv) to suggest to Government such other steps as may

be considered desirable to improve the economic condition of the country.

The District Boards have been entrusted with all economic work in the Districts. The principal functions that District Boards may have to discharge are:—

District
Boards.

(i) to consider all the subjects allotted to the three Central Boards with special reference to the needs and the local conditions of the District;

(ii) to study local deficiencies and local wants and endeavour to supply them largely by the efforts of the people of the locality assisted by Government;

(iii) to submit, not later than the 1st May, a report of work done during the year;

(iv) to collect and furnish from time to time such information and statistics as may be required by the Central Boards;

(v) to disseminate information received from the Central Boards;

(vi) to popularise schemes framed by the Boards or Departments of Government;

(vii) to co-operate generally in the development of programmes of the Boards and the Departments of Government;

(viii) to collect funds—

(a) from public and charitable institutions, Municipalities, Local Boards, Village Unions, fairs, *jātras* and other public gatherings.

(b) by levying voluntary cesses.

(c) by raising subscriptions or donations to supplement Government grants for prosecuting the work of the Conference;

(ix) to apply the funds so obtained in the District itself for—

(a) demonstration work.

(b) collecting and spreading information.

(c) any other object that may be found necessary from time to time, the general sanction of Government being obtained in each case;

(x) to start a reading room and library and a museum of economic products, industrial machinery, etc., at the District Head-quarters;

(xi) to collect and maintain accurate statistics for the District under the three branches of Conference work, *viz.*, Education, Agriculture and Industries and Commerce;

(xii) to organize Agricultural and Industrial Conferences and Shows, both at head-quarters and at important fairs and jattras, festivals, etc., in the District;

(xiii) to encourage the formation of Agricultural, Industrial and other Associations, Societies, Committees, etc. for—

- (a) the investigation and working up of special questions of economic interest, and
- (b) aiding the people in starting industries, joint-stock and other business concerns;

(xiv) to develop local working schemes of economic questions and submit the same for the sanction of Government through the District Boards and in urgent cases, through the head of the District;

(xv) to act as a medium between the Government and the people by studying the requirements of the District;

(xvi) to investigate applications for financial aid in the shape of loans and subsidies or concessions and recommend them to the District Boards for submission to Government;

(xvii) to maintain a list of persons in the District who may be willing and able to do active work to help in the programme of the Conferences and its Boards;

(xviii) to maintain a list of persons—

- (a) who are prepared to follow improved methods of agriculture or develop industries and commerce, or
- (b) who are ready to invest capital and to indicate the nature of expert advice and help they may need from the District Boards or the Heads of Departments;

(xix) to do everything possible to bring together all people interested in any particular subject of economic interest and to keep them thinking and working on it.

Award of Honours and Certificates.

The Government of His Highness the Maharaja considering it necessary that useful work done by public-spirited gentlemen in connection with the economic development of the country should receive public recognition, have sanctioned the award of *Khillats* (Royal gifts) and Certificates according to the nature and value of the work done in each case. These are of four kinds:—

(i) Honours and *Khillats* bestowed in open Durbar in the Palace in the presence of His Highness the Maharaja during the annual Dasara celebrations.

(ii) Printed certificates signed by the Dewan.

(iii) Printed certificates signed by a Secretary to Government on behalf of Government.

(iv) Printed certificates signed by the Deputy Commissioner of the District.

Since its establishment in 1911, the constitution of the Conference has undergone some alterations. When it was first formed, the three Boards forming it were designated Committees; the Industries and Commerce Committee having at first a sub-committee of its own for offering advice in scientific matters referred to it. Subsequently this sub-committee was developed into a Board of Scientific Advice, with a separate Chairman and Secretary. This arrangement was, however, dropped in 1924. Similarly there were in the Districts separate District Committees for economic work located at the headquarters of each District, and Taluk and Town Progress Committees at head-quarters of each Taluk and Town. On the transference of all economic work in the Districts to District Boards, by a suitable amendment of the law, these Committees ceased to exist. Similarly there was a Standing Committee of the Conference for considering important questions as they arose between any two sessions of the Conference, especially questions falling within the scope of more than one Committee. It consisted of the President, the Vice-Presidents, the Chairmen of the three Central Committees and various official and non-official members. This Committee was first formed in June 1913 and was enlarged in August 1915. In the beginning it met once in three months, and later, once every month, the Secretary to the Conference acting as its Secretary. In 1915, an English monthly journal called the *Mysore Economic Journal*, was also started to

Changes in
the constitution of the
Conference.

disseminate sound ideas systematically on economic subjects and to serve the purposes of a continuous record of work done by the various Committees. A Kannada edition of it was simultaneously sanctioned with the object of influencing a wider public in matters relating to economic well-being. The Kannada part was soon converted into a weekly and transferred to a private agency in 1918 and the English journal to another in 1921. In 1919 a new constitution was devised for the Conference. Its general utility led to its being converted into a permanent adjunct to the administration and its work linked up with the activities of the Districts, through the District Boards as mentioned above. The new constitution came in for fresh review and examination by the Constitutional Reforms Committee and in the Proclamation issued in 1923, the Conference was given a permanent place in the constitution of the State. The three Boards were placed on a permanent footing and arrangements were made for their working, in their reconstituted form, in close relationship with the Representative Assembly and the Legislative Council. (*Vide* Part IV. Chapter I).

The new Boards were formed in May 1924. The main feature of their constitution is that they are formed for the most part of elected representatives of the various interests with whose advancement they are concerned. The first joint meeting of the new Board was held on 15th June 1924 and the first annual Conference, in its reconstituted form, took place, after a lull of a couple of years of enforced inactivity, owing to the prevailing financial stringency, on 18th June 1924.

During the fifteen years the Conference has existed, it may be remarked that it has actively helped to awaken a desire for improvement in regard to economic well-being. Nearly 400 subjects, great and small, have been discussed by it and on nearly 150 of these, Government have passed

orders. It has been authoritatively acknowledged that the Conference has rendered valuable service in the fields of Education, Agriculture and Industries and Commerce. The sum total of its work has been declared (by Dewan Sir A. R. Banerji) in the two words "awakening and enterprise."

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CHAPTER II.

AGRICULTURE.

I. GENERAL.

THE area under cultivation in the State is roughly 6 million acres which is about 35·2 per cent of the total area of the State and 72 per cent of the area classed as fit for cultivation. The accompanying table shows the progress that has taken place during the past eighteen years in the extension.

Years	Area under cultivation (actually cropped) Acres	Years	Area under cultivation (actually cropped) Acres
1905-09	... 5,799,850	1920-21	... 6,261,325
1910-14	... 6,188,113	1921-22	... 6,369,379
1915-19	... 6,368,367	1922-23	... 6,461,009
1919-20	... 6,198,407		

The cultivated lands themselves fall into three main classes, the dry, wet and garden. Dry lands are those on which cultivation depends solely upon the rainfall; the bulk of the area under cultivation in the State amounting to about 85 per cent of the total cultivated area is under dry cultivation. It forms therefore the main source of food supply in the State.

Ragi and Jola are the main food grains raised on these lands, the former being the staple food of the majority of the population. In addition to these, several minor food grains and a wide variety of both food and commercial crops such as pulses, oil seeds, cotton, etc., are raised also as dry crops. Information regarding the extent and distribution of rainfall on which alone the success of dry

land cultivation solely depends will be found in Part I, Chapter III (*Meteorology*) and under "Climate and Rain-fall" in this Chapter as well.

On the wet lands are raised crops which require irrigation, that is, a steady and copious watering throughout the period of the growth. Wet cultivation.

The sources of irrigation are:—

(1) Tanks either solely rain-fed, or fed by channels taken from rivers;

(2) Rivers from which water is taken for irrigation by the construction of dams or anicuts across them at convenient places and leading them through channels for irrigation on lands lower down the course of the river;

(3) Channels tapping underground flow, common in the river beds and the spring or "thalparge" areas in the eastern districts of Tumkur and Kolar; and

(4) Wells: in the Districts of Chitaldrug, Tumkur, Kolar and Bangalore, irrigation wells are common; large wells with permanent stone rivetment and capable of irrigating from three to five acres are seen mostly in the taluks of poor rainfall in these districts, that is, in Molkalmuru, Challakere, Pavagada and Sira. Small wells excavated in the firm laterite soils and capable of irrigating up to an acre form a common feature of the taluks of Hoskote, Malur, Chikballapur and Sidlaghatta. Large wells can also be seen constructed below the different tanks more or less as a supplementary source depending mostly on the percolation water of the tanks. The wet or irrigated areas form the most valuable lands, the value depending practically upon the degree to which irrigation water is assured. Those under the river channels command naturally the highest price, as a failure of crops due to lack of water is almost unknown. The lands under the rain-fed tanks vary greatly in value according to the capacity of the tanks and the nature of the rainfall in the catchment. Though the bulk of the irrigated area in the State is under tank irrigation and the aggregate amount of money spent upon them must run to a huge figure, their value is not as great as it might be. The tanks in the western parts of the State or the *Malnād* are very

small, being situated at the head of steep and narrow valleys and therefore requiring to be filled more than once before the crops of the season may be grown to maturity. The small tanks of which there is a very large number suffer from the same cause in addition to neglect in many cases as the annual upkeep is part of the functions of the village communities which in recent times have lost that cohesion and sense of joint responsibility characteristic of them in times gone by. The large tanks command extensive stretches of irrigable land and they form a striking feature of the landscape everywhere, especially in the Kolar District. They are magnificent works and form the main source of the wealth and prosperity of the tracts where they exist. Being however only rain-fed, the vicissitudes of the season affect these tanks also. In spite of the drawbacks inseparable from these sources of irrigation, very valuable crops are raised under them, both as annual crops and as perennial plantations or gardens. The crops usually raised as wet crops in these areas are mainly paddy and sugar-cane; perennial plantation crops are also raised, reference to which is made under "Bagayat" or garden crops.

Garden or
Bagayat.

Under well irrigation are raised a wide variety of crops including food crops like ragi, paddy, jola; and economic crops like sugar-cane, turmeric, chillies, onions, tobacco, garlic, potatoes, mulberry and so on. In the eastern taluks where the rainfall is too precarious for raising crops of any kind, the food crops noted above invariably form part of the rotation, so as to afford food for the raiyat and fodder for his cattle. The commercial crops raised furnish the ready money required for the raiyat for his expense and may be considered to yield a good money return for the raiyat's expenditure of capital and labour.

Bagayat
Crops.

These and the plantation crops such as areca-nut and cocoanut are classed as crops raised under "garden" or "bagayat" cultivation. The principal 'bagayat' crops, *viz.*, areca-nut and cocoanut are of course perennial and they mostly occupy that portion of the wet lands below tanks immediately adjoining the tank bunds. These

areas are in many cases further protected by substantial irrigation wells. In the Malnād, where these gardens are numerous and important, they occupy the long winding narrow valleys; during the monsoons, there is an over-abundance of water and in other seasons, they depend upon the natural moisture supplemented by the small tanks or *kattes* situated at the head of the valley. In the taluks of Maddagiri and Koratagere with their abundance of sub-soil water, the gardens depend upon wells and the river channels tapping underground supplies, referred to above. The greatest care is bestowed upon these gardens and heavy expenditure is incurred in keeping them in first class condition.

One also comes across a system called *Kushki Bagayat*, Kushki bagayat. *i.e.*, literally “dry garden.” This term is applied to the raising of cocoanut plantations on dry lands, on which during the rains heavy flooding is possible; they depend on neither tanks nor wells. These plantations are found extensively in the eastern part of the Hassan and Kadur districts and in the taluks of Tiptur and Chiknayakanhalli of the Tumkur District. They occupy the broad and shallow valleys which drain this part of the country. By repeated ploughings, the soils are kept in excellent condition, for absorbing and retaining the rain water; while the trees themselves are planted very wide apart to further economise the drain upon the soil moisture. It is also common, especially where the breadth of the valleys is not very great, to see low earthen embankments put across them and provided with an overflow weir, in order to impound the rain water for some considerable time in the plantations.

Among plantation crops coming in a class by themselves are :— Plantation crops.

- (1) Coffee; (2) Mango; and (3) Casuarina.

A full list of the crops of the State under the headings *wet*, *dry* and *garden* and *fruits* and *vegetables* is given in Part I, Chapter IV (Botany); but as may be seen from the accounts of the cultivation methods, this distinction is not strictly followed, as many of the crops classed as “dry” are quite often grown under irrigation and should be classed “wet.”

Soil--Red
loams, coffee
soils, Malnād
soils.

The prevailing type of soils in the State is a red loam fairly deep and uniform in character. The depth of the soil in most parts of the State is very remarkable, as a uniform and fairly homogeneous structure can be noticed to a depth of ten and even up to twenty feet. The nature of this loam is altered to different degrees firstly by the variation in the quantity of ferruginous earth present, on account of which these soils vary in colour from light red to deep brown and chocolate; secondly, by the admixture of gravels of different grades of coarseness and composition, and thirdly, by a large admixture of clay either red and highly ferruginous, or light coloured and yellowish. In the eastern districts of Bangalore and Kolar, some of the best types of the deep loam can be seen; both the rolling plains of the cultivated country side as well as the ridges and hollows are composed of this type. Valley sides and bottoms throughout the State may also be said to be composed of this type of soil. The same soil interspersed largely with ferruginous and laterite gravel abounds in the taluks of Hoskote, Sidlaghatta, Malur and Devanhalli where beds of laterite and ochre are met with. On the ridges, both high and moderately high, in nearly all the districts, the soils are highly gravelly; in the Mysore District especially, both in the Cauvery valley and elsewhere, the ridges are exceedingly so. In the Malnād, the cultivated valleys are predominantly clayey; the laterite hills are subject to excessive wash and in many places unweathered clay is

readily exposed. The coffee soils in the State which are situated on hill slopes and valleys are also mostly of the highly ferruginous type; they are also inclined to be clayey; they are further enriched by heavy mulches of organic matter resulting from the shedding of the leaves of the shade trees.

The next important type of soil, but by no means comparable in extent with the first and predominant type, is the black cotton soil of which extensive areas are met with in the Districts of Chitaldrug, Mysore, Kadur and Shimoga. Except in the Mysore District, these are only of a moderate depth of about three or four feet. Black cotton soils.

River alluvia of good quality are not very abundant; it is only in the Kolar District and in Eastern Chitaldrug and Tumkur that it is of some importance, *i.e.*, along the banks of the North Pennār and its tributaries and likewise along the Tungabhadra and its tributaries. In the important Cauvery valley where one would expect good stretches of such soil, it is very inconsiderable, the soils on both sides being highly gravelly. Rich clay soils form a feature of all the wet lands under the numerous tanks. Careful cultivation, manuring and frequent addition of good soil continued through generations have greatly improved what were naturally fertile soils in these situations. This type of familiar rich soil exists here and there throughout the State, but extensive areas are to be found only in the districts of Shimoga, Chitaldrug, Kadur and Mysore. River alluvia.

Alkali lands of all degrees of alkalinity both in dry situations and in low lying flats forming boggy marshes are also to be found. The Mandya and Chamarajnagar taluks of the Mysore District, the Hiriyur taluk of the Chitaldrug District are notable areas; alkali land in both Alkaline soils.

the areas are cultivated by reclaiming them by the usual methods of improvement known to raiyats; considerable limestone and salts of soda such as the carbonate and chloride and even nitre are obtained from these soils; some of them, however, possess a natural vegetation, which consists of coarse grasses and of groves of date and babool. Even the wet lands under many tanks are mildly alkaline, but with close attention to drainage, they are kept in good condition.

Chemical
composition
of typical
soils.

The chemical composition of some of the types of the soils is given in the table annexed.

Constituent	Red loam	Black cotton soil	Dark rich clay	Coffee estate soil
Nitrogen	·04	·039	0·4	·18
Moisture and loss on ignition ...	3·00	16·00	20·00	15·00
Insoluble residue	90·00	54·00	54·00	53·00
Iron and Alumina Fe_2O_3 , Al_2O_3 ...	6·50	16·00	22·00	29·00
Phosphoric acid, P_2O_5	·02	·07	·09	·10
Lime CaO	·12	3·30	1·30	·50
Magnesia Mg O} ... ..	...	1·90	1·40	...
Potash K_2O	·15	·50	·50	·17

It will be noticed that all the soils must be generally classed as poor and that even the soils of the coffee estates are not any different in this respect. Poor in nitrogen and phosphoric acid, moderately well supplied in potash, the predominant type is rich in iron and deficient in lime; the black cotton soils differ only as regards their lime content which is generally sufficient and sometimes abundant.

Soil types and
distribution
of crops.

As regards the crops grown on the different classes of soils, although with a fair season they are all capable of being put under any crop desired, still under ordinary conditions, considerable differentiation is well established and followed in practice. The red soils are the typical

ragi soils of the State, on which ragi is the principal cereal crop, and *save*, *navane*, *haraka* and *jola* the subordinate cereal crops; *avare* and *togari* are the principal pulses; niger and gingelly on the best soils and castor on the gravelly types, and ground-nut on the lighter types are the chief oil seeds. On the deep and well worked and mellow types, chillies, tobacco and Dharwar-American cotton are the economic crops. These are all grown as dry crops. On the black cotton soils, *jola* takes the place of ragi as the chief cereal crop, while *sajje*, *navane* and *wheat* are subordinate cereals; *togari*, Bengal gram, green gram, black gram and cowpea are the common pulses; safflower and linseed and ground-nut are grown as oil seeds; while cotton, mulberry, tobacco, chillies, onions and coriander form the chief economic crops. In addition to the distinctive crops on these two types of soils, there are also other interesting and peculiar differences that could be noticed as in the different implements used and the methods of husbandry adopted. Reference will, however, be made to these under implements and crops.

The size of the average holding in Mysore is roughly about 6 acres. The appended table, however, gives a classified list of the number of holdings of different sizes :—

Size of
holdings.

Number and extent of holdings in the State, 1923-24

		Number	Extent Acres
Below 1 acre	...	109,755	101,365
Between 1 and 5 acres	...	473,941	1,241,014
„ 5 „ 10 „	...	261,326	1,829,524
„ 10 „ 50 „	...	160,312	2,974,176
„ 50 „ 100 „	...	19,350	1,042,174
„ 100 „ 500 „	...	2,804	516,242
Above 500 acres	...	108	99,117

Scattered
fields and
holdings.

As elsewhere in India, the fields constituting individual holdings are situated in strips and seldom in a single block. In villages where there are irrigation tanks and therefore "wet" lands to cultivate, it is inevitable that a man's wet land holding lies in a different place from his dry land fields; but even in holdings consisting solely of wet lands or solely of dry lands, the fields of a holding do not lie in a single compact block. Again the cultivated fields are situated at a considerable distance from the farmer's house, sometimes as much as a mile which renders it necessary for the farmer, his cattle and men to walk this distance to and fro every day during the crop season, carrying and carting implements, manure and produce.

Malnād
holdings.

In the western part of the State, *i.e.*, the *Malnād*, the farmer's home practically adjoins or lies within his garden and lands, where the farmer has his farmstead and his permanent servants have their cottages; villages here are made up of a number of such homesteads which, though isolated in this manner, are still within earshot of each other.

Maidan
holdings and
farm houses.

In the Maidan districts also, there has been, during recent years, a tendency for the farmer to live on his land. Due in the first instance to the desire to quit the village and live far from infection when plague first broke out, the advantage which incidentally resulted to the fields themselves by this step has induced the raiyats to make these temporary sheds into permanent structures. Especially has this been the case where raiyats have had some lands under well irrigation. Much as there is to be said in favour of this system of the farmer dwelling on the land he farms, it is not allowed by the State and the revenue law penalises such change of abode somewhat heavily.

Field fences
for dry land.

The fields are not as a general rule fenced; their small areas and scattered nature, of course, preclude such

fencing, even were the raiyats inclined to do so. The cart-tracts leading into the village through the fields are generally fenced off on both sides permanently and constitute "leafy lanes;" during the cultivation season, the road margins of dry crops and sugar-cane fields are similarly fenced to keep off cattle. Moreover, in the district of Mysore, especially in the taluks of T.-Narsipur, Chamrajnagar, Gundlupet and Nanjangud, fields are generally fenced permanently with quick hedges of *Euphorbia tirucalli*, prickly pear, aloe and other hedge plants.

In the Chitaldrug District, especially in the eastern taluks, where there is much well cultivation, the fields are fenced by substantial quick hedges. Likewise also are the *bagayat* lands throughout the State. Unenclosed fields are, however, the general rule and once the year's crop is off the ground, the village cattle are free to roam about where they will, both on the dry and wet land.

Field fences
for garden
land.

The size of the dry land fields, though small as a rule, is in many cases remarkably large. This is especially the case with the black cotton soil fields of the Chitaldrug District where fields, a furlong and more in length, are very common. Fields measuring up to ten to fifteen acres may be seen. On the red soil types such large fields are not common; but fields three or four acres in extent can be met with. In both cases, where there may be steep slopes or the chance of flooding, laborious terracing and arrangements for letting out surplus water may be seen. It is also usual, especially in the Mysore and Bangalore Districts, to have the fields divided from each other by uncultivated margins which may appear unnecessarily wide, for they may be fifteen to thirty feet wide; these provide a certain amount of grazing in the crop season, and also afford ample roadway to manure and produce carts.

Size of dry
land fields in
red soil and
black cotton
soil tracts.

Size of wet
land fields.

The wet land fields are very small indeed. In the Cauvery valley, in the channel tracts, the paddy flats are laid into very small fields of about 1-10 to 1-20 of an acre each and extensively terraced. The channels run along the breast of a series of ridges, and the irrigable area lies below the channel extending right down to the bottom of the valley. This has rendered extensive terracing necessary and the plots are made small to obviate the need for any expensive levelling of the ground. Under tanks, the fields are not so small but even there the peculiar conditions of paddy cultivation necessitate small flat fields.

Climate and
season.

In the Chapter on *Meteorology* above referred to appears a full account of the rainfall and its distribution throughout the year in the different parts of the State. It may be pointed out here that the western parts of the State comprised by the Districts of Kadur, Hassan and Shimoga, roughly westward of a line drawn from Shikarpur to Arkalgud and passing through Kumsi, Yedahalli and Chikmagalur is the region of the heaviest rainfall exceeding 60 inches per year. The south-west monsoon commences much earlier and throughout its course, the rains are incessant and torrential. In the western parts of the Mysore District also, the rains of the year commence early, and on the whole this region is favoured more by the south-west than by the north-east monsoon. The central and eastern portions of the State enjoy the benefit of both monsoons; a belt passing through the extreme north-eastern taluks of Harihar, Jagalur, Challa-kere, Hiriya, Sira, Pavagada and Bagepalli constitutes a region of poor rainfall, averaging about 20" and under. Throughout the *Maidan* districts of the eastern half of the State, the north-east monsoon rains are the heavy tank filling rains, and the wet cultivation in the months of December up to March and April following depends entirely upon these rains.

The cultivation season is really comprised within the period of the two monsoons for the bulk of the crops in the State. The weather, however, is at no time of the year so cold as to preclude growth altogether and, provided there is a supply of water for irrigation, crops can be raised all the year round. As a matter of fact, under well cultivation and under the larger tanks, land will be found to be under some crop or other throughout the year. In general practice, however, the following well marked seasons are observed :—

Cultivation
seasons : Kar,
Hain, Hingar.

The *kar* or early *mungar* season which is the earliest, beginning in the month of April and May.

(2) The *hain* season or *mungar* beginning in July ;

(3) The *hingar* commencing in September and October.

These terms relate to the dry crops. The *kar* crops are raised systematically in the western districts ; these are followed in the same year with *hingar* crops or by a fallow during which the fields are ploughed. The *hain* crops are the rule in the rest of the State, and form the only crop of the season as they are harvested too late for growing a *hingar* crop. The *hingar* crops may either follow a *mungar* or *kar* crop, or be the only crop of the year.

In the case of paddy lands, the seasons are called *Kārthik* and *Vaishākh*, the former being the monsoon crop, *i.e.*, being sown from July onwards and harvested by December ; and the latter sown from December onwards and harvested in April and May.

Kārthik and
Vaisak
seasons.

The agricultural year which begins roughly in April is divided into 27 rainfall periods called after the lunar asterisms, each roughly of a fortnight's duration ; each such asterism is further divided into four quarters each called a *Pāda*. The names of these asterisms and the

Nakshatra
rainfall.

English months corresponding to them roughly are given below :—

<i>Nakshatra or Lunar asterism</i>	<i>English month</i>
Asvini	... April 14—27.
Bharani	... April 28—May 10.
Krittike	... May 11—May 24.
Rōhini	... May 25—June 7.
Mrigasira	... June 8—June 21.
Āridra ...	... June 22—July 5.
Punarvasu	... July 6—July 20.
Pushya	... July 21—August 2.
Āshlēsha	... August 3—August 15.
Makha	... August 16—August 30.
Pūrvapalguna	... August 31—September 11.
Uttarapalguna	... September 12—September 28.
Hasta ...	... September 29—October 11.
Chitra ...	... October 12—October 24.
Swati ...	... October 25—November 5.
Visākha	... November 6—November 19.
Anūrādha	... November 20—December 2.
Jēshta ...	... December 3—December 16.
Mula ...	... December 17—December 29.
Pūrvāshāda	... December 30—January 10.
Uttarāshāda	... January 11—January 23.
Shrāvana	... January 24—February 5.
Dhanishta	... February 6—February 18.
Satabhisha	... February 19—March 3.
Pūrvabhadra	... March 4—March 17.
Uttarabhadra	... March 18—March 31.
Rēvati ...	... April 1—April 13.

Agricultural
proverbs.

The various agricultural operations in their sequence are fixed in relation to these asterisms and their *pādas*, and the weather conditions during these periods also enable the raiyat roughly to forecast the condition of the weather and the effect on the crops in the succeeding periods. The various important feasts which really mark astronomical events of the year are also associated with distinctive agricultural operations. The experience

of centuries finds crystallized expression in various agricultural proverbs and sayings in regard to each of these asterism feasts, which afford considerable guidance to the farmer. The following proverbs selected out of a large number will serve as a sample :—

1. Uttara pūrva sasyani
Apara sasyani Rēvathi
Sarvam nasyanthi Asvini
Bharani sarva sasyani.

The rains at Uttari, Rēvathi and Bharani promise plenty. Rains at Asvini forebode scarcity.

2. Mikka ellv Mishkirili chellu.

Finish your gingelly sowing by the rains of Mrugashira.

3. Aridra malege, agiruva ukkege bithibidu.

By the rains of Āridra finish your sowings, let no ploughed land remain unsown.

4. Odiolaginādu hindē, hidi olaginādu mundē.

The seed from the basket comes up slower than the seed from the handful. (To show the necessity for sowing promptly with the season.)

5. Bede bandaga belili chellu.

If the season is right, sow even the hedge rows.

6. (1) Harastharasthondu gada
(2) Thadaranandanadondu gada
(3) Nanda kandanadondu gada
(4) Gouri Nandanadondu gada.

Arida, Makha, Pubba and Uttari are the rains suitable for all sowings.

7. Hasthe male beeladdidare hethathai hittikkodilla.

If rains of Hastha fail, even the mother will refuse to feed her child.

8. Uthara pothe, ethara gampa.

If Uttara fails, bring back your basket. (No grain to harvest).

9. Bale bagadu haku
Thengu theli haku.

Plant your plantains deep and your cocoanuts shallow.

10. Maralu bhumige
Kshuthitha mruthige
Ere nambido, Dhore nambido.

The sandy soil is a hungry soil, the black cotton soil gives like a king.

Implements
and other
appliances.

The implements and other agricultural appliances in use in the State are numerous and are of great interest, contrary to the belief that is often expressed by superficial observers that the plough is about the only implement of the Indian farmer. On the other hand, there is hardly a single agricultural operation of any importance which has not its appropriate implement. Next to their number and variety are their characteristics which constitute at once their merits and defects. Their chief characteristic is their simplicity, for the best of them are mere arrangements of rough hewn wood, bamboo and strings. They are cheap to make out of materials all available locally in the village and market towns close by, capable of being readily and cheaply repaired by the raiyat himself or by the village carpenter and blacksmith. Many of them are nevertheless very efficient and show much ingenuity. They are all small scale implements, that is to say, are suited for individual ownership and to holdings of a few acres, being adapted for use either by manual power, and in the case of bullock implements, just suited for a pair of bullocks such as may be kept by the smallest raiyat. They are primitive in the sense that nothing beyond the simplest mechanical principle is involved in their construction and that they are adapted to a condition of society whose wants were few and easily satisfied, when therefore the land could support a much smaller population than it can in these times when conditions have

greatly changed. Many of them, therefore, could be advantageously improved or replaced by better types. This is a branch of work which is being keenly pushed forward by the State Department of Agriculture.

A description of most of the local implements and appliances is given below. Several special operations and the tools needed in connection therewith which are of equal interest are left out here but will be found under the particular crops to which they relate.

The plough is of course the most important implement of tillage; there is, however, quite a variety of ploughs, which are in use in the different parts of the State suited to different conditions. They are all nevertheless made of one uniform type, that is to say, the working part which breaks the soil is a log of hard wood shaped so as to have a V-shaped cross section and tapering from the heel to the point which is reinforced with a flat iron point; they are all single handled so that the ploughman holds and presses the plough at this handle with his left hand, while the right hand is free to drive his bullocks; the beam is so fixed in the plough bottoms that the angle it makes with the latter can be widened or narrowed by driving a small wooden wedge or chip below or above the joint; by this means, the plough is adjusted to the size of the bullocks and depth of working. While this is the general type, the variations arise firstly, from differences in the size of the plough and secondly, the difference in the shape of the plough bottom and consequent differences in the attachment of the beam and handle to the plough. In sizes, three kinds may be distinguished:—

Implements
of tillage.

The general purpose plough used for all the dry land soils other than the black cotton soil. This is the commonest type and is intermediate in size between—

The general
purpose
plough.

The paddy
soil plough.

The paddy soil plough, which is a very light plough used to plough paddy land in puddle (very good examples can be seen round Maddur); and

The black
cotton soil
plough.

The black cotton soil plough used in the black cotton soil tracts which is the heaviest of the ordinary ploughs, and is worked with a pair of good heavy bullocks and sometimes, when it is specially weighted, with two such pairs.

Special
Malnād paddy
land plough.

In addition, there are other special types like the *Malnād* paddy land plough, good specimens of which can be seen in the Shimoga *Malnād* taluks, which is shaped with a cross section like an inverted V and further scooped hollow, so that it resembles a miniature ridging plough. It is even lighter than the wet land plough abovenamed.

The heavy
black cotton
soil plough.

The heavy black cotton soil plough used for very deep ploughing in the hot weather so as to destroy "hariali" grass (*Cynodon dactylon*) and requiring the use of four or five pairs of bullocks. Such ploughing is done only once in three or four years on the same piece of land. This has been almost abandoned in favour of large iron ploughs, of different types and by different makers. Messrs. Massey and Co. of Madras make a single mouldboard type for this purpose and Messrs. Kirloskar Brothers of Satāra make a heavy turnwrest type for the same purpose and both are in use in the black cotton soil areas of the Chitaldrug District and parts of the Shimoga and Kadur Districts.

Shape of
plough
bottoms.

The plough bottoms again differ according as they are bent up at the heel end or not. The ploughs of the Chitaldrug District have the most conspicuous bend or elbow and this plough can work deeper than others.

The ploughs in the southern taluks of Mysore have no such bend at all and lie practically their whole length flat in the ground when they work. The intermediate types are common throughout the State.

Reference has been made to the possibilities of improvement in the type of ploughs used ; the chief improvement lies in the introduction of the mouldboard plough which ploughs a rectangular furrow unlike the local ploughs which plough a V-shaped furrow. This latter fact renders it very uneconomical, for one has to do several ploughings with it before the land can all be stirred up once, an operation which a mouldboard plough can do in one ploughing, resembling in its action the ordinary spade which is a familiar enough tool to the raiyat. It will be interesting to speculate how the Mysore raiyat, shrewd and ingenious in many respects, has failed to exhibit these qualities in the construction of the plough, his most important implement. Be that as it may, it has opened out a great scope of usefulness to the State Department of Agriculture which has very successfully popularised more than one type of the mouldboard plough. Of these, several thousands are in use in the State and there is a keen and increasing demand for such ploughs. The number in use in 1919-20 was returned as 6,400. The favourite type among these ploughs is one which goes by the name of the " Kolar Mission " plough. It is really the American one-horse plough made in the United States of America ; only the plough bottom is imported and the light flat iron standard, wooden beam and flat iron handles are made and fitted together by the American Mission Institute at Kolar from whom the State Department purchases these ploughs. Though the Department has from the very outset set its seal of approval and been chiefly instrumental in the popularisation of this plough, much credit is due to the Rev. W. H. Hollister,

Improved
ploughs.

American Missionary and Superintendent of the Kolar Mission Institute, who started making these ploughs and continues to closely co-operate with the Department in this matter. Three other types of the mouldboard ploughs also deserve mention. Two of these are one-handled and resemble the country plough in this respect. Of these, one called "Eureka" is a product of the Kolar Mission; another called "Meston" is made by Messrs. Burn and Co., of Calcutta. The third is a comparatively heavy plough, being an American general purpose plough, called "Verity" and manufactured by the Massey Harris Co., of Toronto, Canada. The Kolar Mission plough has been copied by a number of local blacksmiths in the Bangalore District, who also sell a fair number of these annually. These blacksmiths also make and mend shares for this plough.

The Bar
Share plough.

Popular as these ploughs are, they are not without drawbacks serious even in the country of their origin, but decidedly so in a poor country like Mysore. Keenly alive to this matter, the Department has been striving to make improvements and what is known as the "Bar Share" type of plough made locally is the result. The chief object of the improvement is to fit the plough with a type of share that will do away with the necessity for its frequent renewal and the expense which such renewal means. The bar share fitted to a plough of the material and workmanship of the popular Kolar Mission plough is what is being aimed at.

Cultivators'
harrows: and
rollers, the
kunte.

The *Kunte* is a cultivating tool with four flat blades of iron tines or teeth passing through a horizontal log of wood which forms the frame. A couple of light wooden beams and a handle, both fitted to the frame complete the implement. It is used immediately after ploughing and is to be seen principally in the Bangalore and Kolar Districts.

The *Dodkunte* is a cultivating tool of a different type altogether. The type is, however, a great favourite with the Mysore raiyat and is very properly so as it is very efficient. This may be described as a bladed harrow; a heavy iron blade about two feet long and three inches broad is the working part; a heavy log of wood to which are attached the handle and the pole for the yoke forms the frame. It is about three feet in length and is provided with a couple of pegs or standards each about nine inches long and fixed one at each end of the frame both pointing forwards and downwards; to their free ends is attached the blade, so that the whole arrangement resembles a rectangular frame, of which the four sides are the blade, the two standards and the heavy log; as it moves along the ground, its long blade cuts through the clods, or through the surface soil according as it is used on ploughed or unploughed land, the half-broken clods pass over the blade and below the long beam which rides over and effectively breaks them up. The ploughman sometimes stands upon the log or weights it with stones to still further increase its effect. The implement is used only on the black cotton soils, and so is practically unknown outside these tracts.

The
Dodkunte.

The *Bōlukunte* is a much lighter type of the same implement having a longer and narrower blade and a lighter frame. This also is used only in the black cotton soil tracts; it is used at a much later stage when the field has been brought into fair tilth, so as to break small clods, smoothen inequalities of the surface and also break the surface crust.

The
Bōlukunte.

The *haluves* or harrows are of both heavy and light types. They all consist of a body with is a thick piece of wood about five feet long and six inches square and of a number of teeth fixed to it in one line. The teeth are of

Haluves or
harrows.

iron in the harrows used on the wet lands under wells in the Eastern districts; or they are made of stout wooden pegs as used in all the districts in paddy fields; or they are of light bamboo, which are used in smoothening the seedbed of ragi in all dry lands and to break a surface crust.

The *Danti* or
hand harrow.

A curious harrow for manual power is the small bamboo harrow called *danti* which is used in paddy fields in the Kolar District; this type of harrow has a long handle fitted with a flat cross bar at the end against which the workman presses his breast and pushes the harrow forward something in the manner of the old fashioned breast plough used in England.

Brush
harrows.

A brush harrow called *Yelave* or *Yetta* is made of thick brushwood tied together and weighted. It is dragged over ragi fields soon after sowing in order to cover the seed. It is used in all the Eastern districts.

Clod crushers
and levelling
boards.

Clod crushers or levelling boards called *mara* are also used; they are either a heavy wooden plank or a rough log when used on dry land fields. In the wet land fields of the *Malnād*, they are made of wood in the shape of a long trough, trapezoidal or semi-cylindrical in the section, and dragged over the soft mud of the paddy field with the open face downwards; another plank leveller used in these parts is the *nolimara* which is also a narrow plank of wood drawn not flat but end on. All these are made about 4 to 5 feet in length, and are provided with holes for passing the ropes through for dragging. They are always worked with bullocks.

The *moodala*.

The *moodala* is a three tined hoe used in the Shimoga and the other western districts, the tines being pointed wooden pegs reinforced with an iron point. It is used

to make furrows for sowing ragi in the special method of sowing ragi mixed with manure prevalent in those parts.

The seed drills in use are also admirably simple imple- Seed drills.
ments; they are all of one general type. They consist of a hopper, seed tubes and furrow opening tines. The hopper is made of a hard black wood, in the shape of a double cup joined base to base like a peg measure, the construction in the middle being not so great. Holes are drilled in the hopper from the funnel-like bottom of the upper half towards the periphery of the lower half so that the holes are situated in a circle close to the rim of the bottom of the hopper. The seed holes are three, six or twelve in number. The seed tubes are of bamboo and connect up with the holes in the hopper above and with holes on a long wooden beam below, which carries the furrow opening tines. The whole arrangement is rigidly fastened by means of ropes; the tines are sometimes hollow in which case they open the furrows and pass the seeds through. There is a tendency to irregular sowing with this type as the tines frequently choke with earth. In another type, the tines are solid and merely make the furrow in which the seeds drop either through holes in the beams to which the seed tubes are attached or through a hole cut in the furrow opening tine itself high enough to clear the soil. The drills in Bangalore and Kolar are twelve-tined, the tines being 4" apart. In Maddur and Channapatna, they are six-tined about 6" apart. In parts of Tumkur and Chitaldrug, they are four and three tined.

Another sowing arrangement is a *sadde* which is a Sadde and mixed crop sowing.
kind of one tined drill; it has a hopper fixed to a long seed tube; the *sadde* is usually tied behind a plough, or behind the cotton sowing *Kuriges* for the sowing of large seeds like *avare*, *togare*, paddy, cotton and so on. The

various mixed or *akkadi* crops are always sown through the *sadde* which for this purpose is tied behind the *kurige*.

Intercultur-
ing imple-
ments, *Chippu*
kuntes, *Yede*
kuntes.

Interculturing implements called *Kuntes* and *yede kuntes* are also made in many patterns. The *chippu kuntes* are hoes with two to four flat bladed cultivating teeth; the *yede kuntes* have two tines, which are shaped like an L with their feet pointing towards each other so that they really look like a miniature bladed harrow. Bladed harrows of the *Dodkunte* type but much smaller are made in different sizes to suit the width of the crop rows; the one used for cotton and called *hatti* or cotton *kunte* is about 18" in breadth, similar ones are made for *haraka*, chillies and other dry crops principally in the Chitaldrug District. They are very efficient in their work both in breaking the surface crust and in thoroughly destroying the weeds in their track. Some of the *yede kuntes* are used in sets of two and even three, all of them hitched to only one yoke with one man to work each of the *kuntes*; ordinarily, however, they are used singly.

Monekuntes.

In certain taluks of Mysore such as Chamrajnagar, Gunlupet and Nanjangud, can be seen hoes called *Monekuntes*; in these, the two tines converge and end in a common blade of iron; they are used in pairs being held close together by the workman who is able to drive the bullocks as well.

All the hoes except the *hatti*, *haraka* and other *kuntes* of that special kind are about 10 to 12" in length and very light.

Hand hoes
and weeding
hooks.

Hand hoes and weeding hooks are of many patterns; the *ujari* and *vorvari* are little blades with suitable handles which are worked with the blades pointing forwards, *i.e.*, away from the workman; the *Kai guddali*,

used mostly in garden cultivation, and the *kale holu*, used in the Mysore District, are little hatchet-shaped implements the former with a long narrow blade and the latter with a short axe-like blade; they are adapted for working like a digging tool, *i.e.*, with their blade pointing towards the workman.

The harvesting tool is only the sickle; threshing is done by the time honoured methods of beating with sticks in the manner of flails and of trampling out the grain under the feet of oxen. Within the last ten years however, in the districts of Chitaldrug, Kolar and Bangalore notably, a stone roller is used for this purpose. This is about 2'-6" long and about 1'-9" in diameter and fitted with an axle and a frame work to attach a seat for the driver and a yoke pole for the oxen. This roller is drawn over the sheaves round and round and the grain is threshed out. Though used at first for the threshing of *jola*, it is now used throughout for ragi as well; the Mysore District, though a *Jola* growing district, has not yet taken to the method, a curious instance of the slow pace at which improvements travel.

Harvesting,
threshing and
cleaning
appliances.

Appliances for winnowing, cleaning, gathering grains, carrying straw, etc., are also very simple and homely, though not without interest. The winnowing tray, a shallow basket called *Mora*, having a rim only on three sides, is very cleverly handled, and can be used at once for the winnowing of chaff and dust, for separating grains of different grades and for cleaning the grain from earth, fine gravel, etc., with a deftness appropriate to each operation. Wicker or bamboo sieves, both large and small, are also used to sift grain, the larger resemble a child's cradle and are used by rocking to and fro. Metal sieves are slowly coming into use. The hand rake of bamboo and large slings or string baskets for carrying straw are other appliances seen on the threshing floor.

Farm carts :
General
purpose carts,
solid wheel
carts.

Of the farm cart can be seen many interesting types. They are all of the two-wheeled type and nowhere are four-wheeled ones made, though it is not uncommon to have more than one pair of bullocks hitched to a cart when the load requires it. The general type of farm cart has ordinary wheels, *i.e.*, with spokes and felloes. They are of medium height, constructed of sound timber, well braced, and generally have a substantial well made appearance. In T.-Narsipur, Chamrajnagar, Gundlupet and that neighbourhood, the carts have low solid wheels; these are so low in fact that they are eminently suited to the rough uneven ground of the countryside, for there is practically no risk of the cart being tilted out of balance. The receptacle for holding produce or manure and other material in the cart is a bamboo crib made either large or small according to the size of the cart; or more often the receptacle is made with wooden or hurdle sides.

Sappe Gādi :
sleds.

In Chitaldrug and Shimoga can be seen carts of a special type which are fitted together only at harvest time; these, called *Sappe gādi* (cart for *Jola* stalks), have a pair of massive solid wheels with an iron tyre three or four inches in thickness; a couple of wooden brackets (being the remains of an old wooden plough) fixed over the axle tree enables a frame to be put on so that the load may clear the wheels. Laden with a huge load of *Jola* stalks placed crosswise in the cart and fastened down tight with leathern ropes, they are being drawn by two or more pairs of heavy bullocks; this is a curious relic of the spacious times when iron and leather were cheap and articles were made to last for an age; for the wheels and ropes of many of these raiyats are really generations old. At the other extreme can be seen also little sleds made by mounting the heavy timber of a *Dodda kunte* over a couple of old plough bottoms fitted sledwise; on these manure baskets, fodder, thorns for

hedges and other odds and ends are drawn along mostly by hand. These can be seen in the Maddagiri, Sira and other eastern taluks. Wheel barrows are nowhere seen; the sleds and low solid wheel carts described above which are practically sleds are their equivalent; small loads are carried in headloads in baskets.

Appliances for the baling of water for irrigation are of two kinds, *i.e.*, those suited (1) for manual power, (2) for bullock power. Water lifts.

The first one is the familiar *picota*, which is a long lever mounted on a central vertical fulcrum; one end of the lever is suitably weighted and the other end carries the water bucket tied to a long bamboo. The weight at the rear end is heavy enough to be of help to the man to raise the full bucket and is at the same time not too heavy when the empty bucket is lowered. In order to further assist the man at the bucket, ropes are also tied on one or both sides of the central pivot at which a second man pulls now the one and now the other as the bucket is raised and lowered. In wells of very low lift, the lever is fairly broad, with steps cut on it, along which men can walk up and down. The buckets hold only about three gallons and even then the work is hard. The wells of the Kolar and Bangalore Districts are mostly *picota* wells. The *picota*.

The *Kapile* lift is of the second class and is adapted for bullock power. The bucket is lowered and raised by the bullocks walking up and down a steep ramp, pulling the bucket by means of a rope passing over an elevated pulley. The bucket is made out of leather and is circular in shape with a wide and long leathern hose stitched on to the bottom of the bucket. As the bucket enters the water, both bucket and hose fill; they are pulled up by The *kapile*.

two ropes, one tied to the mouth of the bucket and the other to the tail end of the hose in such a manner that the hose bends like a U and bucket and hose come up full; when the arrangement comes to the top, the hose or tail rope is pulled and the hose straightens out emptying itself and the bucket with great ease. The buckets hold from 30 to 50 gallons, and either one pair or two or three pairs of bullocks are used; one pair raising the full bucket walks smartly down the steep incline, at the bottom of which it is released to walk up along a less steep incline by the side and take its place again at the yoke for the next downward journey. Two pairs are, however, usual each taking its turn alternately and the driver himself walking up holding on to the rope when the bucket is lowered.

Improved
kapiles.

All the large irrigation wells are provided with the *Kapile*; the work is however so hard, and *kapile* fittings especially leather has become so expensive that improvements are welcomed, and keenly examined as to their merits. A few stray instances may here and there be seen of other types claimed to be improvements; for example, the *Noria* or the Persian wheel type; the *kapile* type adapted to a circular motion of the bullocks on the level along a circular track, in which the bucket rope winds and unwinds round a large wooden drum; the "Stoney" patent lift with its additional improvement in the type of bucket used; all these have been tried but none has taken on as they lack the many-sided merits of the *kapile*.

Engines and
pumps.

It has been somewhat different with the pumping outfits being popularised by the Sate Department of Industries. The increasing cost of bullocks and their keep, and the heavy and tiresome work at the *kapile* wearing out both man and beast form a strong argument in favour

of their displacement by some mechanical power, provided the new appliance is not very costly in initial outlay or in the working charges. Engine-driven pumps have had some chance therefore with the larger farmers who could afford the cost and in places where the supply of water is satisfactory. Several outfits both large and small have within the last ten years been installed in the State. At Shimoga and Harihar, the pumping is from the river while in other parts it is from wells. The largest number within a small area is on the banks of the Jayamangali river in the Maddagiri and Koratagere taluks. As during the great War, not only machinery of all kinds but also Kerosine and crude oil rose abnormally in price and for many months the latter could not be had at any price, the movement received a serious check. Electrically driven pumps are being installed at Kankanhalli along the banks of the Arkāvati river in the area lying close to the switch house on the main electric transmission line. This scheme which is pushed forward by the State Department of Electric Engineering is full of promise though the area of its application is limited. It must be observed that the larger farmers of the State have shown very commendable enterprise in this matter demonstrating that they are by no means indifferent to even costly improvements.

This section may be closed with a description of the farmstead. It has already been mentioned that with the exception of the *Malnād* garden owners, few raiyats live out on their land. They live together in compact little villages whose size and lay out and the disposition of the houses therein have been decided principally by considerations of safety. The requirements of a real farm house are impossible of being satisfied under these conditions. The raiyat further increases his own individual safety by constructing a house not only approximating to the type

The
Farmstead.

of a strong box, but also one that by its outward appearance could never tempt the cupidity of the robber or the tyrant. This stronghold is shared in common by the raiyat and all his belongings including his cattle. The general type of house is made up of a suite of apartments for the family and a row of stalls for the cattle. These stalls may run along only one side of the house in which case it is generally the front, or along two or three sides. The stalls open into the interior, that is, they possess no walls on the side facing the dwelling rooms, from which they are separated by an open yard. The stalls are occupied by the farmers' horned cattle; a portion is shut off by hurdles for sheep. The ploughs, cultivators, hoes and other implements are housed generally in a kind of attic in the stall above the cattle, or when the stalls are flat roofed, are stowed in a corner of the house.

Cattle stall.

The stalls also serve for the washing and bathing for the family and for all the household work other than the cooking. The grain bins when the grain is not stored in underground pits (see under Ragi) are also constructed in this portion of the house. The houses in the districts of Bangalore, Kolar, Tumkur and Chitaldrug are usually flat roofed, and in many cases even the portion which would correspond to a yard is covered in. The front door, a window sometimes and an opening in the roof at the kitchen to allow the smoke to escape are the only ways through which air and light can circulate. In the western taluks of Bangalore, throughout Mysore and the other western districts, the houses are seldom overcrowded in this manner, there being both open yards and detached cattle stalls. Many of the rich *patels* and land-lords have their cattle in a separate farm house altogether. The houses in these districts are also provided with a narrow veranda in front.

The manger for the cattle usually runs along the wall or along the middle of the stalls. The mangers are often only a framework of wood or bamboo; sometimes they are built of mud. Mangers composed of long wooden troughs mounted on an earthen platform or wooden frame work may also be occasionally seen. In the latter case, the dry fodder, *viz.*, jola stalks, is put into the troughs and water is run in, in which the fodder soaks and becomes soft. Water for the cattle is provided in large earthenware pots sunk in convenient intervals along the manger or in one common spot; but being all the time under the eye of the raiyat or his womenfolk, the cattle never lack attention.

Manger and feeding arrangements.

The floor of the stalls is only damped earth, rarely paved; no bedding is provided; and the urine merely soaks into the ground, or collects in a depression in the stall. In the Bangalore and Kolar districts, however, a little of the cattle dung is put out to dry every day and in the evening is strewn on the floor of the stalls as a bedding for the animals. The stalls are cleaned out every morning. In the Malnād, however, the cattle are housed in what may be called box stalls, a litter of green leaves is provided every evening and the manure is allowed to accumulate under the feet of the cattle; the manure is removed only when the level rises inconveniently high; sometimes the clearing takes place at frequent intervals, which is a mercy to the cattle. Excellent manure is the result, but the cattle are tormented by a plague of flies by day while the wet and sodden manure on which they lie at night, by no means tends to their comfort.

System of manure removal.

Ragi is stored underground in pits called *hagēvus*. These are excavated in front of the houses, or in front of the temple or other large open space in the village or in the raiyat's field outside the village altogether.

Grain store.

The system is in vogue only in villages where the soil is such that there will be no fear of water percolating into the pits. They are in shape like a large pot, the body being very large and the neck very narrow. They are made of all sizes depending upon the extent of a man's holding; the largest will hold from 200 to 300 pallas of ragi. The neck usually about 2 to 3 feet in depth is just large enough for a man to get down through. Before filling the ragi, the pit is cleaned and swept clean, the bottom and sides are lined with some straw and chaff and ragi, well dried, is filled in. The mouth of the pit is covered with a stone slab and then with earth. If the soil is quite dry and hard, ragi is said to keep well in these receptacles for many years; but considerable grain in the outer portions, *i.e.*, the top and sides goes bad even in the best of situations; should however water for any reason have got in, the ragi ferments so badly that it emits a most offensive stench. Ptomaines are said to develop under such conditions, fatal to people who may happen to use it as food.

Masonry and
other above-
ground bins.

Jola is also likewise preserved in pits of the same kind but is not kept more than a year. Where these underground bins are not excavated, the grains are kept in bags, or in large earthenware or wicker bins; occasionally in the large houses of families of consequence may be seen large soil-like masonry bins for storing grains. Paddy is stored in large rectangular masonry or wooden bins of the size of an ordinary room; mostly these bins are located above ground and have a draw-hole at the base made to open and shut by a rather clever device, through which grain is taken out when wanted.

Seed
preservation
methods.

Grain and pulses meant for seed are thoroughly dried in the sun, cleaned and winnowed and screened and then preserved in special receptacles called *Moodes*; these are

either cylindrical in shape made out of paddy straw or flat and pot shaped and made of straw twist; in these, grains are preserved as such and pulses are preserved with some ashes, chillies and chaff. In the Mysore District *moodes* of the first type can be seen, while in Chitaldrug and Shimoga, the second type can be seen.

It is said that grain is not stored to the same extent as it used to be many years ago—a result due to the modern facilities for extensive trade and quick and safe transport; this is probably true but the different types of store houses are by no means curiosities and are largely in use everywhere in the State.

The excreta of oxen and sheep form the chief if not the sole manure used in the State. Raiyats generally keep more cattle than they can properly feed and look after, principally with the object of increasing their manure supply. The quality of the manure so made is exceedingly poor on account of the meagre and innutritious feed which most of these animals get and of the careless manner in which the manure itself is collected and preserved. The pasture lands attached to the villages are not only shrinking in area owing to the extension of cultivation but are in a hopeless state of neglect; they are naturally situated on the high lying parts of the village, as the more fertile areas are taken up for cultivation; they are cut up by gullies and streamlets along which such soil as exists is washed down yearly during the rains; they are overgrown with jungle vegetation, and being the common land of the village, it is nobody's business to bestow any attention in improving the pasture lands. While in the rainy season some grazing is available, in the dry months they are absolutely bare of grass. Concentrated feed for cattle is out of the question, the raiyat being too poor to afford it for any except his best or working cattle. The result naturally is a manure of

Manures :
Farmyard
manure.

very poor quality. Further, as we have already noticed in the raiyats' method of housing his cattle, the urine is practically all wasted; the Malnād where owing to the use of green litter the manure is of good quality and the Maidān taluks where dry cow-dung is used as litter are exceptions. After the manure is removed from the stalls, be it every day as is done in the Maidān districts or periodically as is done in the Malnād, the manure is kept in open pits outside the village principally along the margin of the village approach. In these pits the manure lies exposed to the weather, drying in the sun, and being leached in the rains till it is carted to the fields at the commencement of the cultivating season. In some of the taluks of Mysore, Bangalore and Tumkur, it is usual to cart earth either from the dry tank beds or good red earth from the fields to the manure pits where the manure is covered by a thick layer of this earth. When the pits have to be emptied, this earth is well mixed with the manure and then carted.

Sheep
manure,
sheep folding.

The excreta of sheep and goats are highly esteemed as manure and are much sought after. The ordinary raiyat is a mere arable farmer, and he either keeps no sheep at all or only a small number. Herds are kept by a special class of agriculturists called *Gollars* or graziers at whose farms considerable manure accumulates, and is often sold to farmers round about. The *Gollar* farmers are generally reputed to be very successful farmers, mostly on account of the large quantities of sheep manure they are able to use on their lands. The taluks of Mandya, Malvalli and Nagamangala in Mysore, the whole of the Chitaldrug District, the taluks of Sira, Chiknayaikanhalli and Gubbi in Tumkur, and the eastern half of Kolar are the sheep raising tracts of the State. The larger arable farmers in these tracts also keep herds which are usually in the charge of graziers and roam about in the jungle during

the cultivating season and come to the village after harvest. They are then folded on the fields, where the green stubble affords some pasturage. In these tracts it is very common for farmers to hire herds of sheep to be folded on their fields; the consideration is partly the stubble which in the case of fields of cotton is considerable, but more often is a money payment, the sheep grazing where they can in the day and being folded on the raiyat's field at night; to fold a 1,000 sheep for a night the raiyat usually pays Rs. 5. In these districts land ploughed up for sugar-cane or meant for grain and other crops under well cultivation is heavily manured in this manner.

Of the excreta of birds, a noteworthy manure is that of bats collected from caves, abandoned temples or ancient trees and similar haunts of bats. It is esteemed to be a very good manure and is used when it can be got by the growers of water-melons in the bed of the Tungabhadra in the Harihar Taluk. Other bulky manure.

Round Bangalore and Mysore, the use of human excreta as manure is in great vogue. The ragi fields of the villages adjoining the Bangalore City and Military Station are heavily manured with night soil; the Municipality systematically auctions the right to collect the manure and every morning the City refuse is carted away by raiyats to whom contractors sublet the right. The paddy fields and sugar-cane fields round Mysore and Seringapatam likewise are manured with the same material from the Mysore City. Night soil.

Sewage also is utilized for its manurial value by the market gardeners of Bangalore. Sewage.

The silt from tank beds is another favourite form of enriching cultivated fields; as the dry season when the Tank silt.

silt could be had coincides with the slack season of the raiyats, this source is seldom neglected, especially when the cultivated lands are inclined to be sandy and the raiyat feels he could improve them by carting silt.

*Sudhi
mannu.*

The earth from old village sites is also utilized in the same manner. This is a light ashy coloured earth excavated from these sites and contains mixed with it potsherds, bits of bone, kankar, etc., and goes by the name of *sudhi mannu* or ashy earth. It is much used in certain villages of the Dodballapur taluk and elsewhere also wherever such earth is found, as the raiyat knows its value. Some samples analysed showed they were rich in lime and phosphoric acid, evidently due to the decomposed bones in the earth.

Ashes.

Ashes of all kinds are freely used as manure and in fact constitute the sole manure supplying potash.

Lime.

Lime is nowhere used as a manure though it occurs more or less extensively throughout the State. It may in fact be said to be the one local product of importance whose manurial value is not known to the raiyat.

Green
manure :
Honge topes.

The other important source of manure is green manure. Green manures are used largely and almost solely for paddy lands when they are cultivated in puddle. This practice takes the form either of cutting and carting leaves and twigs from elsewhere to be ploughed into the field or of growing a green manure crop in the field itself to be ploughed into it as manure. The first one is the more general practice. The leaves most esteemed for this purpose are those of the honge tree (*Pongaima glabra*). This is the one tree which is regularly and extensively planted for the sake of its use as manure for paddy land. Practically all tank bunds, *i.e.*, the unriveted

side facing the fields are planted with *honge* trees, where they serve a double function, their roots helping to bind the earthwork and their leaves being used as manure. Likewise the natural water courses which are the feeder channels to the tanks and the shallow portion of the catchment are also planted where they also extend by natural agencies; here too they serve the additional function of acting as silt traps. In the Sira and Maddagiri taluks of Tumkur, and in Hiriyur, Challakere and Molakalmuru of the Chitaldrug District can be seen regular plantations of these trees, planted by raiyats on their dry land holdings from which leaves are cut and used on their wet lands or sold to others. They are also planted as avenue trees. In Kolar and Tumkur there is also much natural growth of this tree in the fertile sandy valleys where underground moisture abounds. High prices are paid for the leaves and raiyats go long distances to cut and cart them. In Sira it is usual to apply from 100 to 300 headloads per acre, about 25 headloads going to a cartload. Such manuring will cost from Rs. 12 to Rs. 36 an acre. Trees in these tracts are severely pollarded every season, but in the moist situation where they grow, fresh growth is free and rapid.

In addition to the leaves of the *honge* tree, other leaves are also used, but in a very minor degree and especially in the Mysore District; these are tangadi (*Cassia auriculata*); yekka (*Calotropis gigantes*) said to cure alkalinity and neem (*Melia azadirachta*).

Other leaves
used.

The practice of growing a green manure crop for being ploughed in is confined almost entirely to the Mysore District. The paddy fields are ploughed up soon after harvest as soon as the field is in a fit condition for ploughing; and in the first rains (Bharani) towards the middle of April a mixture of sunn hemp, horse-gram, cow

Paddy land
and growing
green manure
crops.

pea, green gram and black gram is sown; by about the month of July, the pulses are ready to pick and a more or less fair crop is harvested according as the rains have been good or not. It is then partly fed of by bullocks and the remainder is ploughed in into the puddled field. If the green crop is sown late and does not mature by the time water is let into the channels and the fields are to be puddled, it is ploughed in without waiting for it to mature a crop. In recent years through the efforts of the State Department of Agriculture the practice has been copied in the other districts as well, and every year the Department sells large quantities of sunn hemp seed for being sown as a green manure crop not only in paddy fields but also in the cocoanut and areca gardens. As the fields are nowhere enclosed, it is essential that all the raiyats owning land under a tank should grow the crop, otherwise the enterprising pioneer is greatly handicapped; for the green manure has to grow at a time when the country side is dreary and not a green blade is seen anywhere; and single handed he will have to guard the green crop against the village cattle which is practically impossible.

Insufficiency
of manure
supply.

These exhaust the natural or farm made manures of the raiyat. Even with the best efforts of the raiyats, there is not enough cattle manure to go round; but his wasteful methods make the situation worse. Added to this is the custom of using dried cow-dung as fuel. This practice is universal in the country, and the quantity of useful manure which is burnt away in this manner should be very great in the aggregate. In the neighbourhood of the cities of Bangalore and Mysore, particularly the latter, the demand for this fuel is very great and the villages round about are depleted of this material; the same is the case in the black cotton soil tracts of Chitaldrug where fuel is very scarce and the deficiency has to be

made up by this special kind, which in this tract is collected and preserved carefully and a supply put in for use during the rainy season. The opening of Sandalwood Oil Factories in Mysore and Bangalore and a large number of cotton gins and presses in Davangere has certainly made fuel which was scarce and dear enough, much more so in these places. In the extensive cotton growing tract round Harihar and Davangere, it will be no uncommon sight to see even *jola* stalks which are meant for fodder, being used as fuel, the scarcity being so great. There seems, however, to be no way out of the situation which would put an end to this custom and set free all the cattle manure for its legitimate use.

Among commercial or purchased manures used in the State, the most important are the oil-cakes. The use of oil-cakes is, however, confined to the sugar-cane cultivators of the Bangalore and Kolar Districts. As the country produces a variety of oil seeds and as oil-cakes constitute the cheapest nitrogenous fertilizers, the State Department of Agriculture has been making great efforts to popularise its use throughout the State. A very large quantity is sold through the agency of the Department and through private merchants. For sometime, the oil-cakes were also being sold by the Department to raiyats on a twelve to fourteen months' credit so that the purchase money was paid back after the sugar-cane crop was harvested and milled.

Commercial
Manures:
oil-cakes.

The oil-cakes in use at the present time are those of *honge*, castor, and the ground-nut. Until about fifteen years ago, with the sugar-cane growers of these two districts, the favourite and practically the only kind of oil-cake purchased used to be the oil-cake of *honge*. The seeds of this tree are gathered and milled in the ordinary local wooden or stone mills or *gānas* of the village

Oil-cakes
produced
locally.

oil-monger and the cake which comes out in large heavy lumps is sold to the raiyats. Castor, though grown largely and also used for the expression of the oil locally, is treated somewhat differently for this purpose. The local method of obtaining the oil is to grind down the seed, mix the pulp with water and boil the mixture; the oil cells rupture and the oil rises to the top whence it is ladled out. The refuse, after the oil is removed, is therefore obtained in the form of a semi-liquid mass, and not being in a fit condition for commercial handling is usually thrown away in the manure heap. A fair amount is also milled in the stone *gānas* like other oil seeds but with the introduction of screw presses in the Bangalore City, about fifteen years ago, castor oil-cake began to come into the market largely and has been available to the raiyats. It must be said to be quite as popular as the *honge* oil-cake. During the last 5 or 6 years, ground-nut is being milled largely in the State and the oil-cake is becoming available for use. This cake is being popularised very largely by the State Department; there was some prejudice against its use by raiyats, but this has now been overcome and its use is steadily increasing. The new Anderson Oil Expellers installed in Bangalore produce cake in the form of thin flakes which are very easy of powdering and this forms therefore an additional recommendation in favour of this cake. Due chiefly to the cheap and convenient electric power available in Bangalore, several small mills of the rotary type have also come into existence, further increasing the supply of oil-cakes of all kinds. Neem cake can be made in large quantities, for in many parts of the State neem trees have been largely planted as avenue trees; but except in the Mysore District, little is made, and even there, it is made only in small quantities in the houses of the raiyats.

purchased manures, both oil cakes and the artificials referred to below, are used. In fact, for the latter kind of manures outside of these estates, there has been little or no demand. The manure works at Hunsur and Bangalore supply powdered oil-cakes of different kinds to these estates, while from the West Coast, Coimbatore and the Manure Works at Ranipet near Madras, large quantities are also imported.

The raiyat seldom goes to the trouble and expense of powdering the cake he uses. The heavy lumps, in which form the country *gānas* turn out the cake, are hard to grind to powder, and the raiyat merely chops it up into small lumps about the size of one's fist; when sugarcane rows have to be earthed up, he places one or two such pieces under each clump of cane where they are covered with the earth thrown up. It is also common to soak the cakes over night in water in a pit situated at the head of the water channel in the cane field; the cake crumbles down and mixes with the water into a sloppy mess, in which condition it is taken out in potsful and let into the furrows.

Method of
using
oil-cakes.

Bonemeal comes next in importance, but except on the Coffee Estates is used only to a very limited extent. Bone crushing mills exist both in Bangalore and in Hunsur, from which the supply is derived.

Bone meal.

The State Department of Agriculture has been demonstrating the value of Sulphate of Ammonia, of Superphosphates and other chemical fertilisers. Special mixed manures suitable for paddy lands, cocoa-nut gardens, potatoes and such special crops are also made by the Department and sold to raiyats. The paddy lands in Yedatore Taluk in Mysore, Hole-Narsipur in Hassan and in the Hoskote Taluk in Bangalore are noteworthy areas where these manures are used for paddy; the

Artificial
or chemical
manures.

cocoa-nut manure mixture is being taken up in the Tiptur Taluk of Tumkur. There are unmistakable signs that the raiyat is beginning to appreciate the value of these new fertilizers; even the prejudice on religious grounds against handling bone meal which exists among the high caste cultivators is slowly wearing down; the high price of produce of all kinds is also acting as a stimulus. If fertilizers could be made locally and their cost lessened, large quantities would be taken up for use. Oil mills are increasing in number and a notable one is a plant being erected in Tumkur for the extraction of oil by the use of benzene. Under the Krishnarajasagara Dam, it is proposed to start the manufacture of calcium cyanamide by the aid of electricity; provision has already been made for the installation of plant for generating electricity at the dam. The manufacture of steel at the large State Iron Works at Bhadravati, in the Shimoga District, will no doubt bring into existence a number of by-product plants for the production of basic slag and of ammonium sulphate. As manures constitute far and away the most important means of increasing production, these activities are full of promise to the improvement of Agriculture in the State.

Forms of
Tenancy.

Under the overlordship of the State, the land is held under different kinds of tenures in all of which the landholder pays a fixed money rent to the State which absolves him from all further obligations, and confers on him full proprietary rights in the land. An account of these different tenures appears elsewhere. We shall deal here with the various methods by which the actual landholder himself gets his land cultivated, *i.e.*, whether he farms it himself or lets it out to tenants, and if so, the conditions under which he lets it out.

In the old days when the village communities were practically agricultural corporations, things seem to have

been so arranged that each farmer had a share in the dry, wet and garden lands of the village. Conditions have, however, vastly changed and the ownership of land has changed hands bringing into existence a large class of absentee landlords and of resident landlords who have taken to other occupations more lucrative than agriculture.

Broadly speaking, it may be said that all the dry lands are farmed by the owners themselves. Their number is obviously the largest in the State and they also constitute the small holders. The cultivation of ragi, which is the main crop on these lands, has to be looked upon as the means of the people's food supply and not as an undertaking of any commercial value, *i.e.*, as a venture in which one can invest capital with the hope of earning a fair return on it. Taking a good season with a bad one, the ordinary dry land cultivation is not such that if every item of the raiyat's labour on the crop, from the preparation of the land to the marketing of the produce, is valued at market rates for manual and bullock labour, any respectable margin of profit can be expected. It, however, provides food for the raiyat and fodder for his cattle and where the area farmed is not very small, furnishes a modest competence which, combined with his innate desire to cling to his land and his village and to the profession to which he is born, is enough incentive to keep him on the land. Much capital is not required and with a little co-operation from his neighbours at the busy season, he is just able to carry on. Such raiyats possess little or no reserve and money borrowed for marriages and other domestic celebrations is seldom capable of being paid back by an actual money payment.

Dry land farming.

Similarly, the most lucrative form of agriculture such as gardens and plantations, are also owner farmed; areca-

Gardens and plantations.

nut gardens, cocoanut gardens, and coffee plantations are farmed by the proprietors themselves. When the properties are small, the owners themselves work ; in the case of the larger properties, paid labour is employed. Much capital is, however, required as the expenses of digging, watering, etc., are heavy and the garden owners also belong to a better class of people whose standards of living are somewhat higher and their domestic expenses greater. Though they own very valuable properties, it is stated that a large number of them are heavily indebted.

Wet land
cultivation.

Paddy and sugar-cane lands are almost invariably let. They are for one thing generally in the hands of people who do not belong to the farming class, or who though they may belong to this class have given up farming, being either too well-to-do or having other and more lucrative occupations. Being very valuable lands, they are the most favourite form of investment, and are so costly that they are seldom within the means of the ordinary farmer. The extensive paddy lands in the Cauvery valley in the Hole-Narsipur, Yedatore, Mysore, Seringapatam and T.-Narsipur Taluks are to a large extent owned by the absentee landlords and are keenly sought after, on account of the certainty of the paddy crop and therefore of a fair return on the money with the best of security.

Lands in
Jōdi villages.

In the *Jōdi* villages, the dry lands are let out to tenants who as long as they pay their assessment enjoy all but proprietary rights ; the wet lands are kept by the *Jōdidār* himself and are invariably let out by him to his own dry land tenants in the first instance, and to other villages if necessary.

Fixed
produce rent
on paddy
land.

The rent in such leases is always in the shape of produce ; it is either fixed as a share of the produce

which varies a great deal according to circumstances, or a definite quantity of the produce. The latter, called *Gutta*, is the simplest form next to a money rent. It is the one resorted to always by absentee landlords, and is commonest in the paddy tract of the Cauvery channels. The landlord does not trouble himself about the treatment the soil receives; he never supervises or dictates, as a matter of fact, it is not uncommon to find landlords who may not even have seen their fields. The lessee delivers the stipulated quantity of paddy at harvest, and oftentimes is trusted sufficiently to sell it himself and remit the money to the landlord. Leases usually run for a period of three years at a time; longer periods are not uncommon but shorter periods are rare. The *Gutta* varies from one *khandaga* (a *khandaga* of 180 seers) of paddy up to five *khandagas* which may be said to be practically the maximum. When the lands are very fertile and competition is very great, it may go up to seven *khandagas* of paddy. The straw is all taken by the tenant and so is any pulse crop which he may grow as a catch crop. This rent will work out to be almost a half share of the gross produce; the landlord pays the land assessment, and other Government dues such as road cess, out of his share and the tenant pays all the expenses of cultivation. This rent should be taken to be very fair, all things considered. A resident farmer can, and many do actually, obtain considerably more out of their land farming it themselves; as a matter of fact, many lessees sublet the lands for a higher rent and earn the difference as their profit chiefly because they are local residents able to exercise considerable judgment in choosing tenants and supervising the cultivation; but a man whose business is not agriculture and who therefore looks upon his paddy land purely as an investment readily foregoes any such possible enhanced rent in view of other conveniences. The raiyats too further protect

themselves against unreasonable enhancement by refusing to take up such land altogether.

Produce
sharing on
paddy lands.

In the other system where the rent is fixed as a share of the produce, with regard to paddy lands under tank irrigation whether in Government or in *Jōdi* villages, the half share system is almost universal. Land let out in this manner suffers greatly from neglect; and as an investment such land should be deemed poor, unless one farms it himself. The tenant looks upon this paddy land more as a certain source of fodder for his cattle than as a source of grain. His energies are all directed to his own dry lands in the first instance and the paddy land is taken up last; little or no manure is used, and only such attention is paid as can be spared from his all important dry land farming. The scope for increased production with better attention is comparatively great in these areas.

Produce
sharing on
sugar-cane
land.

In the case of sugar-cane, the land is let generally on the condition that the landlord provides the seed and the oil-cake manure; the raiyat undertakes the complete cultivation; the milling charges are borne equally and the produce is also shared equally. This is the commonest form. Sometimes the produce is divided in the proportion of $\frac{2}{3}$ to the tenant and $\frac{1}{3}$ to the landlord, the landlord's liability being the same as in the first case in places where competition for sugar-cane land is not great. In certain parts of Kolar, it is also usual for the tenant to give one boiling in six to the landlord, the latter paying nothing more than the assessment. This is only a kind of *gutta* adapted to sugar-cane cultivation.

Produce
sharing on
areca gardens.

In the case of the areca-nut gardens of the *Malnād*, longer leases are common; the *gutta* is fixed at so much per 100 bearing trees and will generally work out as

1/3rd of the gross produce; leases run for ten years and longer; and strict conditions regarding the carrying out of the customary digging, manuring, etc., yearly are specified in the leases. The expenses are reckoned to amount to 1/3rd of the gross produce and the remaining 1/3rd becomes the share of the tenant.

For labour on the farm, both permanent and casual labour are employed. Permanent labour is generally such that the labourer is bound to work for the employer for a period of many years if not for his life time. In the olden days, in the *Malnād* especially, the system of serfs attached to the land existed. Though absolute serfdom has long ago been abolished and the labourer is free to hire his services to whomsoever he chooses, still by a kind of mutual agreement, the labourer and his family reside permanently in the farmer's land, the farmer finding everything for the labourer, his food, clothing, and ready money for petty luxuries, and also incurring the expenses of the marriage and other domestic events of his labourer. All this is counted as an advance against the labourer to be reckoned up should he show any inclination to quit, but he seldom drives the employer to this necessity.

Labour and
wages:
permanent
labour.

Elsewhere a money advance is always paid with or without interest according to the necessitous circumstance of the labourer; he lives with the farmer who furnishes him with food and once a year a blanket, a pair of slippers, and a cloth in addition. In addition, a money payment of Rs. 2 to 4 per month is also paid. Rs. 24 to Rs. 50 a year with the—" *Unda oota thundu Cambali* "—food to eat and a *Kambli* for clothing used to be a common wage for the permanent labourer.

Wages.

These systems, however, depend for their permanence upon the ignorance of the labourer: conditions are

Difficulty of
securing
labour.

rapidly changing and the procuring of permanent agricultural labour is becoming a serious problem. An advance of money has always to be paid in addition to a monthly wage to secure permanent labour, the advance to be paid back if the labourer wished to leave; but the farmer has no remedy except by suing in a Civil Court if the labourer runs away. Landlords try to get over the difficulty by raising the labourer to the rank of tenant, themselves playing the roll of the capitalist and advancing him money to purchase bullocks and other farm stock and paying the expenses of the first year.

Casual
labour.

Casual labour is generally available in the villages as the women turn out for the lighter class of operations like weeding, transplanting, harvesting, cotton picking and so on. Bullock labour is rarely hired out and the man who depends upon such can never get it when wanted.

Wages for
special
operations.

Payments are made usually in money and range from 3 annas to 5 annas per head. In many villages the labourer also gets a meal in addition to this wage. Transplanting paddy in the Mysore District is done at contract rates, Rs. 5 being paid for transplanting a *khandaga* of land, *i.e.*, about 3 acres. This is generally divided between 25 women coolies, for whom it forms a day's work. The picking of cotton and the harvesting of ground-nut are paid for as a share of the quantities harvested, $\frac{1}{6}$ th in the case of cotton and $\frac{1}{3}$ rd or even $\frac{1}{2}$ in the case of ground-nuts. The harvesting of paddy is paid for in kind, the wage at present being 8 *seers* of paddy per head. In the *Malnad* and for the Coffee estates, casual labour is got from the West Coast for the gathering of the areca-nut; the men hire themselves out in groups, each group being under a headman. Payment is made in the shape partly of rice and provisions, and partly of money. Each

person is allowed a *seer* of rice and annas 3 per day and about an anna worth of condiments. These rates which used to rule for many years have risen 50 to 100 per cent within the last year or two.

The milling of sugar-cane is usually done by the raiyats themselves all clubbing together, the jaggory boiling man and the man who feeds the furnace alone being paid. But in parts of Mysore, in Kunigal, and in the Channarayapatna taluk, groups of professional people go round and do the milling on contract; they take with them their own mill, pans, and also two or more pairs of buffaloes. The charge which is paid by contract will work out at 4 annas a maund of jaggory made. These men in many cases purchase the standing cane as a speculation.

The raiyats also pay *āyam* or a small levy in grain, straw and pulses to the village servants and artisans among whom the Nirganti, who regulates and distributes the water from the tank, the village blacksmith and carpenter, who repair the plough and the few simple implements such as *Kunte* and sickles. Likewise the village chuckler (cobbler) gets one half of the skins of the carcasses of the village in return for the supply of whip thongs, a pair of slippers to the raiyat and repairs to the *Kapile* bucket. Many of these customs are fast disappearing, and both the raiyats and the *āyamgars* are prone to exchange these obligations to each other for independence.

Ayams and wages for village servants.

II. DRY CROPS.

Ragi is the most extensively grown crop in the State. It is the staple food grain of the bulk of the people. It occupies an area of nearly 2,740,000 acres, which is roughly over 1/3rd of the total area under cultivation in

Ragi
(*Eleusine*
coracana)

the State. The following table gives the area in the different districts during the year 1923-24 :—

Bangalore	...	445,736	Hassan	...	261,306
Kolar	...	279,572	Shimoga	...	114,483
Tumkur	...	329,927	Kadur	...	93,127
Mysore	...	510,841	Chitaldrug	...	137,693

In the Chitaldrug District, in the Eastern part of the Shimoga District and the black cotton soil tracts of Mysore its place is taken by the jola as the main food crop; likewise in the *Malnād* tracts where rainfall is too heavy to admit of dry cultivation, it gives place to paddy.

It is grown both as a dry crop and also under irrigation, but the latter though by itself may be taken to be considerable in extent is nevertheless almost nothing by comparison. The cultivation of irrigated ragi is confined to certain taluks of Bangalore, Kolar, Chitaldrug and Tumkur and is then grown mostly under well irrigation.

Being sown so extensively, it is raised on practically all kinds of soils. The deep red fertile loam which forms the predominant type in the State is the most favourite soil. The best yields can be obtained on the rich black cotton soils but these soils are usually under jola, there being a tendency for the ragi to grow rank on such soils.

On good soils, well manured and with good rainfall very heavy yields are secured; but even with a poor rainfall, it makes a moderate growth and will give a fair yield; it is further so hardy and drought-resisting that even under very unfavourable conditions it will struggle on. The crop is remarkably free from fungus or insect attacks. The grain too is unsurpassed for keeping qualities; stories are told of ragi being kept for as many as forty years; it is also free from the pests common to stored grains in the country.

Rotation.

Except in the Mysore District, where it is grown as an irrigated crop in the taluks referred to already,

there is practically no rotation of crops followed in the case of ragi. Ragi follows ragi year after year in the same field. It may, however, be noted that where a raiyat's holding is extensive and a variety of crops can, therefore, be grown, a certain rough kind of rotation is adopted so that the same crop is not raised year after year on one and the same field. There is also the curious practice in vogue throughout, of growing a mixed or subsidiary crop of avare (*Dolichos lablab*) along with the ragi, by having one row of this crop for every 12 rows or less of ragi. It is possible that this interposition of a leguminous crop neutralises in some degree the evil effects of a succession of ragi crops on the same soil which would otherwise follow.

The exceptions referred to above are, however, interesting and are given in detail:—

Dry land
ragi rotation.

A. Dry land Rotations.

- | | | | |
|--------------|-----|---|--|
| (a) 1st year | ... | Gingelli, jola for fodder, Savé or baragu. | Followed by horse-gram in the same year. Savé and baragu may also take the place of horse-gram if they were not already grown as first crop. |
| 2nd year | ... | Ragi. | |
| (b) 1st year | ... | Castor, or chillies (dry land) rarely ground-nut, jola or haraka. | |
| 2nd year | ... | Ragi. | |
| (c) 1st year | ... | Horse-gram as preparatory crop on rough land. | |
| 2nd year | ... | Ragi. | |

These three may be said to be followed in the districts of Bangalore, Kolar and Tumkur, the double crop rotation (a) being more or less confined to Bangalore.

In the Mysore District, especially in the taluks west and south of Mysore, the rotations are these:—

- | | | |
|--------------|-----|---|
| (a) 1st year | ... | Kar-ragi or jola followed by fallow but ploughed up between rows of subsidiary or akkadi crop. |
| 2nd year | ... | Kar-ragi or jola followed by ploughing between rows of subsidiary crop and sowing of hutchellu or hurali in this space, |
| 3rd year | ... | Hain ragi or if hain ragi sowing is not in vogue, transplanted ragi. |

- (b) 1st year ... Kar-ragi (sown pure) followed by fallow but ploughing deep.
 2nd year ... Tobacco or kar-ragi.
- (c) 1st year ... Kar-ragi (sown pure) followed by hurali or hutchellu.
 2nd year ... Hain ragi.
- (d) In the black cotton soils of Hunsur.
 1st year ... Kar-ragi followed by coriander or Bengal-gram.
 2nd year ... Gingelli followed by coriander or Bengal-gram.
 1st year ... Kar-ragi followed by fallow but ploughed.
 2nd year ... Tobacco.
- (e) In the black cotton soils of chararajnagar, Nanjangud and T.-Narsipur.
 1st year ... Jola in kar, followed by cotton sown in the same year.
 2nd year ... Cotton continued, followed by black-gram or cow-pea or Bengal-gram.
 3rd year ... Hain ragi.

B. Rotation for Irrigated Ragi.

Irrigated ragi is grown (1) in tracts where owing to poor rainfall, ragi could not be sown as a dry crop, this being the case in the extreme east such as in parts of Sira, Maddagiri and Pavagada, in the Tumkur District, and in most taluks of the Kolar District and (2) in smallholders' fields under well cultivation, where work in intensive cultivation leaves them little time to attend to dry land ragi growing, this being the case in Hoskote, Devanhalli, Chikballapur, Sidlaghatta and Malur Taluks.

In the former, the crops raised are only food-crops except under the large tanks in the Kolar District where sugar-cane is also grown. The rotations are as follows :—

- (a) First year ... Early mungar, a kind of kar ragi called yenegar ragi which grows quickly and hain ragi on part of the fields.
 Second year ... *i.e.*, in Vaisākhe either paddy or bilijola according to the amount of water in the well which will depend on the plentifulness or otherwise of the previous north-east monsoon.
- (b) First year ... Sugar-cane if north-east monsoon was good.
 Second year ... Irrigated ragi.

In the latter, *i.e.*, on small holdings, a variety of crops is grown, ragi being always one of the crops whatever the others may be and this being managed by growing one or other of two kinds of ragi, *viz.*, gidda ragi which

is a three months' crop, and hain or rainy season which is a four months' crop.

The rotation is arranged in the following way:—

In the middle of December, the *Besike* crop is put in. This may be *gidda ragi*, *Besike* potatoes or onions or garlic. This is followed by one or other of the following crops:—Rainy season potatoes, hain *ragi*, chillies or chrysanthemum, taking care that the same crop is not repeated twice. In the case of the last two crops, *viz.*, chillies and chrysanthemum, there will be only one crop in the year, thus:—

First year ... *Besike* crop, say *gidda ragi* followed by chillies or chrysanthemum up to middle of second year.

Second year ... Hain *ragi* or rainy season potatoes.

Two types are distinguished as *Kar* and *Hain ragi*, the former which matures about a month earlier than the latter and is sown principally in the Western half of the *ragi* area of the State, where it is sown in the month of May; the latter is the more important variety and is sown throughout the central and eastern parts of the State and is sown in July. Several varieties are also distinguished each having fairly distinct characteristics. They fall into two groups according as the glumes are green or tinged with violet; in both these groups, varieties with open earheads, closed earheads and branching spikes can be distinguished by local names and their characteristics are given below:—

Varieties.

1. *Hullubile*, green open spikes.
2. *Madayangiri*, violet open spikes.
3. *Gudubile*, green closed spikes.
4. *Giddaragi*, violet closed spikes.
5. *Hasarkambi*, green open spikes.
6. *Doddaragi*, green open spikes.
7. *Kareegidda*, violet closed spikes.
8. *Jenumudde*, green open spikes.
9. *Majjige*, green open and with white grain.
10. *Jadesangha*, violet branched spikes.
11. *Rudrijade*, green branched spikes.

In various parts of the State, these go by other names also, names more or less descriptive of the appearance of the earheads. No. 2 also goes by the name of *Konankombu* (Sira, Maddagiri); the green open variety of this type goes by the name of *Balepatte*, (Hassan and Channapatna); the open types by the name of *Chowlaga* (Hunsur); and *Makhalhidike* (Tumkur). Trials at the Hebbal Experimental Farm have shown that the open types give heavier yields of grain than the closed ones.

Preparation
of the soil.

In the *Kar* ragi tracts, land intended for ragi is ploughed soon after the previous crop is harvested, *i.e.*, in the month of September and October; the ploughing is repeated with the early rains of the succeeding year, *i.e.*, in the months of April and May, and sowing follows next. Throughout the main ragi area, however, the ploughing begins only in the month of May with the beginning of the rains. The ploughing is repeated several times according to the frequency of the rains and the time at the disposal of the raiyat; the ploughing is followed by working the *kunte* in Bangalore and the Kolar Districts, and by the *Dod-kunte* in Chitaldrug and Shimoga; the weeds and stubble are collected and burnt; and manure either carted already before the ploughing is begun or later, generally at 10 cart loads an acre is spread and the land is again ploughed once or worked with the *kunte*. Levelling implements and clod crushers already described are used as they may be needed and a final harrowing is given prior to sowing.

Sowing
methods.

Sowing is either broadcast or in drills. In the former case, the grain at the rate of 10 to 15 seers per acre is sown and covered by working the light wooden harrow; if the seed bed should be somewhat dry and the soil likely to blow, in parts of the Mysore, Tumkur and Hassan Districts, Nagamangala, French-Rocks, Kunigal

and Channarayapatna, a herd of sheep is driven round and round over the field; after this operation, furrows are opened by the plough at intervals of about two yards throughout the field in which avare (*Dolichos lablab*) the principal mixed crop is sown by hand and covered with the foot.

Drills are used as a rule throughout Bangalore, Kolar, parts of Tumkur, Chitaldrug, Kadur and Shimoga. The drill of the Bangalore and Kolar Districts is of the 12 tined pattern; elsewhere four tined and six tined drills are used; behind the drill the sadde is attached (*Vide* description under implements), through which the avare is sown. After sowing, the land is worked with a brush harrow.

In Shimoga, ragi is sown mixed with manure; for this purpose, shallow furrows are drawn with a three tined hoe (called the Moodala, *vide* description) and in these the whole is then covered by a harrowing.

In parts of Chitaldrug, in Hassan and Kadur and to some small extent elsewhere, ragi is also transplanted on the dry land; for this purpose, the land is well prepared and manured, and shallow furrows are drawn by one of the different kinds of hoes or by the stout tined harrows; often the land is worked both lengthwise and crosswise; the seedlings are then planted at the corners of the squares; the seedlings for this purpose are obtained from the thinnings of broadcast or drill sown fields. In such transplanted fields, no mixed crop of avare is grown.

Transplanting
dry land ragi.

From the fourteenth day onwards, interculturing begins and is continued about three times at intervals; as the sowing in every case is very thick, severe thinning is necessary and the hoes effect this thoroughly; about three are usually thinned out; the hoeings also bring the crop into lines where the ragi was sown broadcast; they also pull

Intercultur-
ing,
harvesting
and
threshing.

out weeds and break up the surface crust. Hand weeding follows once more or sometimes twice and then the crop needs no attention till harvest; where the ragi comes up very luxuriant, it is usual, especially in Bangalore, to lightly graze it down. From 4 to 4½ months after sowing, the crop is ready for harvest; the crop is cut down by the sickle, the unbound sheaves lie on the ground for three days, and then are put up in field stacks; in the case of *Kar* ragi, there are generally rains at the time of the harvest, and harvesting and stacking have to be done very quick and the field stack or heaps turned over taking advantage of dry spells. The field stacks are removed to near the threshing floor where they are put up into skillfully constructed stacks till the threshing time, *i.e.*, about February. About two months after the harvest of the ragi, the mixed crop is ready and is gathered, the threshing floors are meanwhile prepared by cleaning a circular space, loosening the surface lightly, watering it and trampling it well under the feet of bullocks or by means of stone rollers; the floor is well plastered over with cowdung paste, figures of the raiyats' implements, such as ploughs, drills, hoes and carts, are drawn over the surface amidst much reverent exultation, and the floor allowed to dry. From the middle of January onwards, as the weather warms up, threshing is taken up, and conducted either by beating out the grain, or more generally by trampling it under the feet of bullocks; also in recent years, especially in the Eastern Districts, by the use of a stone roller. The grain is then winnowed and cleaned, heaped up when the threshing is all finished, and the heap is worshipped by the raiyat and his family. It is seldom measured, as it is considered inauspicious, but carted home to be stored or sold.

Yields.

The yields of ragi vary greatly; the best yields are in the *kar* ragi areas where 600 to 700 seers per acre are

obtained. Yields however up to 800 or 900 can be obtained on dry land well manured and when the rains are favourable. The average yield for the State can be taken to be 250 or 300 seers per acre. Irrigated ragi gives as much as 1,200 to 1,400 seers per acre. The straw of ragi is considered the best among the cereal straws of the State; the straw of irrigated ragi is very coarse and woody; as a matter of fact, the straw is not harvested at all but is left in the field to be grazed down; in this case, only the earheads are gathered to be dried and threshed. For use, ragi is ground into a fine meal in the household stone mills; cooked into a kind of pudding is the commonest form in which it is eaten; it is made into a kind of unleavened bread, and also eaten as a gruel. (*vide* Volume I, Chapter IX).

The production of ragi in the State per year may be taken to be 600,000 tons roughly; there is a considerable export, but hardly any import.

Total annual production.

Improvements in the methods of ragi cultivation which are being popularised by the State Department of Agriculture as the result of trials, extended over a number of years on the Hebbal Experimental Farm, consist of the following:—

Improvements in ragi cultivation.

(1) The use of the improved plough and the six-shovel cultivator for the preparation of the ground so that a larger area may be covered and the ploughing made thorough;

(2) the rotation of ragi with ground-nuts;

(3) the sowing of ragi in drills in preference to broadcasting;

(4) the ploughing of the land immediately after harvest in view of the beneficial action of the operation on the succeeding crop;

(5) the growing of a green manure crop of some legume to be sown in the first rains of April and ploughed in in mid-July, the sowing of the ragi to follow about a fortnight after;

(6) the growing of the better yielding varieties, such as H22 and other strains, isolated and tested on the Farm and multiplied on the holdings of selected raiyats;

(7) the selection of large earheads for seed in the field itself and later the selection of the heavy seed for sowing; and

(8) the use of the labour saving threshing appliances such as the stone roller and the threshing machine.

Along most of these lines considerable progress has been made.

Jola
(*Sorghum*
vulgare).

Next to ragi, *jola* is the most important dry land food crop. The area under this crop in 1923-24 was 601,845 acres. On the black cotton soils, it generally takes the place of ragi as the main food crop; in the Mysore District, it is grown extensively in other soils also; in Maddagiri, Koratagere, Goribidnur and Sira, it is raised as an irrigated crop during the summer months from January onwards. The Districts of Chitaldrug and Mysore are, however, the most important *jola* tracts, the eastern taluks of Shimoga and Kadur coming next. In these tracts, it is the staple food of the people.

Varieties.

As in the case of ragi, a large number of varieties are grown in the State. The most important group are the varieties sown as the main south-west monsoon crop; in Mysore, these are sown very early and sometimes as early as the middle of March but usually before the second week of April; and in the Chitaldrug District the sowings are late, continuing into May and June. The second group belong to the later monsoon and raised in the months of October onwards. Both these groups are grown for grain and for fodder; another type is grown solely for the sake of the green fodder; very little being allowed to seed.

Jola varieties are distinguished by the shape, size and colour of the earheads; these are either compact, or loose

to varying degrees; the glumes are either dark or white; and the grain is white, yellow or red. The type grown in the *hingar* season is principally the white jola, both compact and loose earhead types, and those with white grains but with white and dark glumes. The latter are also raised as irrigated crops, principally in Sira, Maddagiri and Goribidnur Taluks. In years when the north-east monsoon fails and the large tanks are empty, in these taluks, it is grown in the tank beds on the rich silt of which the crop grows luxuriantly.

The preparation of the field for jola does not differ materially from that for ragi, except that a very elaborate tilth is not attempted as in the case of ragi; for the same reason jola can be seen grown even on the rough land on which ragi is not usually thought of. In the black cotton soils, a shallow tilth is aimed at, the land is generally worked with the *doddakunte* instead of the plough and manured. In the Mysore District as the sowings are very early, jola is sown even on lands only imperfectly prepared, the subsequent interculturing being deemed sufficient to make up for imperfect preparatory cultivation. Sowings are generally either in drills or in plough furrows; in the Chitaldrug and Shimoga and adjoining black cotton soil areas, drill sowing is general. The drills used have from 3 to 6 tines with bowls made suitable to the size of the seed; and the tines are about 9 inches apart. Jola mixed with cattle manure and sown by hand in plough furrows is the custom here. Covering the seed is by the *bolukunte* in the case of the drill sown jola; where sown in plough furrows, seed is covered by ploughing an additional furrow. Like ragi, in the case of jola also, except in the case of *besike* jola or irrigated jola, a mixed or akkadi crop is sown, togare being the one generally grown for this purpose. In Chitaldrug, however, it is usual to raise a great variety of

Cultivation
method.

such crops principally for the household needs of the raiyat, *viz.*, *avare*, *togari*, *menthya*, *alsande* and *pundi*. After the crop comes up, in Mysore it is usual to give one ploughing close to each row of *jola*, which serves to earth up the rows and to collect such water as the rains bring close to the roots of the plants. In the other districts, the *yede kundes* already described are used to intercultivate and weed twice before the rows close up. During the earlier stages, *i.e.*, before the heads begin to appear, the field is guarded against cattle as the young *jola* brings on bloating and often death in cattle grazing on it; when the heads appear and until harvest, a perpetual watch has to be kept against birds which levy a heavy toll. Tall perches are erected in the fields from which the raiyats keep up a great din to scare away birds. In Mysore, trees grown in the hedge row or planted occasionally in the field itself for this purpose are often trained with a flat head so as to form a permanent perch. In 4 to 4½ months the crop is ready to harvest; the plants are cut close to the ground and stacked in the field temporarily. It is also usual especially in Chitaldrug to harvest the earheads separately. These are stored in a large temporary field bin made of the stalks themselves.

Threshing
and stacking.

Threshing is done by trampling out the grain under the feet of cattle; except in Mysore, this has been replaced by the method of threshing under the stone threshing roller; on some of the larger threshing floors in these tracts, two or three rollers may be seen worked simultaneously one behind the other on the same heap. The grain is preserved in underground receptacles or *hagēvus* as the *ragi*, while grain intended for seed is preserved in the *moodes* already described. The stalks form the most important dry fodder in these tracts and is put up in large substantial stacks; some of these are so large that the handing up of the sheaves is

along tall ladders or by means of a kind of see-saw hoist. This is a clever and simple contrivance and worthy of description. A tall post is fixed by the side of the stack, about half a way down its height is slung loosely a long cross pole which can be worked see-saw fashion; to one end of this cross pole the sheaf to be raised is hooked on, a man pulls at the other end by which the sheaf end is raised to the top of the stack; the sheaf can be also slung around to wherever it may be wanted on the stack, by the man moving the power end of the sea-saw suitably. After the stacks are built, they are well thatched over with the dry stalks of the togari plants.

The yield of grain will generally range from 400 to 700 *seers*; irrigated jola will yield up to 1,000 *seers*. Jola is eaten either by grinding into flour out of which unleavened bread is made, or is broken and cooked like rice. Jola is, unlike ragi, subject to pests and diseases; the young crop is preyed upon by the *kambali hula*, hairy caterpillar, (*Amsacta albistriga*) which is a serious pest; these grubs hatch out about the same time as the jola is sown and soon become so numerous and active that whole fields are often wiped out, necessitating a re-sowing altogether. The jola grasshopper is an occasional visitor; about ten years ago there was a serious outbreak in Honnali and Shimoga but in subsequent years, the pest has not appeared. The jola fly is another enemy; in the Mysore District, it becomes serious in some years; the young earheads are the portions attacked, the juice being sucked and no grain forming at all. Another serious pest is the *Kadike* or smut, which is prevalent more in the Chitaldrug tract than elsewhere. Stored in bags or above ground bins, jola is subject to weevil attacks which, in serious cases, besides preying upon the grain, will render such as is left absolutely unfit for food. The Department of Agriculture has all these pests well in hand and timely

Yields and
Pests

measures are taken by the District staff to combat them.

Navane
(*Setaria*
italica).

Navane is another important dry land grain crop. It is grown extensively in the Mysore and Chitaldrug Districts. In the latter district, it is grown practically only on the black cotton soil. In Mysore, it is grown on red soils also. Except the varieties known as garden *navane* which are grown either as irrigated crops or in the moist situations, *navane* is seldom grown by itself. In Chitaldrug on the black cotton soil, it is grown as a mixed crop with the local cotton which is on this account often referred to as *navane hatti*. The two crops are sown at the same time, five to seven rows of *navane* alternating with one of cotton. *Navane* is harvested in three months after which the rows are ploughed up or harrowed which helps the cotton to shoot up. Elsewhere it is grown as a mixed crop along with *ragi*. There are a large number of varieties which fall into two types, one having a thin low compact earhead and the other a thick heavy and very much larger earhead which bends down by its weight. In both these types, there are white, yellow, dark and orange yellow coloured grains. The heavier type is the one often grown under irrigation. In Mysore, it is sown about the month of May along with early *kar ragi*. In Chitaldrug, it is sown in the month of September in rows 9 inches apart. Cultivation is given as for other dry crops; in three months, the crop matures; it is harvested like *ragi*. The grain is threshed straight away; the straw is not considered as of much value. *Navane* is eaten cooked like rice. An average yield when grown as a mixed crop may be taken as 600 lbs. per acre.

Sajje (Bajri,
Kumbu)
(*Pennisstum*)
typhoideum.

Sajje is the next most extensively grown dry land grain. It is grown extensively in the Chitaldrug, Mysore and Kolar Districts. It is grown both as a pure crop and

as a mixed crop sown along with ragi. The varieties differ in size, colour of the ear-heads and in the presence or absence of awns. Though many varieties may be distinguished among the crop as generally grown, a variety with a thin greenish ear-head and the thick awned pinkish variety called *mullu sajje* are the ones grown mainly.

It is grown on the cotton soil much in the same way as jola; it is also usual to grow it on red loam and even gravelly soils especially in the Kolar District; in this district, it can be seen grown under irrigation in wet lands.

It is grown as a principal crop like jola in which case a mixed crop of some kind is also sown; or the sajje itself may be sown as a mixed crop in ragi; the sowing season is the main Mungar; land is prepared as for jola or ragi, and the grain is sown mixed with manure in plough furrows through a *Sadde* or through one of the ordinary seed drills, giving rows 1 foot or 18" apart, the seed rate being 6 lbs. per acre. The crop is intercultured and thinned out as for other dry crops. If there are heavy showers at flowering time, the pollen is washed away and seeds do not set properly. Harvest commences in October; the plants are cut like jola and stacked; at threshing time the ear-heads are cut off and threshed. About 900 lbs. of grain is a good yield. The grain is eaten cooked like rice.

Cultivation
methods.

Sāve is another minor grain grown to some extent in the districts of Mysore, Chitaldrug, Tumkur and Kolar. It is grown both as a pure crop and as a mixed crop, along with ragi; when grown alone, it is sown mostly on the poorer sandy soils; when, however, owing to the failure of the seasonal rainfalls ragi cannot be sown, *sāve* is sown on the better class soils also. Two varieties are

Sāve
(*Panicum*
miliare).

recognized, a tall heavily bearing variety called *Hire-sāve* and a dwarf variety called *kiri-sāve*. Varieties differing in colour of grain such as white, dark and yellow are also to be seen in both the types. The taller variety is the one which is chosen for sowing on the better class soils and also for sowing as a mixed crop with ragi. The dwarf variety is sown on the poorer class of soils.

The grain is generally sown after the end of the main Mungar rain and before the beginning of the Hingar, that is to say about the end of August. The grain ripens in three months and is harvested and threshed in the same way as the other grains. From good soils about three to four *pallas* of grain can be expected.

The straw is esteemed good fodder; the grain is eaten boiled whole like rice and ground into flour for making cakes.

Baragu
(*Panicum*
miliaceum).

Baragu is another inferior millet grown to an insignificant extent; as it is the earliest to mature among cereal grains, it is sown mostly by the poorer class of raiyats who wish to have some grain before the main crop of ragi is harvested. It is sown both as a Mungar as well as Hingar crop. It ripens in $2\frac{1}{2}$ months, when it is pulled out and threshed. The crop is very small in height and with a very poor vegetation growth. The straw is therefore insignificant.

Hāraka
(*Paspalum*
scrobiculatum).

Hāraka is grown extensively in the districts of Bangalore, Tumkur and Kolar. It is about the hardiest amongst the dry land cereals, and will struggle on even in the most trying season and yield a small crop. It is sown only on the rough and poor varieties of soils and on the fields situated far away from the villages. As a matter of fact, it is only with a view to get some grain crop on the poorer lands and even when the season may be unfavourable that it is sown. The land is given very

little preparatory tillage; the grain is sown, either broadcast or in rows, about the middle of June before the main ragi sowing commences.

It receives little or no attention except one hoeing with the *kunte*. It takes 6 to 7 months to ripen. The grain is exceedingly coarse; it is pounded to remove the thick shiny husk and ground into flour for eating. The straw is insignificant and also not reckoned good fodder.

Wheat is grown to a very small extent only in the black cotton soil tracts of the State, *viz.*, Chitaldrug, Shimoga, Kadur, Mysore and Tumkur, the total area under the crop being between 5,000 to 5,500 acres annually. During the year 1922-23, the total area under this crop was 5,765 acres the extent of cultivation having fallen to 2508 during the year 1923-24. In the Tumkur and Chitaldrug Districts, it is grown on other soils also chiefly under irrigation. On the black cotton soil lands, it is grown as a dry crop. Two varieties are grown. *Triticum monococum* and *Triticum spelta*. The usual sowing season is in the *Hingar* or North-East Monsoon. It is sown in plough furrows, or sown broadcast; when grown under irrigation, it is sown usually as a Vaisāk crop, that is, sown in the month of January. In both the cases, the crop is well attended to; weeding by bullock hoes and also hand weeding being given.

Wheat
(*Triticum sativum*).

In three months the crop ripens and is harvested; in the case of the *spelta* wheat, the grain is beaten by sticks to separate the seed. The crop is much subject to rust; sometimes whole fields may be attacked and the crop ruined.

Avare is one of the important articles of food of the Mysore raiyat. Every raiyat raises at least enough for his domestic needs. The crop is never raised pure but is grown as a mixed crop with ragi. Sown along with ragi, it

Pulses:
Avare
(*Dolichos lablab*) or
Ballar.

comes to maturity only about the end of January; but from December onwards the green pods are picked and sold as a vegetable. The crop is harvested when the pods are quite dry; it is threshed by beating the pods when quite dry with sticks. The haulms form excellent grazing and are to a considerable extent gathered and stacked. A great part, however, is grazed down in the field itself.

A number of varieties exist, the differences arising from the colour of the seed coat and the shape of the pulse, *i.e.*, whether rounded or oval; the colours are purple, cream colour and white. There is also a variety which matures very much earlier than the field varieties. The seeds of this as well as of the other pulses are subject to weevil pest and are difficult to keep sound. Specially made straw *moodes*, are used in which the quantity meant for seed is preserved; ashes, chillies and some of the chaff are put in along with the seed in the belief that they keep away insects. The pulse is usually sold split and the seed coat removed.

Togare or
Tuver
(*Cajanus*
indicus).

Considered as a human food *Togare* or *Tuver* is the most important among the pulses of the State. The total area under *togare* in the State in 1923-24 was 153,903 acres. It is grown on all kinds of soils. Soils not deficient in lime are said to yield the best quality. Quality consists in the readiness with which the pulse softens on boiling. It is grown as a mixed crop both with *ragi* and with *jola*; as in the case of *avare*, this crop also comes to maturity long after the *ragi* or *jola* is harvested; that is about the middle of January. When mature, the plants are cut at the base and are brought to the threshing floor and stacked. The pulse is threshed out by piling the crop in a thick layer on the threshing floor and beating out with a stick. In Chitaldrug, the stone roller used for threshing *jola* and *ragi* is used for this purpose.

The empty pods and chaff are used as fodder and the dry plants used as fuel, and to a small extent for making cart hurdles and for thatching jola stacks.

The pulse is split and husked for consumption, by inducing incipient sprouting and then drying and splitting in a grinding mill. The germination is brought about by mixing the pulse with wet red earth and piling it loose; the pile is opened and heaped twice over in the course of a day; the sprouts then become slightly visible, and the pulse is then dried in the sun, freed from the adhering earth and then passed through the splitting stone mills.

A garden variety which grows into a tall and highly branching bush is often planted round sugar-cane fields and in gardens. This bears longer and larger pods in great abundance which are picked for use as a green vegetable.

Bengal-gram, called *kadale* or *chenna*, is another pulse grown extensively. The total area in the State under the crop in 1923-24 was 56,904 acres. It is grown almost exclusively on the black cotton soils, on the wet black clays, and on the beds of tanks when these dry up. Mysore and Chitaldrug are the districts where notable areas are grown with this crop. Unlike *avare* and *togare*, this pulse is always grown pure, that is by itself. It is a cold weather crop and is sown late in the North-east Monsoon, *i.e.*, from October onwards up to December. On the black cotton soil, it follows cotton, or any the minor crops like coriander. In many cases, it is the only crop raised on the land in the year. This happens on the wet lands when no *Kārthik* crop is raised and when the tanks do not receive enough water for a *Vaisāk* crop. Four varieties which are distinguished by the colour of the seed, *viz.*, black, dark brown, white and yellow exist but are grown indiscriminately; the variety with the dark brown colour is the one which is grown to the largest

Bengal-gram
(*Cicer
arietinum*).

extent. Except when grown as the single crop of the year, the soil is not worked up to a fine tilth; seed is sown in plough furrows and is also broadcasted. Little attention is paid to interculture; the crop comes to maturity in about three months; the heavy dews of the cold months of December, January and February are said to be greatly beneficial to the crop.

Considerable quantities of the crop are sold when it is only partially ripe to be eaten green or cooked as a vegetable. When dead-ripe, the plants are pulled out and the pulse beaten out on the threshing floor.

The pulse is eaten in various ways, fried, whole and salted, parched and split, cooked with a variety of dishes or ground into flour and made into a number of sweet-meats. It is fed to cattle, often softened by soaking in water; it is seldom fed to horses in this State, though in other parts of India this is one of its chief uses.

Horse-gram
(*Dolichos*
biflorus).

Horse-gram is the most extensively grown pulse of the State; about 800,000 to 900,000 acres being put down every year; about a third of this acreage is contributed by the Mysore District. During the year 1922-23, the total area under this crop was 714,698 acres. It is grown either as the sole crop of the year or following a *Mungar* crop of Jola, or gingelly. It is grown nearly always as a pure crop but in the Mysore District *hutchellu* comes as a mixed crop with it, and in Hassan and in parts of Tumkur, it is grown under castor as a mixed crop. On all rough new land, it is raised as a preparatory crop for a year or two by which time the land comes into a fit condition for growing ragi. Most of the surplus lands of the raiyat which he cannot prepare sufficiently well in time for the ragi crop is also put under horse gram. In years when the *Mungār* rains fail and even grains like *sāve* cannot be put in also for a like reason, the land is sown to horse gram in the North-east Monsoon, if the soil

is red, and to Bengal gram or wheat or other black cotton soil crops on the black cotton soils. In normal years, on the good red soils, horse gram is grown extensively as a second crop after jola or *kar ragi* in the Mysore District; in the other districts following gingelly, fodder jola or hutchellu, or other minor early crop of the South-west Monsoon. Black seeded and brown seeded varieties exist; but the brown variety is the one grown most extensively.

Sowing is generally by broadcasting; the field is then ploughed up to cover the seed; but sowing in plough furrows with a view to interculturing is also common, especially in Hassan and in parts of the adjoining Districts of Mysore and Tumkur. The sowing time is in the months of September and October. Except in these areas, horse gram receives no attention after sowing. When the crop grows rank, it is lightly grazed down. A large quantity of green material, both stalks and pods, is removed as green feed to cattle and sheep. The crop is ready for harvest in $3\frac{1}{2}$ months, and is pulled out and stacked. Threshing is under the stone roller, but beating out by sticks and trampling out under the feet of oxen are more common. About two *pallas* per acre may be taken as the average yield. Both the husks, chaff and the straw are fed to cattle. Horse gram is chiefly used as the main concentrated feed of the working cattle of the State. Its use as human food is comparatively insignificant. As the State grows a very large area, there is a considerable export trade in horse gram.

Blackgram or *Uddu* (*Phaseolus mungo*), green gram or *hesaru* (*Phaseolus radiatus*), cowpea or *alsandi* (*Vigna catjang*). Black gram is grown as an early monsoon crop on the black cotton soils; also to some extent on wet lands as a catch crop preceding the main paddy crop. It is further put in occasionally as one of the mixed crops with jola where often several kinds of seed are sown mixed

Other pulses.

together. Two varieties exist, a small seeded one and a large seeded one, the latter being rather larger than a pepper corn. Sowing is in the months of April and May; little is done by way of manuring and weeding; the crop is harvested in from three to four months, after which the stubble is ploughed in for paddy on the wet lands, or is followed by wheat, coriander or *bili jola* on the black cotton soil. The larger seeded variety is sown in the main season in August.

Green gram is also raised in a similar manner on the same class of soils; it is, however, grown on the red soils also and on the wet lands to a much larger extent than black gram; *alsandi* or cowpea is grown largely on the black cotton soils as a pure crop and also as a mixture. It is common on the red soils also especially in the eastern taluks of Mysore where it is grown as a mixed crop in rows with ragi. Two varieties are grown, one with a large seed and luxuriant leaf growth and the other small seeded and less bushy.

Both green gram and black gram are also raised as catch crops on wet lands.

These pulses are used principally as human food and for this purpose are prepared in a number of ways. To a small extent they form part of the concentrated ration of milch cows and buffaloes for which purpose they are ground up into a mash with other ingredients like cotton seeds.

Oil-seeds.

The total area under oil-seeds of all kinds in the State amounted to 475,613 acres in 1923-24. The oil seeds grown are :—

- (1) Gingelly or Sesamum ;
- (2) Hutchellu or Niger ;
- (3) Castor ;
- (4) Ground-nut ; and to a small extent
- (5) Safflower ; and
- (6) Linseed.

Other oil-seeds produced largely in the State consist of honge (*Pongamia glabra*), hippe (*Bassia latifolia*) and neem (*Melia azadirachta*), but as these are not agricultural crops they are not noticed here further.

Gingelly is one of the important crops sown early in the South-West Monsoon. The total area under gingelly in 1922-23 was 76,914 acres. About $\frac{1}{6}$ of the total area under oil-seeds is generally under gingelly; the area of early rainfall, viz., the south-west taluks of Mysore grow the largest acreage. It is sown largely on the red loams and on the soils inclined to be sandy, as a dry crop. As a semi-irrigated crop it is raised on the paddy lands in the Cauvery valley, and under tanks on clay soils also, where it is taken as a catch crop in the same way as the different kinds of pulses described above. Gingelly is usually followed by another crop in the same year, horse gram or jola or a minor millet in the dry lands and paddy on the wet lands. Gingelly is said to be an exhausting crop and is popularly believed to be prejudicial to the succeeding grain crop.

Gingelly
(*Sesamum indicum*).

The dry land fields intended for gingelly are ploughed and prepared well as usual; the land has to be in readiness for the crop quite early in the season; lands which are ploughed in the early April showers of the year or which were ploughed after harvest the previous season, provided there were suitable rains, are usually taken up.

Cultivation
methods.

There are two varieties, one black seeded and the other white seeded, the former being the variety generally cultivated.

The seed being very small in size is mixed with earth, ashes or mouldy ragi from *hagevus* and then is sown either broadcast or in drills. The fields are hoed with the *kunte* after the plants grow up and are also hand weeded. The crop is ready for harvest in three months. The plants are then pulled out and taken to the threshing floor; threshing

is exceedingly simple, the bundles are shaken upside down so that such of the capsules as have opened in the field itself shed the seeds; the bundles are stacked for a few days when all the capsules dry and open; they are then shaken and also beaten to get out all the seed; as brought from the threshing floor, the seeds are mixed with a lot of earth and gravel and require much winnowing and screening out.

Yield. An acre would yield about 200 *seers* of seed, but the crop is somewhat delicate and uncertain.

How used. The seed is used principally for the extraction of the oil which is the most important among the edible oils used by the people. With the poor classes it really takes the place of butter or ghee. The oil-cake is a highly priced cattle food and is largely fed to milk cows and buffaloes. The seed to some extent also enters into the preparation of various dishes.

The stalk and chaff are merely used as fuel.

Hutchellu or
Niger
(*Guizotia*
abyssinica).

Hutchellu or Niger is also an extensively grown oil-seed throughout the State. Unlike gingelly, it is not grown usually as a pure crop but mostly as a subordinate crop mixed with ragi if sown in the main season or with horse gram if sown later. About the month of November, it is a most conspicuous crop in the dry fields in many parts of the State, where the rows of the crop are picked out in the showy yellow flowers with which it is covered. Even though the akkadi rows may not be entirely devoted to this crop, it is always part of the mixture of seeds used for this purpose, and there will consequently be a fair percentage of this crop along with the avare, fodder jola or other akkadi crop. When sown with ragi as a mixed crop, it is sown about the end of June; if as in parts of the Mysore District it is sown after *kar* ragi, or *Mungar* jola,

it is sown by itself or along with horse gram in the month of September. It is also said to stand a certain amount of waterlogging in the dry lands. When in flower, the crop furnishes along with a lot of other green material, excellent green feed for cattle and sheep; for this purpose a considerable portion is cut.

The crop matures in three to four months; the plants are then cut down at the base and are stacked. They are spread out to dry and the seeds are beaten out and winnowed out of the chaff.

Castor is the most extensively grown oil seed in the State, the acreage amounting to more than 1-3rd of the whole area under oil-seeds. The total area under this crop during 1922-23 and 1923-24 was 111,726 and 116,982 acres respectively. It is grown throughout the State and mostly the red and ash coloured soils are put under the crop; but rough soils are also taken up specially where holdings are large, and the comparatively intensively ragi cultivation is not possible on the whole area. The crop is of the main crop type, and occupies the ground throughout the cropping season. It is almost always grown by itself, the growing of a crop of horse gram under it between the castor rows being to some extent in vogue in Hassan.

Castor or
Haralu
(*Ricinus*
communis).

The better lands are given thorough preparation by repeated ploughing and working with *kuntas* and a good seed bed is prepared. Plough furrows are then made both lengthwise and crosswise at a distance of about four feet, and at the intersection of the furrows a little cattle manure is put in and two seeds are planted. This practice is followed in the districts of Tumkur, Chitaldrug and Kolar; elsewhere it is common to make only the longitudinal furrows at a distance of 3 to 4 feet and plant the seeds fairly closely at about a foot from each other. The sowing is in the month of June. There are several varieties, but

Cultivation
methods.

only two are grown as annual field crops ; one of these has a reddish stem, while the other has a greenish stem, a bluish white bloom covering the stem in both the cases. The seeds of these are medium sized. There is a larger seeded variety and a very small seeded variety, which grow as perennials in gardens and backyards and in the margin of sugar-cane fields. The latter is esteemed best for the extraction of oil for medicinal purposes. There is also a large red ornamental variety which grows very tall and in which the inflorescence is strikingly red in colour.

After the plants come up, the large spaces between the rows are worked with the plough so that the rows are earthed up, a furrow being made close to the row, and the interspaces well weeded. The rows themselves are also handweeded, and thinned out. In Chitaldrug and the adjoining districts, the bladed *kuntas* are worked both lengthwise and crosswise, the regular check board like planting making this easy. This hoeing is repeated twice till the fields are absolutely clean.

In three months the plants begin to flower and fruit and from December onwards the fruit bunches are picked and the picking is continued as the bunches keep ripening ; by about February the picking ceases ; the fruits are spread out in the sun and well beaten out to separate the hard husk from the seed.

Castor pests.

The standing crop in its earlier stages is subject to the attacks of the castor semi-looper called *Kondli Hula* (*Achoea Janata*, Dr.) This causes considerable damage, and cases where the plants are completely defoliated are not uncommon. A good shower of rain mitigates the injury. Spraying with lead arsenite is recommended and spraying outfits and solutions are supplied by the Agricultural Department. Methods of prevention by cheaper methods are also advised in special leaflets published by the Department.

The seeds are used for the extraction of the oil which finds use as a medicine, as unguent, and as lamp oil; in recent years the use of kerosine for lamps has reduced the use of castor oil for this purpose which used to be one of its chief uses. The seeds are largely exported. Local mills also handle it to some extent. Further information will be found under manures and oils cakes.

The ground-nut as a field crop finds no mention in that exhaustive account of the Agriculture of Mysore recorded in Buchanan's *Journey from Madras*, nor is it referred to in the last edition of this *Gazetteer*; and yet the crop is grown on an area of over 100,000 acres at the present time. It is an instance of a crop which, though comparatively a new introduction to the State, has yet been taken up to an extent which is truly remarkable.

Ground-nuts
(*Arachis*
hypogoea).

The bulk of the cultivation is in the Districts of Bangalore, Tumkur and Kolar but it is rapidly extending into the other districts, notably the south-eastern taluks of Mysore. Were it not that the crop is subject to the ravages of wild pigs and jackals, its cultivation would have extended more rapidly and into most of the other parts of the State as well.

The cultivation is principally as a dry land crop; in the Goribidnur Taluk and its neighbourhood, it is grown on the wet lands also under more or less semi-irrigated conditions. It is cultivated only in the better class soils, the light red, and ashy coloured loams inclined to be sandy as well as on the stiffer loams. It is at present grown only as the main crop of the year, but earlier maturing varieties called Spanish and small Japan have been introduced by the Department of Agriculture, and these are grown as the early monsoon crop to be followed by jola or an inferior millet.

The long established variety has a much spreading habit, takes about five months to mature, and bears thin long

Varieties.

pods with three or four seeds in the pod. This is esteemed to be sweeter and is a great favourite with the people for eating purposes. The variety is confined to Bangalore largely and it is probably in the Bangalore District it was introduced first. The variety which is rapidly extending and is grown now most is called Bādāmi or *Sime Kayi* is also a spreading long season variety but with a thicker shorter pod with only two seeds in the pod. This is reckoned to have a higher oil content though not as nice to eat as the local variety. In addition to these are other varieties introduced by the Department of Agriculture, the same Japan and Spanish referred to already, which are erect in their habit of growth and also mature in $3\frac{1}{2}$ months and Mauritius and Virginia which are trailing long duration varieties with large pods.

Cultivation
methods.

The land intended for the crop receives a good preparatory tillage in the early monsoon rains; sowing is in July for the long season variety and May for the early maturing variety. Seeds are sown in plough furrows about one foot apart and about 4" in the rows from each other. After the plants come up, the rows are worked with a *kunte*; this may be repeated in the case of the erect varieties. In the case of the spreading variety, the crop will have to be thoroughly hand weeded. In from $3\frac{1}{2}$ to $5\frac{1}{2}$ months according to the variety the crop matures, the leaves become yellowish and begin to dry. During the later stages of the crop, for about a month or two, the crop has to be guarded against the ravages of crows by day and of pigs and jackals by night. Digging out the pods is laborious; in the case of the early erect varieties, the operation is less difficult as there may be rains at the time rendering the ground soft; also as the pods all form immediately round the base of the plant in a bunch. With the long duration varieties, the harvest time usually coincides with the cessation of the rains for the year and

the ground becomes very hard. About one-third of the crop will have to be paid as wages for digging. If the ground is not very hard, it is usual to plough the land in order to help the pickers to gather the pods more readily. The pods are dried well before they are sold or sent to market for sale; the haulms are fed to cattle if the crop is harvested in time, otherwise they are left in the field as they become too dry to be fed when harvesting is delayed.

The later maturing varieties yield more than the early varieties. About 500 lbs. of the latter and 800 lbs. of the former may be taken as average yields per acre. Yields.

Under irrigation they may be expected to yield twice or thrice these quantities. With the exception of the comparatively small quantity used as food in the State, the large annual production is exported; the country oil mills and the Anderson Oil Expellers also take up some for milling in the State. The oil-cake is rapidly becoming known as a cattle food and as a valuable manure due to the endeavours of the Agricultural Department which has been popularising it against the initial prejudices of the raiyat.

Safflower and linseed are grown to a very small extent, principally for the individual needs of the raiyat. They are grown as mixed crop along with wheat in the black cotton soils, in the Mysore and Chitaldrug Districts. The Safflower is generally grown all round the margin of the field as its spiny leaves prevent the inroads of cattle into the fields of cotton, jola or wheat. Safflower of two varieties., *i.e.*, a large seeded and a small seeded variety, are grown; both, however, are grown for their seeds which find use solely as an article of food. It is not grown in sufficient quantities for the expression of oil. Safflower and
Linseed.

Fibre crops.

The fibre crops raised as annual crops in the State are:—

- (1) Cotton ;
- (2) Sanabu or Sann hemp ; and
- (3) Poondi or Bimlipatam Jute.

The raiyats' requirements for ropes and striking and all forms of cordage are also met from the following fibres :—

- (4) aloe and
- (5) coir or the fibre of cocoa-nut husks, and
- (6) from the tender leaves of the Date palm.

Cotton
(*Gossypium*).

The cultivation of cotton is confined to the Chitaldrug and parts of the Tumkur, Shimoga, Kadur and Mysore Districts. Until recently, it used to be grown only on the black cotton soils in the State as the indigenous variety cannot be raised successfully on any other soil ; but with the introduction of the American Upland variety, called Dharwar-American, which can be grown on the red soils as well, practically all kinds of soils are put down to the crop. The annual area under the crop has steadily increased, reaching about 100,000 acres. In 1923-24, the total area under this crop was 88,283 acres as against 147,280 acres in 1919-20, 125,125 in 1918-19, 56,669 in 1921-22 and 83,120 acres in 1922-23. On the black cotton soils of the T.-Narsipur and Chamrajnagar Taluks, cotton is beginning to be displaced by dry land mulberry as the price of silk has been very encouraging.

Varieties.

The varieties grown are two indigenous types of *Gossypium herbaceum*, both called Sannahatti ; viz., (1) grown in the Mysore District which is the Nadam cotton of Coimbatore, (2) grown in Chitaldrug called the Chitaldrug Sannahatti ; and two types of *Gossypium hirsutum* the American Upland Cotton, viz., (1) the Dharwar-American and (2) the Cambodia Cotton. The last has been only a recent introduction being about eight or nine years under cultivation in the State. The first two types differ in many

respects from the second two types ; the former have a tall habit of growth, the branches growing mostly upwards giving the plants a tall and spindly appearance, the stem and leaves are green throughout, while the flowers are deep yellow with an " eye " or dark spot inside at the base of the petals ; the fruits are smaller, the cotton gives a smaller percentage of lint, and the yield per acre is also low. In the latter type, the branches grow more horizontally giving the plants a thick bushy appearance, the stems and the midribs of the leaves are reddish in colour, the leaves and fruits larger, the flowers cream coloured and with no " eye ; " they mature earlier, give a better yield and the percentage of lint is higher. The type is, however, not so hardy and is subject to disease notably a reddening of the leaves followed by the shedding of leaves and bolls.

Cotton is grown either pure by itself or as a subordinate crop. From December onwards the green pods are picked and sold as a vegetable. The crop is harvested when the pods are quite dry ; it is threshed by beating the pods when quite dry with sticks. The haulms form excellent grazing and are to a considerable extent gathered and stacked. A great part, however, is grazed down in the field itself. Rotation.

On the black cotton soils, cotton is always rotated with jola ; in the Mysore cotton tract, cotton is taken only once in three or four years on the same land, jola, wheat, pulses like cowpeas, Bengal gram, Black gram, etc., being grown in the other years. On the red soils where Doddahatti (Dharwar-American) is grown, the cotton may follow jola or ragi, according to the fancy of the raiyat.

The preparation of the black cotton soil for cotton or other crops has been described under " Soils " and also under " Implements." The land is ploughed with the first heavy rains in the months of May and June ; the Cultivation
of local cotton.

heavy Doddakunte is worked several times, the jola stubble is completely cleared, the field is manured with cattle manure and worked with the light kundes. In about August, cotton is sown; for this purpose, the seed is prepared by being rubbed up with wet earth and cow-dung which makes the fluff adhere to the seed; sowing is generally through a two tined drill, a saddle being tied behind each tine. Seed is covered with light kundes. After the cotton is well above ground, interculturing is given thrice at frequent intervals with the special hatti kunte. If the weather is too wet for these weedings and the interculturing is omitted, the crop receives a serious set back.

For three months from February onwards pickings go on, usually three in number, as the bolls are in different degrees of ripeness and do not therefore open at the same time. Round Harihar, Davangere and Chitaldrug where good crops may be seen, yields up to 30 *maunds* of seed cotton per acre are reported; but about 12 *maunds* may be taken as a fair average.

Cultivation of
Dharwar-
American
cotton.

In the case of the Dharwar-American cotton, the sowings are much earlier; the red soils admit of ploughing even with ordinary showers unlike the black cotton soils. The land is prepared as for any other dry crop and the cotton is sown through saddes in the month of May or early June. The field is also set out chessboard fashion by working a plough or a cotton drill (without the sadde) lengthwise and crosswise, and the seed is sown at the intersections much in the same way as castor. Interculture and weeding are as already described. The pickings finish by the end of the year.

Cultivation of
Cambodia
cotton.

Cambodia cotton is grown under irrigation in Hiriyur and Challakere, and as a dry crop in Chamarajnagar; yields up to 40 *maunds* of seed cotton per acre are obtained,

provided the plants do not become diseased. But both the varieties are subject to the attacks of the stem borer and of the red leaf disease. The bolls are also attacked by the boll worm which also cuts down the yield considerably.

Through the depôts maintained by the Department of Agriculture, seed of good quality is supplied in large quantities to raiyats; trials of cotton varieties with a view to isolate superior types and later multiply the same for general distribution are conducted on the Government Farm at Babboor in the Hiriyr Taluk.

This is grown for the sake of fibre only to a very limited extent. Its cultivation for this purpose is confined practically to certain parts of the Bangalore and Tumkur districts, chiefly the taluks of Dodballapur, Gubbi and Sira. The crop is sold to the "Gōnigars" who spin and weave the fibre into the coarse tent cloths which are made use of for bags, curtains, awnings and so forth. The Sanabu for this purpose is grown both on paddy lands as a semi-irrigated crop and on the red soils of dry fields as a rain fed crop. It is sown in the Mungar rains on lands roughly prepared by broadcasting the seed and ploughing to cover them. Seed is sown very thick to suppress branching. Little further attention is paid; with a favourable rainfall, the crop grows luxuriantly reaching a height of about ten feet. The plants are allowed to set and ripen seed before being cut down though it is believed that for the best fibre the plants should be cut before the seeds set. The raiyats, however, leave them till the seeds are ripe and then cut down the plants; the seeds are beaten out and the stalks are sold to the "Gōnigars" who prepare the fibre by retting the stalk in water which helps the fibrous bark to peel off.

Sann hemp
(*Crotolaria
juncea*).

The seeds are purchased largely for being sown in paddy fields for growing the sann hemp crop as a green manure (see under green manures).

Poondi
(*Hibiscus*
cannabinus).

Poondi is also a minor crop. It is sown along with ragi as a mixed crop, and even then only a few rows just enough for the needs of the individual raiyats. The plants are allowed to grow till they flower and seed, then cut down for retting. On a small scale they are grown throughout the eastern districts.

Aloe (*Agave*
americana).

The other fibres, *viz.*, aloe and cocoa-nut furnish the bulk of the cordage requirements. Aloe is the *Agave americana*, also called "railway aloe," as it has been planted on both sides of the railway lines in the country. Though raiyats do not raise any aloe plantations, still the aloe has become a favourite hedge plant with the raiyat which gives him also the fibre he needs. The aloe supplies the bulk of the raiyat's needs in the way of ropes for carts, *kapiles*, bullocks, etc.

Another important source is referred to under cocoa-nut. The tender leaves of the date palm furnish excellent material for ropes. In Sira, Challakere and the eastern dry taluks, thick *kapile* ropes are made out of these leaves, by splitting them into narrow strips almost as thin as fibre and plaiting them into thick strands.

Tobacco
(*Nicotiana*
tabacum).

Tobacco is raised as an important field crop in the Hunsur and Yedatore Taluks of Mysore and in the adjoining taluks of the Hassan District and in the Chitaldrug District. In these tracts, it is mainly raised as a dry crop; but in certain taluks of Chitaldrug, Tumkur and Kolar, it is an important money crop raised under well irrigation. Elsewhere, practically throughout the State, the crop is also raised in small patches by most raiyats for their own individual needs. The land under tobacco cultivation during the years 1922-23 and 1923-24 was 23,521 and 26,289 acres respectively.

Dry land
tobacco.

Dry land tobacco is raised both on the black cotton and on the red soils; the latter, however, constitute the bulk of

the area. The red soils preferred are fairly light or medium in character, with a considerable admixture of fine gravel. The cultivation of dry land tobacco is carried out with great care and thoroughness. Though it is a crop which occupies the ground only for about $3\frac{1}{2}$ to 4 months, yet it forms the sole and only crop of the year on the land, as the land is under preparation for the greater part of the year.

Two varieties are raised, one broad-leaved and the other with long narrow leaves. In the Mysore District, the former is extensively grown while in the other parts both varieties can be seen. Each variety is, however, grown by itself and mixtures are seldom met with. Varieties.

For dry land tobacco, the land is ploughed and reploughed with every rain from the earliest onwards; the thorough drying of the ploughed lands in the hot months is considered very beneficial; the *kuntas* are worked more than once, sheep are folded on the land and manure also applied at the rate of about 30 cartloads to the acre; heavy manuring is more usual with the irrigated crop than with dry land crop. The soil is thoroughly cleared of weeds and reduced to a fine tilth. Plough furrows are drawn at regular intervals of three feet both lengthwise and crosswise. These operations finish by about the end of September and the planting is done immediately after. For this purpose, seedlings are raised separately in the raiyat's back garden or other suitable place, where the seeds are sown in July so that seedlings of about 45 days old may be ready for transplanting. This takes place during the early north-east monsoon rains; the plants carefully removed from the nurseries are inserted two or three in each of the little holes prepared for them in the field; a small twig is planted by the side of each seedling to shade Cultivation.

it; if there be no rains at the time, some amount of hand watering is also done, for which water is carted to the fields. After the plants take root, from about the 20th day the *kunte* or plough is set going both across and along in the interspaces for clean and thorough interculture. When the plants have put out from ten to twelve good leaves, further vegetative growth is checked by pinching off the tops. All side shoots which begin to arise as the result of this operation are gone over and removed as they appear. The leaves begin to yellow in about four months from planting, when they are either harvested by the raiyat himself if he chooses to cure the leaves, or sold as standing crop to men who make a profession of buying and curing the leaves. The crop is sold at so much per 1,000 plants; usually about 4,000 go to an acre, as the plants are not planted exactly one yard square.

Curing
methods.

In curing, two methods are common; the plants are cut whole at the base and allowed to lie in the fields for three days, they are then split along the length into two halves, and these are strung on a line in the open till they become more brown than yellow. They are then taken to a shed or to the raiyat's house where they are first cut into short lengths (two leaves each) piled in heaps of thirty to dry; after three days the piles are divided into two and dried, then again into two after three days; when thoroughly dry, the leaves are all piled together neatly covered over and weighted. The next day the pile is opened and rebuilt, changing the position of the leaves in the heap so that they may sweat uniformly. This is repeated on three or four occasions at intervals of a few days; the heap is not allowed to heat up too much, a little water is sprinkled, and the heap opened up for rebuilding whenever it is felt to become too hot. This process goes on till the curing is complete and no more heat develops. The leaves are then sorted and tied up into compact round bundles for the market.

In another method followed in the Hunsur Taluk, the plants are cut whole and are dried in the field without splitting the stems and are strung out to dry under shade for about a month ; then they are piled up and cured as in the first method.

In the case of the irrigated crop, the land is heavily manured, and the crop is succeeded by irrigated ragi or paddy in the same year. Irrigation is given regularly and copiously and all the weeding is done by hand. The method of curing is the same as for the dry land crop. The dry land crop, especially in the black cotton soils, gives a fair ratoon and even the red soils, if there should be a suitable rain, give a small second crop which is gathered and cured for the raiyats' household use. The tobacco stems are also sold to poor people ; powdered up with the refuse, the leaf stalk, etc., it forms a low grade chewing tobacco. The tobacco grown in the country is used principally for chewing purposes and for the making of snuff ; in fact, the dry land tobacco of Bettadpur (Hunsur Taluk) and that neighbourhood is greatly fancied for this purpose and very high prices are consequently paid for well cured lots. A large quantity is exported to Madras for the snuff makers.

Irrigated tobacco.

Tobacco is not without its crop pests ; plant lice are very troublesome and if rains are not favourable, do much damage, checking the growth and disfiguring the leaves. Orobanche, a vegetable root parasite on the tobacco, is also common though the damage is not great.

Tobacco pests.

Like tobacco, chillies form an important crop grown both on dry lands and under well irrigation. It is a most important and indispensable article of the dietary of the people and practically every raiyat grows a small patch of it for household needs. The area under this crop in

Chillies (*Capsicum frutescens*). Dry land chillies.

1923-24 was 59,393 acres. In parts of the Chitaldrug, and Hassan Districts, it is grown on large areas on the dry land. Both the red soils and the black cotton soils are put down to the crop; the latter gives the better yield. The cultivation is as thorough and careful as for dry land tobacco, ploughing several times, working with kuntas and so on, producing an excellent, fine and deep tilth. The variety grown is principally a long, thin, stringy variety, which is a heavy yielder and is yet quite hardy. It is also exceedingly pungent, which is all in its favour. In Mysore, a thicker and shorter variety is grown. Fancy varieties are grown in gardens, notably round Seringapatam. Seedlings are raised in small nurseries in the backyards or gardens, for which they are sown in the month of June and are kept watered regularly. Seedlings fit to transplant are ready in about a month or five weeks and transplanting is done about the same time as sowing ragi in mid-July or early in August. For transplanting, in the Chitaldrug District, plough furrows are drawn lengthwise and crosswise at intervals of 18" and the intersections are manured with a little cattle manure and one or two seedlings are planted in each hole. After the plants take root, interculturing with special *kuntas* is done twice so as to remove the weeds and to earth up the rows. At one of the hoeings, some manure is also given to the plants. In three months green chillies can be picked but the field crop is not gathered green. It is allowed to yellow and ripen. The crop continues to bear even till February, though the bulk of the pickings finish by the end of December.

Irrigated
chillies.

In the Goribidnur Taluk of Kolar and in all the well-irrigated tracts of the north-eastern part of the State, excellent chilly crops are grown under irrigation. The crop is heavily manured with sheep folding and cattle manure, while it is prepared and after the first hoeing, oil cake is applied as manure at the rate of about 30 *maunds*

an acre. Yields up to a 100 maunds of dry chillies are said to be produced but 30 maunds may be taken to be an average for chillies under irrigation, while 15 maunds may be taken as the yield for dry land chillies. The total land under chilly cultivation during 1922-23 was 59,038 acres.

III. WET CROPS.

Rice is the most important wet land crop of the State. The annual acreage under it varies round 700,000 acres. Being almost a semi-aquatic crop, it requires an abundance of water supplied either by a high rainfall or by artificial irrigation. The acreage is largest therefore in the districts where such facilities exist. The total paddy area was distributed in 1923-24 as under :—

Rice (*Oryza sativa*).

	Acres.		Acres.
Bangalore	... 40,131	Hassan ...	... 105,572
Kolar ...	... 18,827	Shimoga...	... 204,211
Tumkur ...	... 27,198	Kadur ...	... 94,406
Mysore ...	... 130,921	Chitaldrug	... 25,693

The total for the State is 707,509 acres. In the western districts of the State, it is grown to a great extent with the help of the torrential rains of the south-west monsoon. In the Hassan and Mysore Districts, in the valleys of the Cauvery and its tributaries, it is grown largely under canal irrigation. In the eastern districts, the large rain-fed tanks supply the irrigation water; while in the extreme east and north-east it is grown under well irrigation. In parts of Chitaldrug District and in the taluks of Channapatna, Malvalli and Mandya, quite a large area is under what is called "dry land" paddy; in these areas all low lying places, hollows, and pockets of sandy soil, which collect and retain rain water, are put under this variety.

There is no kind of soil on which paddy is not grown in the State; under most of the tanks, the soils are either clayey or decidedly inclined to be such; in the Cauvery valleys, the fields are highly gravelly and the soil thin; at

Soils on which grown.

the tail end of most achkats, alkali patches can be seen on which paddy is grown; on the laterite soils may be some exceedingly fine mud and inclined to be boggy. In fact, the incessant yearly use of water on the different types of soils produces several variations which are not ordinarily seen on dry land soils. Once water can be had, paddy is invariably put in, whatever the soil condition may be. The best crops are obtained where there is an abundance of water and the soil is a clayey one with ample drainage.

Varieties.

The kinds of paddy grown in the State are numerous. One hundred named specimens can be seen in the Museum collection in Bangalore. There is no doubt there may be more. Many of these are, however, merely nominal varieties as one and the same kind of paddy is known by different names in different parts of the country. The commonest way in which such duplication arises is the fact that paddies are called after the names of the places from which they may have come into any particular village, and with every such migration, there is the chance for a new name. But even allowing for all such doubtful or nominal varieties, the number of varieties in the State is truly remarkable. They differ in the colour and fineness of the grain, in the period of growth, in the adaptability to different conditions of water supply, in their yielding capacities and so on.

The following are some of the chief varieties of the State:—

(a) *Maidān varieties*:—

- (1) Dodda Byra, grown under “punije” methods, a coarse long duration variety,
- (2) Bolu Mallige, a medium quality general in Tumkur and parts of Bangalore and Mysore,
- (3) Maralkanti, a coarse paddy general in Tumkur,
- (4) Kembuti Sanna,
- (5) Patsōmnahalli Sanna,

- (6) Bile Sanna,
- (7) Saklāti Sanna, all main season fine varieties common in the Cauvery channel tract,
- (8) Kaddi Sanna, a medium quality main season paddy in the same tract,
- (9) Hālubbalu, a short season (4 months) paddy of medium quality, very general in Tumkur and Chitaldrug, fit both for the Kārthik and the Vaisāke seasons,
- (10) Kapile Sanna, a short season fine variety, superior to Hālubbalu and grown largely in the Goribidnur, Maddagiri and Koratagere taluks, and
- (11) Chintamani Sanna, a main season superior paddy, general in Kolar and parts of Bangalore.

(b) *Malnād varieties* :—

- (1) Dabbinsāle, a main season variety with thick white rice,
- (2) Sidsale, and
- (3) Shimoga Sanna, both medium quality white rice of the main season,
- (4) Jeddu,
- (5) Hegge, and
- (6) Jolaga, very coarse varieties of the Malnād, giving red rice and used considerably for making parched rice (Kudapal akki).

In most *Maidān* parts, two crops of paddy are grown in a year, the *Kārthike* or rainy season crop and the *Vaisāke* or the hot weather crop. Cropping seasons.

The commonest rotation is that of paddy with sugar-cane. Occasionally, white jola and fodder jola are grown on paddy land; especially when it appears likely that the water-supply will not be sufficient for a paddy crop. In this case, the jola is grown from February to June under irrigation, while the paddy is grown as a *Mungar* crop from May to August. Paddy land is also at times planted with plantains for about three years. Transplanted ragi is grown as a summer as well as rain crop in rotation with paddy. In some parts, garden crops such as tobacco, Rotation.

chillies, brinjals, turmeric, garlic and onions, are at times grown in rotation with paddy on soils that do not become waterlogged.

In localities where rice is sown early in May, Bengal gram, black gram, green gram, and fenugreek are raised in the autumn and winter months. Under the Marikanave tank, every description of dry and garden crop is raised in rotation with paddy.

Preparation
of rice fields.

Rice is grown in embanked fields. Level or nearly level beds are necessary, because rain or irrigation water must be impounded and kept at a height which should vary as the crop grows. Small sized fields are the rule in the highly terraced lands under the Cauvery channels while under the tanks in Kolar and Tumkur Districts larger fields are possible and are general.

Rice is cultivated in different ways, *viz* :—

(1) the seed is sown dry much in the same way as a dry crop and either broadcast or in drills ;

(2) the field is puddled and the seeds previously sprouted are sown broadcast ;

(3) the field is puddled and then seedlings raised separately are transplanted into the fields.

The various methods are described below.

“Puniji”
cultivation.

The “Puniji” or “dry” cultivation of paddy called also “Barabatta” is done mostly in the districts of Bangalore and Kolar for the *Kārthike* or the rainy season of paddy under tanks. The variety usually grown in this way is the “Dodda Baira.” The cultivation is as follows:—The land is ploughed twice or thrice in the early rains till about June ; when the ground is moist after a rain, with moisture enough for a seed bed, the seed grain is sown broadcast and harrowed in with the wooden “halube.” The crops receive no attention for two months, when irrigation is commenced. After the first flooding the

“halube” is again drawn over the standing crop in the soft mud, the field is then handweeded, and the flooding is continued as in the case of the ordinary paddy cultivation till harvest.

The sowing of sprouted seed in puddled land called “Mole” (sprout) cultivation is followed very extensively under the larger tanks in all the districts, more especially in the case of the *Vaisāke* or summer paddy, that is, the one which is sown about December and harvested about April. The method of cultivation is as follows:—
The field is watered and the soil is softened and then ploughed in puddle. The ploughing is repeated four or five days till the stubble of the old crop rots well and the soil is thoroughly stirred up. The excess water is then drained. Leaves and twigs are spread on the field uniformly and then trampled in; sprouted seed—prepared as described below—is then sown broadcast; the seed sinks in the soft mud and the next day the field is drained thoroughly. For two weeks water is let in carefully for a few hours and drained, till the crop is well established. It is then irrigated copiously; after a month, harrowing is done both by the hand “harrow” and the bullock harrow; this being repeated both crosswise and diagonally. Hand weeding follows and the crop requires no further attention except copious irrigation till harvest.

Puddle
cultivation.

The sprouting of the seed required for this as well as for raising seedlings for transplanting is effected by soaking the seed tied up in a bag or in straw twist for a night in water; the bag is then taken out and the contents heaped in a cool place covered up with straw and leaves; the heap is kept moist for two days, after which the sprouts begin to appear. In some places it is usual to mix the leaves of “Tumbe” (*Phomis esculenta*) with the paddy in the heaps.

Drill sown
paddy.

In the semi-malnād tracts, the system of sowing dry seed paddy (*i.e.*, not sprouted) in drills in the moist (*i.e.*, not puddled) soil somewhat in the manner of the “Puniji” cultivation already described is common. For this purpose, the land is prepared as if for dry cultivation, *i.e.*, frequent ploughings and breaking the clods by working the “Koradu” and the “Heg Kunte”; manure is spread and the seed is sown through four-tined drills and covered with the “Koradu” or “bolukunte.” The field is kept moist but no water is impounded, though rains are frequent. After the crop shows above ground, the “yedekunte” is used between the rows repeatedly, to remove the weeds which spring up in great profusion, and after the “yedekunte,” “the koradu” is used to smoothen the field. The “yedekunte” is also made to straddle the rows at the final hoeing so as to remove weeds close to the rows; water is impounded at the third month after sowing, the “yedekunte” is used once again, this time being worked in the puddle, the “koradu” or the *noli mara*, both being smoothening planks, are made to follow the “yedekunte”; the bruising of the crops by these implements being said to help the crop to tiller; the field is also levelled thereby. More handweeding follows, and the crop thereafter receives no further attention. After harvest, the grain remains unthreshed for a considerable time in these tracts, and is taken up at leisure any time within a month.

Transplanted
paddy.

The method of growing paddy by transplanting seedlings is prevalent largely throughout the State, more largely, however, in the Maidān districts than in the Malnād. This practice has apparently displaced the other methods in many parts of the country, as a comparison of the present practices in these parts with those described by Dr. Buchanan will show. This method of cultivation as carried out in the channel tracts of Mysore is as follows:—The paddy land is ploughed soon after the

harvest of the paddy as early as the condition of the soil will permit it; in the month of April or earlier, provided there is rain, green manure crops are sown. In June, water is let into the fields and the green manure crop is trampled in. The crop rots for a week, when the field is ploughed once again, the bunds are trimmed, and the puddle is levelled. Into this puddle seedlings about 30 days to 45 days old are transplanted in bunches containing from 4 to 15 plants, at intervals of about a span. Water is let in scantily till the yellow of the transplanted seedlings changes into a deep green, after which the field is kept continuously irrigated till about 10 days prior to harvesting when the water is stopped. The crop is harvested and threshed straightway.

The seedlings required for this are raised in a separate nursery; this prepared with great thoroughness, a fine tilth is prepared; a heavy dose of manure such as ashes and cattle manure is applied, and the seed is sown in semi-puddle; a seed rate of about 800 to 1,000 *seers* to an acre is usual, so that the seedlings come up very thick. Seed is usually sown dry but sprouted seed is also sown. Water is let in through small shallow drains till the seedlings come up; after this the plot is watered regularly without flooding the field. Prior to transplantation the plot is flooded to soften the soil.

Among these various methods, the last-named, *viz.*, Yields. transplantation gives a high yield; the expenses of weeding are also less; on the other hand, extra labour is necessary and when such cannot be had, the method cannot be adopted; there is also a great saving in seed; and if economically done, *i.e.*, transplanting the seedlings single or in doubles, the saving may amount to nearly 50 *seers* an acre, as ten *seers* will be enough for such transplantation while 50 to 70 *seers* will be required for broadcasting.

The outturn of paddy varies a great deal; in the Cauvery channel tract, about 15 *pallas* may be taken to be the average. The highest yields are, however, obtained under the tank and well irrigation in Kolar and Tumkur where cultivation is very carefully carried out. From 20 to 25 *pallas* are often obtained on the best lands. The precarious "Punije" will average about 7 to 10 *pallas* an acre.

Preservation.

The grain is always preserved in the husk or in paddy, either in large earthen jars or in pits or store houses strongly floored with plank or in small cylindrical stores made of clay or in bags made of straw called *Mude*. Paddy will keep for two years without deterioration and four years without being unfit for use.

Converting
paddy into
rice.

There are two ways of converting paddy into rice, one by boiling it previously to beating and the other by beating alone. Rice prepared by boiling is called *Kudupalakki*. Five parts of paddy are put into a pot with one part of water and boiled for about two hours, till one or two of the grains burst. It is then spread out in the sun for two hours and the drying is repeated the next day, after which the paddy is immediately beaten.

The rice called *Hasi akki* is never boiled. The paddy is exposed two hours to the sun and subsequently beaten. Beating is performed chiefly by women. The common method is by means of wooden pestle, about four feet in length and three inches in diameter, made of heavy timber and shod with iron. The grain is put in a hole formed in a rock or stone. Sometimes the *Yēta* is used. It is a block of timber fastened to a wooden lever, which is supported on its centre. The woman raises the block by pressing with her foot in the far end of the lever and by removing her foot, allows the block to fall down on the grain. Still another method is to pass the paddy

through a large wooden mill of the same type as the stone grinding mill. However, several rice hulling machines have been recently introduced in the State.

The rice grass-hopper while found widespread in Mysore, has as yet proved a serious pest only in a few isolated localities. The most efficient method of combating these grass-hoppers, according to the Agricultural Department, is by catching them in bags; about which full instruction is given by the Department. The most apparent damage done to the paddy is in cutting through the stem, so that the ears fall to the ground. Rice pests.

In certain years, during the months of August, September and October, when paddy has grown over a foot in height, a serious pest appears in many parts of the State, called *Kokkare rōga*. The popular name describes the usual symptom of the leaves showing white patches here and there and of their tips turning white altogether; the whole crop appears whitish and shrivelled up. The Department suggests a suitable remedy through the use of kerosine oil for effectively dealing with the pest.

Mysore imports a considerable quantity of rice and exports a large amount of paddy to the Madras Presidency. The quantity of rice imported in 1922-23 was 17,671 tons and that of paddy exported 1,967 tons. Exports and Imports.

Sugar-cane may be considered to be the most important money crop of the State. Between 35,000 and 40,000 acres of cane are grown yearly, the area fluctuating greatly from year to year. Sugar-cane
(*Saccharum officinarum*).

It has to be grown only under the most assured sources of irrigation water where water for irrigation can be had all through the year. The important irrigation tract of the channel areas of Mysore where water is let into the channels only during six months of the

year is not at present suitable for sugar-cane for this reason. With the hot weather supply of irrigation water proposed to be given in this tract on the completion of the Krishnarajasagara Dam, a great extension of cane cultivation in this tract may be expected. It is only under the large tanks that cane is grown principally; wells are also dug to supplement the tanks and also as independent sources of irrigation for sugar-cane.

The area under sugar-cane in 1923-24 was distributed as under:—

	Acres.		Acres.
Bangalore	... 4,754	Hassan	... 5,622
Kolar	... 7,545	Shimoga	... 7,672
Tumknr	... 1,344	Kadur	... 2,003
Mysore	... 5,348	Chitaldrug	... 1,178

Total for the State 37,922 acres.

Soils on
which grown.

Sugar-cane thrives best on a light clay with thorough drainage; under most of the tanks, the soils are of this character; in many parts of Kolar and Bangalore, the sugar-cane soils are of a light character; under many of the tanks and channels in Mysore, Tumkur and other districts the sugar-cane soils are very heavy clay. As drainage is very important, the raiyat generally tries to provide it; and further works up his soil with addition of clay or sand to the consistency of a clay loam.

Varieties.

There are three main varieties grown in the State, viz:—

(1) The *Cheni* or *Mara Kabbu*, a thin white cane with a hard rind taking 12 to 18 months to mature, and capable of standing considerable shortage of irrigation water; it gives a juice of high sugar content yielding good firm very light coloured jaggory. This is the cane grown to a large extent in Hassan, Shimoga, Chitaldrug and Mysore.

(2) *Pattapatti*, a red and white stripped cane less hardy than *Cheni*, has a rind not so hard as *Cheni*; matures in 12 months, the juice has a high sugar content and yields a good

quality of jaggory ; it responds well to manuring and irrigation yielding as high as 400 *maunds* of jaggory per acre as a maximum. It is said to have been introduced into the State from Vellore during the reign of Tipu Sultān by one Mustapha Alī Khān, paymaster of the forces. It is now very generally grown throughout the State but largely in Kolar, Bangalore, Tumkur and Mysore.

(3) *Rasdali*, a greenish white soft juicy cane, requiring great attention ; the juice is not so rich as either *Pattapatti* or *Cheni* ; matures in ten months ; is grown largely mixed with *Pattapatti*.

The varieties mentioned above may be taken to be the present local varieties ; in addition, during the last fifteen years as the result of the work of the State Department of Agriculture, several new varieties have been introduced. Among these the Red Mauritius cane has been taken up extensively ; it is a cane with a hard rind, purple in colour, rich in sugar, grows very tall and gives a heavy tonnage per acre. The quality of the jaggory is not so good as that of the local light coloured canes. Besides Red Mauritius cane, Java, B. 208, striped and ashy Mauritius, Elephant cane and several among the new seedling canes originated in the Hebbal Farm may also be found mixed up here and there in many a raiyat's sugar-cane field. These new seedling canes are very large in number and are being tested both on the Government Farms and on private holdings.

The general rotation is of sugar-cane and paddy ; other garden crops, irrigated ragi and jola may also be taken. In the Mysore district, it is usual to take a catch crop of vegetables such as radish, onions and greens under the young cane in the first three months after planting.

Very little ratooning of cane is done in the State except in the Malnād. Even here only a first ratoon is taken and the field is then got ready for paddy.

tion
soil.

The land meant for sugar-cane is given very thorough preparatory tillage; the land is ploughed several times; worked with the *kunte* and harrow; weeds and stubble are gathered and burnt; the clods are broken by mallets; sand or silt is carted and ploughed in; sheep are folded on the land; and cattle manure also applied, usually at from 30 to 60 cartloads an acre. In the case of heavy land, the field is laid into beds 8 to 12 feet broad and as long as the field, and divided from each other by drainage trenches; on these ridges, small pits are made at two feet intervals for receiving the cane sets. In the Kolar District, however, the field is ploughed into ridges and furrows about $1\frac{1}{2}$ to 2 feet apart, and the cane sets are planted in these furrows through which irrigated water is also let in.

Planting
method.

The most common season for planting is February and March. An October planting is also prevalent in parts of Mysore and Tumkur. The crop is propagated generally from sets or cuttings and sometimes by planting whole canes. The sets consist of pieces of cane, each with three eye buds and generally about a foot long. Irrigation is given immediately after planting, either by hand-watering in the case of pit planting or by furrow irrigation in furrow planting.

Manuring.

The manuring consists of 30 to 60 cartloads of cattle manure applied as already stated (or less in case sheep are penned on the land) when the land is being prepared. When the canes are three months old, oil-cakes, *honge* leaves and flowers are applied especially in the Kolar and Bangalore districts. The cake is applied at the rate of 10 *maunds* of 25 lbs. of 1,000 sets. The use of oil-cake and other manures like sulphate of ammonia are being popularised by the Department of Agriculture (see under *Manures*).

Sugar-cane requires constant attention during the first four to six months of its growth. Soon after planting, hand weeding is required, which is repeated as often as necessary. Digging between the rows with a light pick is beneficial. As the crop acquires height, the canes should be supported by earthing them up. This is done three or four months after planting. The canes originally planted in flat beds or in furrows are earthed up with a small hand hoe so as to form ridges the furrows between which serve as water channels for further irrigation. Wrapping the cane in its own dead side-leaves, though costly, is usual and is required where rats, jackals and wild hogs are numerous and destructive.

After
cultivated
under

The crop matures in from 10 to 18 months depending upon the variety.

Harvesting.

The cane is cut with a sharp sickle, one or two inches above the ground. The dry side leaves are striped off with a sickle and the green top leaves removed for fodder. Two or three of the young tops or internodes are removed and are kept aside for being used as seed sets. If these are left on and milled, the resulting jaggory may not set. The cut cane is tied into head-loads or cartloads and carried to the mill.

The cane is crushed in iron mills, the old wooden mills having entirely gone out of use.

Milling and
mills.

The iron mills now used are three roller mills of different makes; one of these is of local origin, *viz.*, the Rickie Mill. This was made by Messrs. Rickie and Co., Engineers of Bangalore, and for a long time commanded a wide sale. A large number of mills are made in Madras foundries, one by Messrs. Gopal Nayakar and Sons is much in use. In Chikballapur, Channarayapatna and Kirangur near Seringapatam and Kunigal, lathes are owned and worked by local people to groove worn rollers

and to make petty repairs. The Department of Agriculture has been popularising the "Nahan" bullock power mill which is made in the Punjab, as it gives a high extraction and is substantially built.

Jaggory
boiling
furnaces.

The furnace over which the juice is boiled is an open hearth dug in the ground sometimes constructed half way up the middle to receive a crude substitute for fire bars; or often without any such arrangement at all. The top of the hearth is shaped so as to receive a large round open iron pan with flaring sides in which the juice is boiled. One or two holes in the ground by the side of the pan serve as a vent for the smoke to escape. These pans take enough juice to make three *maunds* (or 75 lbs.) of jaggory at one charge. The juice is strained and put into the pan, and a quantity of slaked lime is added which is decided by the experience of one or more trial boilings. In certain places, quick lime powder is added instead of slaked lime and in certain parts of Kolar where "Country sugar" is made, no lime is added at all. As the juice heats up, the scum which forms is removed by little basket ladles or metal ladles, especially in Kolar and Bangalore; elsewhere the scum is not removed at all.

Jaggory
boiling.

Brisk heating is continued and the stage to stop the heating and remove the pan from the fire is a matter of experience; a little of the thick syrup taken out quickly on the finger point should be able to set with a little kneading and cooling. The professional men are very good judges on the whole and rarely make a mistake. The pan is removed from the fire at this stage, is stirred with long handled wooden stirrers and then poured into a wooden cooling trough from which after a little while it is emptied into moulds to set into jaggory. As it is made in Bangalore and Kolar, the cooling

takes place in the pan itself and when sufficiently cooled and thickened, the mass is taken out in large or small handfuls and rolled between the hands into large balls (in the Bangalore District) or into small ones of the size of pastry cakes (in Kolar). In Chitaldrug and parts of Hassan, the syrup is allowed to set as a large one inch thick slab which is then broken up. In the Malnād the jaggory does not set and even if it does, in the monsoon it begins to run; for this reason, the thick syrup is poured into pots and is preserved as a massecuite. In Kolar and Bangalore, it is also usual to rub down the whole of the concentrated syrup, as it cools and solidifies in the pan, into a fine powder which is sold as "Makudam" sugar; when the colour is good and the powder uniform without any lumps of jaggory in it, it fetches as high a price as sugar.

In Kolar, again, especially in Sidlaghatta, Bowringpet and Mulbagal Taluks, there are establishments for making local white sugar by a system akin to the old West Indian method of "Claying sugar." For this purpose, the juice is boiled down to a stage just prior to the jaggory stage, *i.e.*, into a good massecuite; it is then poured into pots to crystallise; after a month or three weeks, the pots are punctured at the bottom so that the molasses could drain; when no more molasses drain freely, the pots are broken and the crystalline mass is broken into rough pieces and charged into wicker baskets and covered over with wet moss; more molasses drain out and the sugar also improves in colour; the moss is changed six times, when at the end of 30 days a clear raw sugar results; this is later on dissolved in water and boiled and the syrup is rubbed down so that a fine soft white sugar results, fetching a price much higher than that of even refined sugar. These establishments had all gone out of operation for many years

Country
sugar.

owing to the competition of cheap imported sugar, but reopened after the last War broke out in Europe. They have nearly all shut down again with the return of normal conditions.

Yields.

The outturn of jaggory per acre varies greatly but if the crop has been at all fair, about 150-200 *maunds* of jaggory can be obtained. Yields, however, as high as 500 *maunds* are reported.

Sugar-cane
and the
Government
Farms.

The Government Farms are all doing considerable work on sugar-cane. At Hebbal, cane varieties are originated and tested; manurial and cultural experiments are conducted; improvements in mills, furnaces and boiling methods are studied; on the Babboor Farm, sugar-cane cultivation is on a large scale and is conducted as a commercial undertaking with experiments in large scale methods, and with varieties and manures incidentally. In Nagenahalli (Mysore District), varietal trials are conducted and good varieties multiplied for seed distribution in the channel tract. The large sale of new mills, new varieties of cane, planting of canes in wider rows, the extended use of oil-cake manure, and the adoption of furnaces with chimneys, fire bars, etc., are all results based on the work of these farms.

IV. GARDEN CROPS.

Areca Palm.

The areca palm (*Areca catechu*) belongs to the group of palms of which the other common representatives in Mysore are the cocoa-nut, date, *bagini* (*Caryota urens*), *kiri ichalu* (*Phœnix acaulis*) and *thadasalu* (*Arenga wightii*). It has an elegant, straight and unbranched stem with a crown of green leaves at the top. Next to the cocoa-nut, it is economically the most important palm, every part of it being useful to man in one form or another.

The total area under areca palm during 1922-23 was 53,242 acres. It is most extensively grown in the *Malnād* or western part of the State and especially in the *Malnād* of the Shimoga District. The following are the figures for the various districts in 1922-23 :—

Acres.			Acres.		
Bangalore	...	756	Hassan	...	2,321
Kolar	...	636	Shimoga	...	15,409
Tumkur	...	7,994	Kadur	...	6,497
Mysore	...	3,403	Chitaldrug	...	3,226

Total area for the State : 53,242 acres.

In the *Malnād*, the gardens run in long ranges and are situated in valleys where they are sheltered from heavy winds and have an assured supply of water during the summer months. The ranges are bordered on the sides by virgin forests of great luxuriance which serve both as wind belts and as store houses for green manure and fuel for the cultivator. In some of the *Maidān* parts, the gardens are commanded by at least one tank. In other parts, they lie in the open plains, side by side with wet lands and one or more wells dug in the garden serve as a source of irrigation. In a few other places, they lie along the banks of rivers. In any case, one must have an assured supply of water to grow areca-nut successfully.

The trees are almost always planted in rows. Usually and almost invariably in the *Malnād*, a drainage channel is found after every two rows. The normal number of bearing trees per acre is usually four hundred, though it is not uncommon to find a much larger number.

There are no markedly distinct varieties, if we except the sweet variety found in small numbers in the *Malnād*.

The usual custom is to plant the seed-nuts in a nursery and, when they have sprouted and grown sufficiently, to

transplant them farther apart, either in a nursery plot or near the drainage channels. When the plants are from three to four years old, they are planted out in gaps in the gardens, in pits, one and a half to three feet deep and three feet square.

Growth.

The plants continue their vegetative growth for about eight years and then put out their first flower stalk.

Manuring.

In parts of the *Maidān*, the gardens do not receive any manure. In some places, the river floods the gardens and a valuable amount of silt is left. In other parts the gardens receive a heavy application of cattle manure. Tank silt is also used. In the *Malnād*, cattle manure is always supplemented by green manure. The Agricultural Department is carrying on experiments in manuring areca gardens.

Crops associated with areca-nut.

In areca gardens, one or more of the following subsidiary crops are also grown, *viz.*, betel-vines, plantains, pepper-vines and cardamoms.

Laying out a new garden.

A suitable piece of land is selected (in a valley in the *Malnād* and under a tank or in a fertile area in the *Maidān* tracts) for making a new plantation. All scrub jungle and roots of dead and decaying trees are removed. Ridges are formed and channels are dug. Plantains are planted about eight feet apart, two rows being put in on each plot of ground situated between two trenches or channels. When the plantains have grown for about twelve months, young areca plants are planted in pits dug in the same rows. The plantains serve to protect the young areca palms from sun and rain and later act as wind breaks to check the velocity of the wind in the monsoon. When the areca palms have grown for sometime, cardamom plants are put in along the channels

and pepper vines are trained to the stems of the areca palm later on.

After a period of about twenty years, fresh areca palms are planted so that a fresh lot may come into bearing, in the place of those that have become old and ceased to yield. The gardens have always gaps owing to some of the trees dying a natural death, others being blown down by wind, while the damaged ones are cut down. Life of the palm.

In the *Malnād* there are at least three harvests, the first one in September, the second in October, and the last in December, and in the *Maidān*, only two, in September and December respectively. Harvesting.

There are several ways of harvesting the nuts. In *Malnād*, the climber, after climbing the tree, cuts the bunch and sends it down by sliding it along a rope. In other arecas, the bunch is cut and allowed to drop when it is caught in a blanket stretched tight a few feet above the ground. In other cases, a small gunny bag is thrown up to meet the falling bunch. In other areas, especially in the *Maidān*, the nuts are allowed to harden and the bunches are pulled down by means of a sickle attached to a long bamboo. There is a wastage of labour in collecting the produce under this method.

Each tree yields, on an average, two to three bunches and an acre in the *Malnād* gives roughly 800 to 1,000 bunches. Each bunch consists on an average of 200 to 250 nuts so that the total yield in an acre is $1\frac{1}{2}$ to 2 lakhs. The actual yield in dried nuts varies from 20 to 40 *maunds* per acre. Outturn.

The bunches are either brought home or piled up in a cool and shady part of the garden where they are shelled. There are two types of implements used in Shelling and curing the nuts.

shelling areca-nuts, one a small curved knife with a sharp point and the other a flat knife. The husk represents roughly 65 per cent of the total weight of the green nuts. The subsequent operations differ in different parts of the State. The nuts are boiled whole in some places, in some places they are cut into two or more pieces. In the *Mulnād* the "Batlu adike," *i.e.*, nuts cut into two across the length, are made; in Sira and Maddagiri, "Chooru adike," *i.e.*, nuts cut into eight or six pieces lengthwise and crosswise are made; in Chamarajnagar the nuts are just jammed flat and boiled and the kind called "Jajju adike" are made. Other fancy kinds are also prepared. When they are boiled in water, various organic and inorganic ingredients are used in conjunction with water to prevent excessive removal of tannin and to improve the colour of the nuts. The substance used for this called "chogaru" is the inspissated remains of the liquor in which the nuts were boiled in the previous year. When required for the first time, the "chogaru" is prepared by powdering up roots of *manjatti* (*Pterocarpus santalinus*), a piece of *Raktahonne* (*Aderianthera pavoria*), a large bundle of "nerale" bark (*Eugenia jambalona*), and boiling the mass in water to which betel leaves and a lump of lime of the size of an orange are added. The mixture is boiled down to a thick consistency, filtered and kept for use. Before boiling the nuts, this is mixed with an equal quantity of water and used; after the season's boiling is over, the liquid which remains in the cauldron is dried into a solid and kept as "chogaru" for the next season.

The nuts are taken out by means of a perforated ladle which allows for straining. They are then exposed to the sun for six to eight days or dried over a fire.

A special drying apparatus, manufactured by the Tyneside Foundry and Engineering Works, was imported

by the Agricultural Department and has given very encouraging results.

The nuts are used for chewing and manufacture of *catechu*. The stem is used as fuel and for pillars in constructing sheds, etc., and split into two, as channels to transport water from place to place. Split items are used for rafters, fencing, manufacture of torches and for making sides of country carts, and weirs for catching fish.

Uses of the various parts of the Areca palm.

The midribs of leaves are used as brooms and the leaves for thatching.

The disease known as *Kolerōga* in which the nuts rot and drop off is the most serious of all areca-nut diseases, causing as it does annual losses estimated at Rs. 4,00,000. The Department of Agriculture recommends the spraying of the bunches with a special Boardeaux mixture; the method has been taken up by garden owners and the disease has been greatly checked.

Areca-nut pests and diseases.

Anaberōga is a disease which attacks the roots and the stems and brings about the death of the tree. The treatment recommended is the burning of the affected plant.

Brownspot of the areca-nut is another disease which attacks the nut and makes it rot. The disease is, however, not yet serious.

Hidimundige is a disease in which the stem becomes constricted at the top and the whole crown of leaves becomes gradually smaller. Finally the top dries and falls off. This is attributed to faulty nutrition.

The export of areca-nut in 1922-23 was 1,578 tons.

Export.

The cocoa-nut, an important plantation crop, is grown by itself or in gardens in conjunction with areca, mango, jack and other fruit trees. Except in the taluks of

Cocoa-nuts (*Cocos nucifera*.)

Tiptur, Chiknayakanhalli, Arsikere and that neighbourhood, cocoa-nuts are grown in gardens capable of irrigation from tanks or flooded by rivers. In the former area, the broad and shallow valleys that are characteristic of the tract are planted with cocoa-nuts; the system of cultivation is such that with ordinary rainfall the gardens thrive. In the taluks of Kankanhalli and Chamrajnagar the gardens are made along the river banks which in the latter taluk overflows into the gardens with its silt-laden flood water. Everywhere else the "Bagayat" or gardens under the tanks carry a mixed crop of cocoa-nut with the other crops mentioned above.

Area under
crop.

The area under cocoa-nuts in the State is over 122,970 acres. This acreage was thus distributed in 1922-23 over the State:—

	Acres.		Acres.
Bangalore	... 3,925	Hassan	... 29,465
Kolar	... 1,427	Shimoga	... 149
Tumkur	... 50,772	Kadur	... 15,899
Mysore	... 10,873	Chitaldrug	... 10,460

Soils.

Cocoa-nuts are grown generally on the light sandy soils; but the heavy rich clays under most of the tanks also give excellent crops; the soils of the "Kushki bagayat" plantations round Tiptur and Chiknayakanhalli are light red loams and light coloured sandy loams.

Varieties.

Several varieties of the cocoa-nut can be seen in the State; no attempt is made anywhere to grow any variety by itself; all the varieties are grown promiscuously. The varieties are distinguished by differences not only in the size, shape and colour of the nuts but also in the character of the nuts as also in the character of the meat inside. Classed according to colour there are:—

- | | |
|----------------------|-----------------------|
| (1) the dark green, | (3) reddish yellow, |
| (2) the light green, | (4) light orange red. |

According to size, there are large, medium and shell sized

nuts which are apparently distinct varieties. The medium sized ones are preferred as they give a large number of average nuts per tree. According to shape, there are the round type which is general and a longish type which under the name of "Gangapāni" nuts is to be seen in certain gardens in Tiptur.

As regards the character of the meat, most varieties have a firm and thick layer giving a high percentage of copra; in others, the meat is thin, though the nut may be large; there are also special varieties; one of these has a soft buttery kind of meat which can be squeezed between the fingers; in another, both shell and meat are very thin. In the case of the Gangapāni and the ornamental orange red cocoa-nuts, the tender cocoa-nuts form a very sweet drink and are specially esteemed for this purpose. Probably the various characters are correlated with one another but the matter requires study.

To start a plantation large dead ripe seednuts, *i.e.*, unhusked ones are selected; those which drop naturally from the trees are preferred. A nursery bed is prepared by digging the soil two feet deep, then leaving it to weather, then filling the pit with sand nearly to the top, laying the seednuts close to each other with the germ end upwards or pointing sideways; they are then covered with soil mixed with sand. The nursery is watered frequently to keep it moist; seedlings fit for transplanting will be ready in three months. Seedlings are transplanted either in their permanent places in the garden or merely to give them more room to grow into larger seedlings. Seedlings more than a year are seldom used for transplanting; but in Tiptur it is also common to plant three years old plants called "Goppe Sosi."

Starting a
plantation.

In the dry land plantations of Tiptur and Chiknayakanhalli, the seedlings are planted at distances of 36 feet each way; more than 40 trees to the acre are seldom planted;

where the gardens are commanded by tanks, they are planted closer to give as many as 60 to 70 trees per acre. For the planting of the seedlings, pits about a yard deep are dug and filled with earth mixed with manure and sand quite up to the top. It is believed that the cocoa-nut should not be planted deep.

In the gardens under tanks, moisture is abundant as they are irrigated whenever necessary ; in the dry land gardens, tillage takes its place ; the gardens have to be ploughed six times in the year, the earlier ploughings help to soak up the rains and the later ones to retain the moisture in the soil. Manure in the shape of sand and red earth and cattle manure is applied about the middle of the year. In gardens, a good digging up is given after the North-East Monsoons are over about January and February.

Harvest and
yields.

The trees begin to bear from the 7th year, more generally from the 10th and continue to bear, it is said, for 100 years. About 100 nuts per year will be the yield of an average well-grown tree. Produce is gathered mostly from the month of October onwards. Except in the Tiptur neighbourhood, the nuts are gathered when they are quite ripe from the trees and sold in the shell. In the Tiptur area, they are allowed to ripen completely and drop. They are gathered and stacked ; when a sufficient number accumulates, they are husked in such a way that both husk and shell are removed and the kernel (called " Gitaku ") is got intact ; they are sold straightway. A thousand cocoa-nuts will give from 10 to 13 maunds of copra of this kind.

The copra so made is sold for use in confectionery and is too valuable to be used for the extraction of oil. Only those which become mouldy and unfit for this purpose are used for extracting oil.

Coir.

Coir, the most important bye-product of the cocoa-nut tree, is made only in the areas where the cocoa-nuts are

picked for the sake of the nuts in the shell, *i.e.*, before they are dead ripe. With dead ripe cocoa-nuts, the fibre is very coarse and woody. The best coir is made from the husks of the cocoa-nuts which are picked young for the sake of the cool refreshing drink they afford at this stage.

Special shows of cocoa-nuts and cocoa-nut products have been held by the Department of Agriculture to demonstrate strikingly the uses of the cocoa-nut palm; special manures are being popularised; the Government also sent at the cost of the State certain selected merchants to study the manufacture of copra and coir in Ceylon and Travancore.

Special shows
of cocoa-nuts.

The export of cocoa-nuts and copra is valued at about Rs. 53 lakhs (1922-23).

Export.

The betel-vine thrives best in low ground where it can have a supply of water. A black soil is required. In the western parts of the State, the betel-vine is grown with areca palm.

Betel vine
(*Piper betel*).

In the eastern parts, the garden is divided into rows, 10 cubits in width, having on one side an elevated channel for supplying it with water and on the other side, a canal to carry off what is superfluous. The rows are divided into beds. In the centre of each division, a row of small holes is formed, each one cubit distant from the other. In December or January, in every hole, two cuttings of the vine are put, each two cubits long and covered with earth. The shoots are watered regularly; while the four ends project and form an equal number of young plants, they are allowed to climb upon dry sticks, put in for the purpose. In small drills made across each of the beds, are planted rows of the seeds of the *agase*, *nugge*, and *verjpu*. The garden should be kept clean of weeds and manured once a year. When the plants are a year and a half old, they are

Cultivation.

detached from the sticks, two cubits of each are buried in the ground and the remainder, conducted close to the root of one of the young trees, is allowed to support itself on the stem. At the end of two years, two cubits more of each plant are buried in the ground and ever afterwards, this is once a year repeated. A plantain tree is planted at each corner of the bed to give additional coolness to the garden.

In the western parts, where the betel-vine is grown with areca palm, when the plantain is fifteen years old, a hole is dug near every tree, one cubit deep and one and a half in width. The ends of five cuttings of the betel-vine are buried in each hole with the upper extremity sloping towards the palms. In the second year, the vines are tied up to the palm. In the third year, and every other year, so much of the vines next the root as have no leaf must be buried.

Harvest.

At the beginning of the fourth year, the cultivator begins to gather the leaves for sale and for 15 to 20 years, continues to obtain a constant supply. Afterwards, the plants die and a new garden is formed. From 4 to 6 pickings a year are had; the money value of the produce of an acre may come to Rs. 2,000 but few raiyats do more than 1-10th of an acre as the cultivation is very laborious and has to be all done by manual labour.

How used.

The leaves are extensively used in the Indian household for chewing with areca-nut.

Coffee. (*Coffea* *Arabica*.)

The coffee plant (*Coffea arabica*) is believed to be a native of Abyssinia and most writers agree that it was brought to Mysore about two centuries ago by one Baba Budan who had made a pilgrimage to Mecca. The plant is a many branched small tree or bush, which if left to grow naturally, is 15 to 20 feet high and bears white flowers resembling orange blossom.

Coffee unfortunately registers a continued decline with 122,000 acres in 1914-1915, 108,000 in 1915-1916 and 104,000 in 1916-1917. There was a slight rise with 108,175 acres in 1917-1918 and 110,066 in 1918-1919. But it again began to decline with 106,066 acres in 1919-1920, 106,946 in 1920-1921, 103,951 in 1921-1922, 103,800 in 1922-1923 and 97,585 in 1923-24. The following are the acreage figures from 1916-1917 to 1923-1924:—

Area under
crop.

Acres.		Acres.	
1916-17	... 104,416	1920-21	... 106,949
1917-18	... 108,175	1921-22	... 103,951
1918-19	... 110,066	1922-23	... 103,800
1919-20	... 106,066	1923-24	... 97,585

Coffee grows best at altitudes between 2,000 and 5,000 feet with a rainfall of 60 to 90 inches and a temperate climate. Sloping or even fairly steep land is suitable, provided that surface erosion is prevented; good natural drainage is important and flat and wet lands are unsuitable.

Selection of
land.

There are five descriptions of land in Mysore in which coffee has been planted :—

(1) The forests termed *kans* generally situated in mountainous country intersected by streams of clear water, with rocky or sandy beds,

(2) Heavy ghat forests termed *male*,

(3) Village jungles termed *uduve*,

(4) *kumri*, or land, the original timber on which having been cut, has been followed by a secondary growth of trees of a smaller type and

(5) *Kanave*, or land covered with hard wood-trees or bamboos.

Some of the finest estates have been formed on lands of the first and third classes which have the decided advantage of possessing a rich deposit of decayed vegetable mould that has not been exposed to atmospheric influences, and hence contain an almost inexhaustible store of organic and

inorganic constituents available as food for the coffee plant.

Soil

The land selected for growing coffee should be a rich sandy loam containing an abundance of humus with a well drained gravelly sub-soil. If clayey soils are used, they must be frequently limed.

Preparation of the land.

The best plan is, after felling and clearing the land, to remove all the stumps of the jungle trees, and then to fork the whole clearing, two feet deep, taking out as many roots as possible. The stumps and roots removed should be subsequently burnt. This work should be done at the beginning of the dry weather and with the first rains, the whole clearing should be thickly sown with a green dressing crop and the permanent shade trees planted and the pits for the coffee plants made.

Selection of seed.

Seed should be obtained from healthy strong trees known to be good croppers and should be fully ripe. The seed should be obtained from another estate or preferably district and only the very best, perfectly shaped beans selected for sowing.

Nurseries.

A light sand soil not too far from a supply of water may be selected. The soil should be dug deeply and reduced to a fine tilth and made up into beds about four feet wide with paths between them. The whole nursery should be well drained. The seeds should be sown in rows at least six inches apart. The beds are shaded by means of *pandāls* about six feet high and the beds are watered by hand as often as necessary and kept carefully free of all weeds. The plants are also grown in baskets.

Planting.

The one or two years old nursery plants are put in five

or six feet apart each way or even wider in pits about two feet deep.

When the land is cleared for planting, the drainage system should be laid out. Main drains about four feet deep and two feet wide at the top should be made in the direction of the natural flow of the surface water, and may be put about eighty to one hundred yards apart. The side drains should be three feet deep and eighteen inches wide at the top and should follow the contour of the land, the distance between them depending upon the nature of the soil and climate. Drainage.

It is necessary to grow coffee under shade in South India. As to the best trees suitable for shade, there is much difference of opinion. Probably the best all-round shade tree is the silver oak. After a few years when the tree grows big, the shade needs careful regulation from time to time to prevent its getting too dense, and each coffee grower must find out for himself the best amount of shade for his particular garden and keep it regulated. It will be good to arrange the shade by a number of different trees of different varieties, ages, and sizes throughout the estate. Shade.

The young trees are usually topped by cutting off the leading shoot with a sharp knife, when they are about five feet high. Topping.

The principal objects are to secure the plants against wind and storm and to make it easier to collect the crop. Topping checks a too free upward growth and causes the plant to branch freely.

Careful pruning is really important and where it is neglected, poor crops will usually follow. Pruning.

The object of pruning is to divert the energies of the plant from forming wood, and to concentrate them upon forming fruit.

Weeding.

As a general rule, a coffee estate should be kept clean and as free as possible from weeds.

Mulching.

The shade trees establish a thick mulch of leaves on the surface of the ground and this mulch plays an important part in the success of the coffee cultivation, as it tends to preserve moisture and also to supply plant food and humus to the soil. It is in fact a most valuable manure.

Manuring.

Coffee is an exhausting crop when in full bearing and requires manure regularly.

Nitrogen, phosphoric acid, potash and lime must all be present in sufficient quantities, if a good crop is to be grown.

As a general rule, it is best to broadcast all fertilisers and lightly work them into the top two inches of the soil. Where there is a good mulch of leaves, these should first be swept up into heaps round the stems of the trees. The ground should not be scraped. Between the rows, the manure should be broadcasted and spread as evenly as possible. Under no circumstances should any manures be applied close to the stems of the bushes. Manure should be put out as soon as the heavy monsoon rain is over. As a fertiliser, cattle manure is a complete manure.

Another source of nitrogenous manure is a composition made out of waste materials, such as coffee pulp, line sweepings and estate sweepings, etc.; another natural manure of great value is bone. Artificial manures are also useful to supplement the above.

Harvest.

Good trees will yield a first crop in two years but this is left ungathered, the berries being stripped off before they

develop. If a maiden crop from three year old trees is a heavy one, it is thinned, otherwise there will be little crop in the following year. Full crops may be taken in the fourth year and thereafter. The fruits commence to ripen in October or early in November and continue till January.

Directly the berries are ripe and have begun to turn red, they must be picked. Handling of the crop.

The ripe coffee fruit is termed the cherry, the succulent outer coat of the fruit, the pulp, the inner adhesive layer, the parchment, and the seed coat within the parchment which adheres closely to the seed, the silver skin. The preparation of coffee beans from the cherry is accomplished in the following stages, pulping, fermenting, drying, peeling, milling or hulling and sizing or winnowing. Pulping is done by hand or by machinery. The beans are then fermented to remove a sticky mucilaginous substance. The produce gathered in a day is put into a vat and left for 24 to 36 hours until fermentation sets in. The fermented beans are washed by a stream of water and are cleaned. The washed beans are then carried to the drying floors and exposed to sun and air. Peeling means the removal of parchment and silver skin from the beans, by pounding or by machinery. The parchment coffee is well warmed in the sun before it is peeled and the peeling is not undertaken on a wet or damp day. Manufacture.

The parchment is best sent to the curers at the coast where it undergoes the final process of peeling, polishing and grading.

The average yield from matured plants is from 300 to 400 lbs. of clean coffee per acre. Prices vary according to the size, colour, smell, flavour and uniformity of the coffee beans. Outturn.

Quality.

The Mysore coffee has a high reputation, the best quality of which is commonly quoted at 10s. to 15s. a cwt., above that of any other kind that reaches the London market. This is attributed partly to the soil and climate, and partly to the coffee being slowly ripened under shade.

Coffee diseases.

Of the diseases to which the coffee plant is subject in Mysore, leaf disease is the growth of a fungus named *Hemileia vastatrix*, which distributes its spores in the form of yellow powder. The effect is to strip the tree more or less of its foliage. The disease called *borer* is due to a beetle (*Xylotrechus quadripes*) black with white lines and about as large as a horsefly. Coffee trees attacked by the *borer* wither away. Another disease of coffee is called *rot*, also the growth of a fungus named *Corticium kolerōga*, which covers the leaves and berries with a black slime, which causes them to rot away.

The green bug or the green *scale* of coffee, has always been regarded as a most serious enemy, but fortunately for Mysore the weather conditions do not permit the continued multiplication of the insect so that in normal years nothing serious need be apprehended.

The die back of coffee.

The die back of coffee is a disease which seems to be increasing in seriousness. It is marked by the dying off of young coffee twigs and is accompanied by a particular fungus *Glucosporium coffeanum* on the twigs.

The Agricultural Department is dealing exhaustively with the diseases.

Other money crops: the Potato (*Solanum tuberosum*).

The potato is another crop new to the State the cultivation of which in recent years has extended greatly. It is chiefly confined to the taluks of Bangalore, Hoskote, Devanahalli, Chikballapur, Malur and Sidlaghatta. The extent of land under potato during the year 1922-1923 in the State was 3,726 acres, and in the year 1923-24, 5688 acres.

The soils on which the crop is grown are mostly the typical red loams of these tracts, some of them strongly lateritic with a considerable mixture of fine laterite nodules of the size of a pepper corn. Water is invariably available in these localities within about 20 feet; rectangular wells are dug and water is baled out by means of the picotah; naturally, under these conditions, individual raiyats can cultivate only from half an acre to an acre. The varieties grown are:—

Soils on
which grown
and varieties

(1) a round type with pronounced eyes, and with a yellow waxy flesh called "country" and

(2) a kidney shaped or oval type called "Ricketts" which is smooth and white and mealy.

Seed is continuously replenished from Italy, consignments from which country arrive in Bombay and are grown in Poona in the first season, in Belgaum and Dharwar in the second and in Mysore in the third season, *i.e.*, the second year after arrival in India. In some parts, seeds got out directly from Italy are also planted.

The land meant for potatoes is well dug by hand implements and allowed to dry; it is then broken up, cleared of weeds and other rubbish, and manured with about 50 cartloads of cattle manure per acre. The field is then laid into beds for irrigation and furrows are made from 9 inches to 1 foot apart. Planting is done in two seasons, one, a rainy season planting done in July and another, a "Vaisāke" planting in November and December. Seed potatoes showing eye buds fairly starting into growth are selected; each tuber is cut into two or three pieces each having at least one eye, the raiyat being exceedingly economical here in this respect; 30 *maunds* of tubers are required per acre. The cut sets are planted very close in the furrows at distances of 4 inches from each other and covered over lightly with soil; water is let into furrows and every three days or oftener, if the soil should require it, irrigation is given. In 15 days the sprouts

Cultivation:
yields.

appear quite above ground and in a month grow with great rapidity; the field is now hand weeded thoroughly and the rows are earthed up, the ridges being split and converted into furrows. In three months the crop matures, the plants yellowing and drying up. The crop is then dug up, and laid into heaps in the field or in sheds and covered over; it is not handled for a week at least as the skin is liable to be rubbed off otherwise. After this time, the skin becomes firm and the potatoes are ready for sale. If there should be no disease and if the season should be favourable, very heavy crops of up to 400 *maunds* an acre of average size potatoes are obtained. Three hundred *maunds* is reckoned a good yield.

Potato
diseases and
pests.

Owing to the prevalence of 'Ring disease,' there is considerable risk in the crop; plants affected will die when they are about 12 months old; sometimes when disease is very bad, the loss may be 30 per cent. The potato moth is another enemy, this attacking stored potatoes.

The bulk of the potato crop of the State is exported to Madras and Ceylon.

Mulberry
(*Morus*
indica).

The rearing of the silk is a very large industry in the State and the cultivation of the mulberry for the feeding of the worm is carried on fairly extensively. The total land under mulberry in the State during the year 1922-1923 was 33,552 acres and during 1923-1924, 29,589 acres. The cultivation of the mulberry is as described below:—

Taluks in
which grown.

The mulberry crop is a well established crop in the Taluks of Channapatna, Closepet, Sidlaghatta, Kolar, Chikballapur, Hoskote, Kunigal and Mandya as an irrigated crop and in T.-Narsipur and Chamrajnagar as a dry land crop. The cultivation is steadily extending into new areas as a result of the newly established Department of Sericulture and of the high prices ruling for silk.

The dry land mulberry can be grown only on the heavy black cotton soil on which sufficient moisture is retained to keep the crop alive through the hot weather months. The bulk of the mulberry is, however, under irrigation and is grown on both heavy clayey soils as well as the red loams of Kolar and Hoskote tracts and the light alluvial soils on the banks of the Arkāvati river in the Closepet Taluk.

Dry land
mulberry.

A good irrigation source is essential, and where it is grown under tanks, wells are dug in the garden to be used when the tank water fails. Throughout the eastern taluks, however, the mulberry is mostly grown under well cultivation.

Irrigated
mulberry.

The variety of mulberry grown is the bush type, which seldom grows more than five or six feet at the most. Of these, two kinds are grown which are however seldom put down separately but are grown mixed together. One of these is distinguished by a whitish stem and the other has a dark green stem and are on this account distinguished as “ vili kaddi ” and “ kari kaddi. ”

Varieties.

A few specimens of tree mulberry may be seen, however, in the Government Sericultural Farms and on the Tata Silk Farm at Bangalore. These have not, however, been taken up by the raiyats ; an attempt is being made to start “ topes ” of tree mulberry in suitable villages.

Tree
mulberry.

The land intended for planting mulberry is invariably dug about three feet deep prior to the hot weather through which the clods dry till the advent of the rains. These are now broken, grass and other weed roots are gathered and removed ; cattle manure is added at about 50 cartloads an acre and the soil is reduced to a fine tilth.

Preparation
of the soil.

Irrigation beds are formed usually about 6 feet broad, each bed being divided from the other by a prominent

Cultivation
methods.

bund ; across the beds little furrows are made at intervals of three feet and in these mulberry cuttings about 12" to 18" long are planted by sticking them slantingly in the soft mud. As the plants grow up, more manure is added and the rows are earthed up; irrigation is given systematically and copiously. The plants are pruned once a year from November to January being cut right down to the base of the plants ; the ground round the base is also dug and manured at this time. The excreta of the worms along with the refuse of the rearing house is also applied as manure. With good irrigation a flush of leaves is ready in a month ; this is stripped for the worms, and in another six weeks there is a second flush of leaves, there being generally six such pickings in the year ; in the taluks of Kolar it is usual to cut the plants right down to the base and carry home the young twigs themselves instead of stripping only the leaves as is done elsewhere. The plants are trimmed thrice a year in this way. In the case of the black cotton soil mulberry raised as a dry crop, there are only three pickings in the year. Raiyats either rear the worms themselves or sell the leaves to rearers.

Yields.

In recent years the leaves from an acre have fetched as much as Rs. 50 per acre per picking, and the six pickings usual in the year have given Rs. 300 an acre. Leaves fetch a higher price in the hot weather.

Miscellaneous
crops:
Baje,
Annatto,
Indigo,
Ginger, and
Ganja.

Among miscellaneous crops may be mentioned Baje (*Acorus calamus*), a medicinal crop grown in puddled fields in the taluk of Koratagere, for the sake of its root stocks which have important medicinal properties ; annatto (*Rangamale*) grown for the sake of the dye prepared from its seeds, which is grown to some extent in the Closepet Taluk ; indigo which was grown in the days prior to synthetic dye at Belakvadi (Mysore), Nadoor, (Sira Taluk) and has again begun to be cultivated near

Mysore, and in certain villages in the Maddagiri and Chikballapur Taluks; pepper, and cardamoms in the Malnād which have been referred to under areca-nut; ginger grown in several areca-nut and plantain gardens; turmeric grown as an important field crop in the Goribidnur Taluk; Ganja (*cannabis sativa*), the narcotic which is grown to a small extent under the supervision of the Excise Department of the State, from whom a special license has to be obtained before any one can attempt the cultivation. Onions and garlic are quite considerable crops in the Chikballapur, Devanhalli, Sidlaghatta, French Rocks and Hunsur Taluks.

A list of the fruits and vegetables grown in the State is given in Volume I, Chapter IV. The Horticultural Department is devoting special attention to the encouragement of fruit cultivation and a survey of the fruit trees in the Bangalore District was carried out by the Superintendent of Gardens in the year 1913-14.

Fruits and
vegetables.

During the season, there is a plentiful supply of oranges, mangoes, plantains, jack-fruits, grapes, figs and rose apples. Apples, pomegranates and peaches are also available; melons are also grown. The plantain, the jack-fruit and the mango are largely availed of by the people as articles of diet. The total extent of land in the State, during 1922-23, under mango was 12,246 acres.

Fruits.

During all the seasons of the year, there is an unfailing supply of indigenous vegetables in the Cities of Bangalore and Mysore and at Bangalore a fairly large supply of cabbages, cauli-flowers, tomatoes, etc. A large quantity of vegetables and beans is exported from Bangalore to the neighbouring British territories.

Vegetables.

V. FARM ANIMALS.

Cattle.

Mysore has, from a very early period, enjoyed a just renown for her superior breed of cattle. The generally mild and salubrious climate of the plateau, with extensive pastures, favoured cattle breeding and attracted nomadic tribes who brought with them excellent breeds which could not fail to improve the indigenous cattle. Cattle play a very important part in local agriculture. Cattle manure serves to enrich the soil. Carts and bullocks enable the removal of manure to distant fields. The operations of ploughing and harrowing the soil, of sowing and thinning the crop and of lifting water from wells for irrigation purposes, are mostly carried on by bullock power. The crop when cut is removed to the threshing floor and trodden out by cattle, and the grain taken to the market in carts drawn by cattle.

Number.

According to the quinquennial census of agricultural stock in the State, held in March and April 1925, the total number of each kind was as follows:—

Bulls	...	...	213,647
Bullocks	...	...	1,327,330
Cows	...	...	1,494,097
<i>Buffaloes—</i>			
(1) Bull	...	...	81,744
(2) Cow	...	...	459,535
Young stock	...	...	993,941
Sheep	...	...	2,492,021
Goats	...	...	1,742,017

During the years 1923 and 1924 owing to the failure of crops over the greater part of the State, there was a serious shortage of fodder. The cattle mortality was very heavy and large numbers were also sold away. The cattle census of 1925 registered therefore a great decline in the cattle

population, the percentage of decline being as shown below :—

Bulls	...	...	2'5
Bullocks	...	...	6'0
Cows	..	...	13'0
<i>Buffaloes—</i>			
(1) Bull	...	...	28'0
(2) Cow	...	...	17'0
Young Stock	...	...	24'0
Sheep	...	...	13'0

Goats alone registered an increase, and very materially, due to the increasing practice of goat keeping by ryots and others as well, because of its hardy nature.

The principal breeds of horned cattle in Mysore are the Amrut Mahal, Mahadesvaran Betta, the Kankanhalli and the village cattle. Breeds.

The Amrut Mahal cattle comprises three varieties or family groups called the Hallikar, Hagalvadi and Chitaldrug from the districts which originally produced them. This is a far famed breed characteristically different from every other Indian breed. It stands in relation to other Indian breeds, much as the thorough bred horse to horses generally. These cattle are of medium size and white or grey in colour. They are fiery tempered and very active, enduring and hardy. The bullocks are essentially suitable for road work and are capable of quick, long journeys under a light or moderate load. They have fine heads, alert ears and long pointed horns, while the compactly proportioned frame, the shapely limbs and the hard, black feet indicate endurance, activity and strength. This breed matures very slowly and the cows are poor milkers. Amrut Mahal.

This breed comes from the jungles and hills near Biligirirangan Betta on the south-eastern frontier of Mahadesvaran Betta.

Mysore. They are larger than the Amrut Mahal cattle, but are loosely made and not well ribbed up. They have heavy loose-hanging dewlaps, sloping broad foreheads and large muzzles. They are very heavy and slow animals.

Kankanhalli. This breed comes from Kankanhalli in the south-east of Mysore; they are very like the Mahadesvaran Betta breed. They have thick horns, broad sloping foreheads and white, very thick skins.

Village cattle. These vary very much in size, colour and characteristics. As a general rule, they are shunted per lactation.

Cows. The indigenous cows are generally poor milkers. Cows from Kankanhalli are said to be the best among the local breeds of cows; under proper feeding and keep such as they get with the milkmen of the towns, they yield up to 4,000 lbs. of milk per lactation.

Palace cattle. The Palace Establishment of His Highness the Maharaja maintains varieties of breeds of superior cattle. The latest addition is a large herd of Scindi cows.

Feeding. The great majority of the live-stock is maintained by grazing during the day and home feeding at night, while considerable numbers are supported either purely on pasturage or are chiefly home fed. All large herds of cattle which are usually kept in the open, are generally maintained on pasturage alone.

Cattle are also allowed to graze in Government forests on payment of a small fee. All village cattle, except valuable bulls and cows which may be specially taken care of, are collected together in the morning and driven out to the village *Gomal* or common where they are grazed. Most of the pasture lands of the country are very indifferent as to soil, and produce scanty, innutritious grass even at the best

of seasons. In the hot weather or during drought, the pastures afford absolutely no grazing.

The Amrut Mahal cattle are kept in grazing grounds called *kavals* under an establishment of graziers and other attendants. These *kavals* are low and sheltered valleys on the catchments of tanks, where pasturage and water are available in the hot weather. The herds are moved about from *kavals* to *kavals* as each *kaval* becomes grazed down. The cattle are brought up in a semi-wild state ; taming and breaking them to work is an arduous operation; the Department holds sales of these cattle yearly ; breeding bulls are also sold at a concession price to *bona fide* breeders.

The chief breeding tracts in the State are the Kankan-
halli Taluk where, along the banks of the Cauvery and
Arkāvati, large herds are kept by breeders. The jungles
and river margins afford good pasturage and water. Breeding
tracts. Breeders have their own *kavals* in which the herds are
kept in the open. One year old and ten months old bull
calves are bought from these men and taken to the villages
far and near to rear. In addition to this taluk, the taluks
of Mandya, Malavalli, Nagamangala and Kunigal also form
notable breeding areas ; in these latter taluks however the
breeders are only the small raiyats who keep one or more
cows of the best Hallikar breeds and put them to bulls of
proven merit and good quality ; great care is taken in the
keeping of these cows ; they are never let out with the other
cattle, they are tethered and grazed under the eye of the
breeder and are led home in the evening ; by this means
crossing with the scrub bulls of the village is prevented.
Both calves and bulls of known parentage fetch fancy
prices. Though no record of pedigree is kept, yet raiyats
know it quite well up to one or two generations ; the
character and performance of any good specimens are
known throughout the tract and remembered even though
the animals may change hands many times. So great is

the demand for the bull calves in this tract that the country is depleted of such, and often hardly a single bull calf of over a year can be seen; it is usual to put cows to the plough in these taluks on account of the scarcity of bull calves.

Rearing of
cattle.

The rearing of cattle is carried on throughout the Maidān districts; the fodder jola often sown as an early *Mungār* crop, the green grazing afforded by the ragi thinnings, the grazing the field margins which are for this purpose kept very large about 20' to 30' broad, jola grown as akadi or mixed crop, the haulms of avare, and horse gram—all these provide a succession of green feed through the season favourable to the rearing of superior cattle.

Cattle fairs,
etc.

Outside the local market, the great customers for the Mysore cattle are dealers from Nellore in Madras and raiyats from the black soil tracts of Dharwar. The annual *jātras* at many of the sacred shrines are also great cattle fairs where magnificent cattle are brought for sale in large numbers; at Chunchinkatte in Mysore, at Nandi in Kolar, at Subrahmaniamghatti near Maklidrug in Bangalore, and at Harihar in Chitaldrug and Rampur in Shimoga, the typical heavy cattle of the State are brought and sold. Small sized cattle fancied by raiyats of the Madras Districts of Arcot, Vellore and Chingleput are picked up mostly in the Kolar District, especially at the Āvani *Jātra*.

In addition to these yearly fairs, cattle are brought by dealers in the villages themselves; about September and October, the Nellore dealers come round and their brokers collect together eligible cattle in specified places; after purchasing, the herds are taken to Bellary, Dharwar and the adjacent northern districts.

Castration.

All male stock other than breeding stock is regularly castrated. The operation is, however, seldom performed

until the animals are about 5 years old. It is believed that early castration interferes with the full bodily development of the animal and that the typical bodily configuration peculiar to these animals becomes altered. The result of this belief, so far as the generality of the cattle of the country is concerned, is that it acts as a hindrance to any scheme of cattle improvement. A large number of scrub bulls move freely in the village herds; many cows are covered by these bulls, some of them immature and nearly all of them very poor specimens of bulls, being more or less mongrel in type. The Veterinary Department is, however, trying to effect a great change in the methods by inducing raiyats to have all their bull calves, other than those intended for breeding purposes, castrated at a very early age. The local methods of castration practised by the raiyat are also crude; they are exceedingly cruel, the animals take a long time to recover and the operation itself is often only imperfectly done. The quick and thorough operation, being popularised by the Veterinary Officers, is much appreciated by the raiyats and many of them gladly bring their animals to be castrated by this method both in the Veterinary Hospitals and elsewhere where Veterinary Officers may be touring for this purpose.

Buffaloes thrive better than ordinary cattle in districts of heavy rainfall, and in rice tracts male buffaloes are extensively used for both tillage and road work. The best are produced in districts of moderate rainfall where conditions for breeding are favourable. They should have access to deep water or be bathed twice daily. Their sparse coarse hair is usually shaved off several times a year. Buffaloes vary in colour, but the majority have black hair and shining black skins. Some have white markings and a few are grey or light dun and very occasionally albino. Their lowing differs from that of kine and they have no hump, while buffalo milk is richer in butter fat than cow's

Buffaloes.

milk. Large male buffaloes are used for heavy cartage. They can draw heavier loads or carry heavier packs than bullocks of the same size.

Varieties.

There are three varieties, the Hullu, the Gaujri or Gujarat, and the Chokkatu, which comes from the country bordering on the river Krishna. The Hullu is by far the most common and is the native breed of the country. The outside breeds are greatly superior in size to the Hullu, but in this country they very soon degenerate. The female of the first breed has a calf every year and gives milk for seven months while the latter breeds once in two or three years only, and gives a large quantity of milk. In recent years, a large number of Delhi and Jafferbadi buffaloes have been imported by the milkmen of Bangalore.

Sheep.

Sheep and goats are bred most successfully in areas receiving a moderate rainfall. Upland or well drained soil, with sparse jungle growth and a considerable variety of natural herbage, is good if of sufficient extent. The notable sheep breeding tracts of the State are Hunsur, Mandya, Channarayapatna, Kolar, Mulbagal and Davan-gere.

Varieties.

There are three varieties, the *Kurubar* or ordinary breed, the *Gollar* which is less common and the *Yelaga* which is the rarest of the three. White, brown and black colours are found in all the three breeds.

The *Kurubar* is a small sheep with horns curling backwards. Both its flesh and wool are superior to those of the other two varieties. The *Gollar* is distinguished from the *Kurubar* by its large size, coarser wool, longer neck and different formation as to the head and jaws. The *Yelaga* is longer in the leg and stands higher than the other breeds, but is less bulky and more resembles a goat in structure.

They are solely dependent on pasturage, being never fed on grain. Feeding.

Sheep, with the exception of *Yelagas*, are shorn twice a year and fifty fleeces amount to about a *maund* weight. Wool.
The wool is coarse, and is made into rough *kambalies*. The shepherd usually hands over a hundred fleeces to the weaver who gives him in return a *kambali*.

There are two kinds of goats, the long legged or *mēke* and the short legged or *kanchi mēke*; but the two can propagate together. Goats.

The rapid increase in the number of goats in the State within the last few years is really an outstanding feature of rural life. The increase within the last five years alone was as high as 36 per cent and this notwithstanding the great fodder famine and the period which reduced the cattle population seriously. In the 1925 census, the number of goats registered was 1,742,017.

Goats live entirely on the leaves of bushes and trees. One male is kept for twenty females. Of those not wanted for breeding, the shepherd sacrifices some for his own use and the remainder he castrates and sells to the butcher. They generally breed once a year, about 4 times, after which they are generally killed by the shepherds for their own use. For three months, the kid is allowed the whole milk; afterwards, the mother is milked once a day for two months.

The most common cattle diseases met with in the State are:—Rinderpest, black-quarter, foot and mouth disease and anthrax. Cattle diseases.

Preventive measures, such as inoculation of all the healthy cattle against the various diseases, have been found very successful. Veterinary hospitals and dispensaries Preventive measures.

have been opened in all the district head-quarters and also in the more important taluk head-quarters. All these institutions are in charge of Assistant Veterinary Inspectors. As soon as any infectious disease breaks out in a village, the village headman is to inform both the Revenue and the Veterinary Officers who make the necessary arrangements to combat the diseases.

VI. IRRIGATION.

Irrigation.

Irrigation forms the subject of a separate Chapter in this Volume, and is also referred to in the earlier part of this Chapter. Without irrigation from wells or tanks or channels, many of the food and commercial crops could not be raised in the State as in other parts of India. Only the direct effects of irrigation on agriculture are indicated below :—

Irrigated area.

The irrigated area during the year 1923-24 was as follows :—

Under Government channels	...	124,609 acres
Under private channels	...	11,920 „
Under tanks	...	465,544 „
Under wells	...	87,001 „
Other sources	...	510,064 „

thus making up a total of 1,199,138 acres or about 16 per cent of the total cropped area.

VII. AGRICULTURAL STATISTICS.

Area available for cultivation.

The net area available for cultivation during the year 1923-24 omitting forests and other lands not available for cultivation was 8,644,125 acres.

Area under occupancy.

The area under occupancy was 7,953,888 acres of which 2,044,645 acres were current fallows. The net area cropped was thus 5,909,243 acres.

The extent of cultivable waste not under occupancy was 690,237 acres, of which 610,179 acres were dry, 62,227 acres wet and 17,831 acres garden. Cultivable waste.

The extent of individual holdings classified is given under "extent and size of holdings."

Classifying the number of holders according to the revenue paid by each of them, the figures stand as follows :— Number of holders according to the amount of revenue paid.

Those paying Rs. 5 and under were 419,508 ; those paying between Rs. 5 and 25 were 436,717 ; those paying between Rs. 25 and 100 were 122,202 ; those paying between Rs. 100 and 500 were 9,235 and those paying above Rs. 500 each were 255.

The incidence of land revenue, per acre, on the fully assessed area, was Rs. 1-4-8 for total area ; for cultivated area, 1-11-10 and Rs. 2-0-5 (excluding excess 2-0-4) per head of population. Incidence of land revenue.

In 1923-24, the number of ploughs was 8,329 of the country wooden type and 8,577 of the improved iron type ; and the number of carts was 26,315. Ploughs and carts.

VIII. AGRICULTURAL CREDIT.

In Mysore, as in other parts of India generally, agriculture is in the hands of small men and the capital required for the cultivation of the soil is supplied in small sums by small capitalists. Very often the peasant has to work on borrowed capital. From time immemorial, the small village banker has had the monopoly of supplying money to the agriculturist. In some parts of the country, the land itself passes either by sale or by usufructuary mortgage into the hands of the money lending class. The transfer of the land to a class which merely speculates on quick returns has contributed not only to the discontent of the peasantry, but also to the impoverishment of the soil. General.

The peasants are, as a class, and with but a few rare exceptions, illiterate and men of small commercial intelligence. They are not yet weaned from costly traditional customs.

It is no doubt true that during the last quarter of a century, the value of land and the prices of agricultural products have increased appreciably and thus the security of the peasant and his credit have been enhanced and his receipts also have increased.

Remedial
measures.

Among the measures adopted from time to time by the Government of His Highness the Maharaja to improve the economic condition of the agriculturists, the following are the most important :—

(i) The formation of Agricultural Banks.

(ii) Grant of loans under Land Improvement Loans Regulation IV of 1890 for the construction or repair of wells or tanks, the reclamation of waste or any other work by which the letting value of land for purposes of agriculture will be permanently increased.

(iii) Grant of loans under Section 194 of the Land Revenue Code—

(1) for the purchase of :—

- (a) seed grain (including seed sugar-cane, seed plantations, etc.),
- (b) ploughing cattle (including cattle used for raising water and carting manure),
- (c) horse and pony stallions and breeding bulls,
- (d) fodder for cattle,
- (e) manure ;

(2) for other agricultural objects, such as :—

- (a) the building or re-building of houses,
- (b) the purchase of agricultural implements (including carts),
- (c) erection of double mholes or other contrivances for raising water,
- (d) erection of indigo vats and such like appliances for dealing with raw agricultural produce,
- (e) for the erection of sugar-cane mills,
- (f) for the purchase of other agricultural machinery,
- (g) for the relief of distress.

(iv) Formation of Co-operative Societies ;

(v) Grant of loans for Fruit Culture, Sericulture, Dairy Farms ; and

(vi) The supply of seed and machinery by the Agricultural Department on easy terms.

The following quotation from the Dewan's Address to the Representative Assembly in 1894 explains the origin of these Banks and the lines on which they were formed:—

Agricultural
Banks.

“ On the one hand, we have large accumulations of unused capital in the country as evidenced by the balances in the Presidency and other Exchange Banks, the refusal of the former to receive any private deposits except as current ones carrying no interest and the high premium which the Government of India $3\frac{1}{2}$ per cent securities command. On the other hand, we have the agriculturist suffering from inability to raise the funds required for his *bona fide* purposes, except at ruinous rates of interest. In our own State, the balance of the Government Savings Bank deposits has risen from four lakhs in 1881, to 28 lakhs during the last year, though the rate of interest was recently reduced to $3\frac{1}{2}$ per cent, but the borrowing power of our raiyat is nevertheless as low as ever. The substantial agriculturist, especially the coffee planter and the grower of exportable produce, is able to obtain some credit from the foreign buyer on the security of his crops at 9 and 12 per cent interest, but the ordinary raiyat is unable to get any credit except at usurious rates. How to bridge over the wide gulf that thus separates capital from want is one of the most important problems of the day in this country, and it is not without considerable diffidence that His Highness' Government approach its solution ; but we derive the hope of eventual success from what has already been accomplished in some European countries, where conditions very similar to ours have existed. The most successful system has been proved to be that in which the agriculturists forming themselves into an Association on strictly co-operative principles substituted their own united credit for that of the intermediate body, thus securing for themselves the fullest return for their own credit as agriculturists and doing away with the profits of the middlemen. The existing conditions among us offer no insuperable obstacle in the way of the establishment and successful working

of similar Associations in this country under the designation of Agricultural Banks. The essential principles underlying their constitution are:—

(i) Every Bank to be an association of landholders formed on strictly co-operative principles, and enlisted on the basis of mutual confidence arising from the mutual information of each other's character and resources. The object to be the common benefit of cheap credit and not the earning of divisible profits ;

(ii) There should be no share capital, the funds required for the Bank being obtained by means of loans raised or deposits received ;

(iii) The members to contribute their liability only. They will be at full liberty to limit this liability by prescribing a maximum for each individual loan or for the sum total of all loans, or to resign at any time and thus escape from further liability ;

(iv) The funds raised by the Bank to be lent only to its members, at such moderate rate of interest as will leave the Bank a small margin for the actual expenses of management and for the gradual formation of a Reserve Fund ;

(v) The affairs of the Bank to be managed by a body elected from among the members themselves and giving their services gratuitously ; and

(vi) No loan to be made except for an approved purpose, such as some agricultural operation, which, with ordinary care, may be expected to yield enough to repay the loan and to leave some profit for the borrower.

And it only remains for me to add that a Bank thus constituted and doing business on such conditions must be solvent and will be able eventually to command ample credit in the open market ; but while such credit is in the process of growth—and its growth will take time—the Government will be prepared to help the Bank, with deposits of money at favourable rates of interest. The Government will, in addition, be able to grant exemption from stamp and other duties, to provide for the special registration of loans and their ready recovery, for the custody of funds in public treasuries, for the periodical audit of accounts, etc., but the co-operative spirit to which the Association is to owe its existence must emanate from the agriculturists themselves.”

Their growth.

In the year 1895, two Banks were started. In 1896, the Government appointed a special agency to supervise the working of the Banks, and by the year 1901, the number of Banks rose to 64 and the total advances made by Government to them was about Rs. 15 lakhs.

The Banks did not work well and the first serious note of warning was sounded in the Dewan's address to the Representative Assembly in the year 1901 in the following terms :— Their decline.

“ It is unfortunate that these Banks have not worked as successfully as was expected at the time of their institution The outbreak of plague and the consequent depression in trade and business can only be said to have very slightly retarded the growth of these institutions. There seems to be deeper causes for this unsatisfactory result which require to be investigated. Possibly, the defect lay in the too easy terms granted by Government. The difference between the rates of interest prescribed for the Banks and the current market rate was so great that borrowing was, in a measure, stimulated beyond the actual bounds of necessity. The members also were not perhaps all of them strictly of the class and occupation for whose benefit such Banks were intended. About Rs. 15 lakhs have been advanced by the State, of which, deducting the amount refunded till now, there is still a large outstanding balance of more than Rs. 13,82,000. The Banks have moreover failed to attract deposits to a larger extent than about Rs. 15,000 and the Reserve Fund has not amounted to more than Rs. 35,000. The property of the members which has been looked upon as security for the amount advanced by Government has been valued, it is true, at about Rs. 48 lakhs, but it is possible that the value has been over-estimated or has deteriorated in a number of cases. The imperative necessity of adhering to a prepared scheme of repayments has been enjoined, and the granting of any further advances has been suspended for the present.”

The number of Banks began to decrease year after year, till the year 1917 when there were only two Agricultural Banks, which, however, had repaid their loans to Government.

To promote thrift and providence among the people and to afford to the agriculturists and artisans an easy means of Co-operative movement.

combination to obtain credit and with a view to avoid the defects which marred the successful working of the Agricultural Banks, the Co-operative Societies Regulation, which is an adaptation of the British enactment of 1904, with a somewhat wider range of objects, was passed into law in June 1905 and the Registrar of Co-operative Societies was appointed in September 1905. The progress of the movement is dealt with in Volume IV, Administrative, Chapter IV.

Agricultural Societies.

During the year 1923-24, the number of Agricultural Societies was 1,184.

Loans for Agricultural purposes.

The total amount of loans granted during the year 1923-24 for productive purposes was Rs. 43·24 lakhs or nearly 77·6 per cent of the total loans.

Loans for necessary purposes.

A sum of Rs. 1·09 lakhs was given for payment of *kandayam* due to Government and Rs. 10·52 lakhs for purchase of food and other necessities of life and Rs. 16·01 lakhs for discharging prior debts.

Co-operative Societies in place of Agricultural Banks.

It was decided in 1912 to establish, where conditions were favourable, Co-operative Societies on the unlimited liability basis by the side of the defunct Agricultural Banks, and thus give an opportunity to the members of the latter institutions to enjoy the facilities afforded by Co-operative Societies. Accordingly, from 1912 to the year 1915, thirty-three such societies were started.

IX. WORK DONE BY THE DEPARTMENTS OF AGRICULTURE, VETERINARY SCIENCE AND SERICULTURE, AND THE CENTRAL AGRICULTURAL BOARD.

Classification of work.

The work of the Agricultural Department may be broadly classed into (I) Research, (II) Extension or Popularisation, and (III) Agricultural Education.

Research is carried on in the laboratories of the Department and on the different Government Farms, through the following sections :—

(a) *The chemical section.*—Undertakes the analysis of soils, manures and produce; conducts manurial and other experiments on soils by pot-culture methods, and on experimental plots in the Government Farms and in the holdings of selected raiyats; carries out all the chemical work connected with the trial of varieties of sugar-cane, ground-nuts and with the manufacture of jaggory, sugar, etc.

(b) *The entomological section.*—Carries on investigations into the insect pests of the State, both of growing crops and stored produce, with a view to the devising of remedial measures through its insectory and other indoor work, and on the field; undertakes demonstration of remedial measures on raiyats' holdings; supervises the working of the 'Pest Act' recently passed as the result of the work of this section in regard to the *Kambli Hula* (or caterpillar pest) in parts of the Chitaldrug and Kadur Districts. Researches on the Jola grasshopper, *Kambli Hula*, ground beetles, pests of stored grain, Castor semi-looper, and the mango-hopper are some of the noteworthy items of the work accomplished.

(c) *The mycological section.*—Carries on investigations into the fungus and other diseases of crops both in the laboratory and on special gardens and fields taken up for the purpose from time to time; carries out spraying and other combative measures on the holdings of applicants; supervises the working of the Pest Act in regard to the *Kole Roga* of areca-nuts in the Shimoga Malnād. Work on (1) the ring disease of the potato, (2) the *Kole Roga* of the areca-nut which alone has meant the saving in the aggregate of a very large sum of money to the areca growers whose annual losses used to be very great and (3) the spike disease of sandal, are noteworthy items of the work accomplished so far.

(d) *The section of botany.*—Carries on work in plant breeding; varieties of the field crops of the State are tested, pure strains isolated and compared and new varieties originated for the production if possible of better varieties. The work on ragi and sugar-cane accomplished so far is notable, a yearly increasing area is being put under the improved strain of Ragi

(H22) recommended by this section; a very large number of seedling canes have been originated, one of which, *viz.*, H.M. 544, is now grown over large areas.

(e) *The engineering section.*—Carries on studies regarding implements with a view to improve or adapt foreign ones or devise new implements; assistance to raiyats in drainage and irrigation matters is given; experiments on the duty of water are carried out; all the heavy machinery of the department such as cane mills, engines, tractor, etc., are looked after. The new mould-board plough referred to under “Implements” in this Chapter is a promising piece of work.

(f) *The Government Farms.*—Carry on both experimental and demonstration work and incidentally supply seeds, implements and manures:—

(1) The Hebbal Farm is the oldest; much promising work on ragi, paddy and sugar-cane has been done; the plant breeding work on ragi and sugar-cane is done here. The Government Agricultural School is also located on this Farm.

(2) The Marthur Farm in the Shimoga District studies *Malnād* problems regarding the cultivation of areca, paddy and sugar-cane. The cultivation of sugar-cane and the manufacture of jaggory has extended in the locality as the result of the example of the Farm.

(3) The Babboor Farm in the Marikanave tract of the Chitaldrug District is a large sugar-cane Farm in which sugar-cane is grown as a commercial undertaking; plant breeding work on cotton and jola is conducted on this Farm. The Farm provides cane mills and cotton gins, the latter to handle the raiyats' cotton also.

(4) The Nagenahalli Sugar-cane Farm in the Cauvery channel tract close to Mysore City is to test sugar-cane varieties, select suitable ones for the tract, and undertake the supply on a large scale of the seed of the selected varieties. Incidentally manuring, cultivation and manufacture and other studies regarding sugar-cane are undertaken.

This section is the largest and is in direct touch with the raiyat. The results attained by the various scientific sections and deemed fit for being taken up by the raiyat are popularised; the co-operation of the raiyats is enlisted for the trial of these recommendations on their own holdings; as the result of the field trials, arrangements are made to bring them into general adoption with such modification as may be found necessary. Demonstrations of all these recommendations are carried out; advice and help given to all raiyats; estates are inspected; depôts are maintained in the district head-quarters and in some

taluk head-quarters for the stocking and sale of improved implements, manures and seeds. These depôts are also the offices of the Agricultural Inspectors who are to interview and advise raiyats when called upon. Lectures, demonstrations and exhibitions at *Jātras* and other gatherings, village talks and other means of propaganda work are undertaken. Through co-operation with the various district and taluk organizations, Co-operative Societies, Agricultural Associations and so on, improvements are popularised. The whole work is in charge of two Divisional Officers helped by a large staff of Agricultural Inspectors and Fieldmen.

(1) Instruction in Agriculture is imparted in the Hebbal Education. Agricultural School, which provides a three-year course. The instruction is in English.

(2) At Chikkanahalli in the Tumkur District, a Vernacular Agricultural School gives a one-year course.

(3) In all the Government Farms, short courses are held for small periods for practical instruction in the various operations recommended by the Department.

(4) In co-operation with the Educational Department, "Rural Science" classes are held in certain selected Village Schools.

In addition to the above, the Department also embraces two sub-departments, one being the Veterinary and Live-Stock and the other Sericultural.

Live-stock
including
Veterinary
Science.

Through Veterinary hospitals throughout the State, veterinary aid is rendered, while considerable itineration is done also for preventive inoculation of the raiyats' cattle, for castration of stock and so on.

The study of cattle and sheep, with a view to improvement, forms the functions of the latest addition to the Agricultural Department, *viz.*, the section of the Live-Stock Expert. Advice on Dairy matters, supply of Dairy machinery, etc., are also undertaken.

The
Sericultural
Department.

This is also a recent addition to the Agricultural Department.

Mysore is well-fitted by soil, climate and local conditions for silk production. There is practically no parts of the State, with the exception perhaps of portions of Chitaldrug, where it cannot be successfully introduced. In Mysore, a distinct race of the silk worm has been evolved which is multivoltine, and admittedly superior to other multivoltine races in robustness and yield.

Extent and
distribution.

The industry is at present practised as an important subsidiary occupation to the south of a line joining Chikballapur, Kunigal, Mandya and Nanjangud. The total area under mulberry is nearly 35,000 acres, the value of silk production is annually about Rs. 60 lakhs and some 120,000 persons find employment in the various branches of the industry.

Department
of Sericulture.

Some years ago, the Education Department was entrusted with teaching sericulture through the agency of village schools, but with no great success. The subject was then taken up in 1911 by the Agricultural Committee of the Economic Conference and men trained at Tata's Silk Farm in Bangalore were sent out for work in Sericultural Taluks. In the years 1914 and 1916, the services of Signor Washington Mari, an Italian Expert, were secured by the State and he organised a small farm with a school and grainage at Channapatna, established a few outstations for propagandist work and made a small beginning in the preparation and issue of disease-free eggs. In 1916 the Government sanctioned temporarily the formation of a Sericultural Department and its activities are indicated below :—

- (i) Seed production grainages.
- (ii) Demonstration of better methods of rearing, popular schools, farms and village demonstrations.

(iii) *Finance*.—Technical part of the enquiry relating to applications for sericultural loans under rules sanctioned by Government at the instance of the Agricultural Committee.

(iv) *Organization*.—Stimulation of Co-operative effort, study of markets; improvement of reeling; introduction of doubling and twisting, etc.

(v) *Experimental work*.—Determination of the best manures and cultural methods for mulberry; the best methods of selective breeding; the improvement of reeling; the increase of output by the partial substitution of higher yielding races and hybrids; the most efficient grainage technique, etc.

Government have also sanctioned temporarily scholar-
ships ranging from Rs. 10 to 20 per mensem according to
qualifications, to male and female candidates for learning
Sericulture, with a view to encourage the recruitment to
the Department of qualified agency.

Scholarships
for
Sericulture.

The Department was strengthened lately by the appointment of two Japanese experts, one of whom is a lady expert intended for the benefit of Purdah women Sericulturists. The Department has been put under the Administrative control of the Director of Agriculture.

The work of the Central Agricultural Board of the
Economic Conference is being carried on in close co-opera-
tion with that of the Agricultural Department.

The Central
Agricultural
Board.

The encouragement of horticulture and fruit culture, the opening of dairy farms, the organization of co-operative societies for agricultural production, the extension of sugar-cane cultivation, the investigation of conditions connected with the coffee industry, the improvement of agricultural stock and sheep rearing, the improvement of the cocoa-nut and potato and cultivation of tea and camphor and the use of better manures, forest and fuel plantations and organization of rural credit, are some of the subjects engaging the attention of the Board.

As regards commercial crops, special attention has been devoted to the extension of cultivation of sugar-cane and mulberry and the improvement of coffee. Steps have been taken to collect information regarding the economic condition and subsidiary occupations of raiyats. The Board have prepared estimates of production for the whole State. They have taken part in organizing several agricultural demonstrations and exhibitions. For some time past, the Board have been concentrating their attention on—

- (1) still further popularising the business of improved agricultural implements ;
- (2) utilizing the co-operative movement in furthering agricultural improvements ;
- (3) developing of agriculture in the Malnād ;
- (4) developing of live-stock industry ; and
- (5) improving of fodder supplies and utilisation of existing fodder resources, *e.g.*, Malnād grass, grazing lands, etc.

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CHAPTER III.

IRRIGATION.

Irrigation
Works in
the State.

THE object of irrigation works is the artificial application of water to the land for purposes of agriculture as a means of supplementing the natural rainfall. The *Imperial Gazetteer of India* referring to irrigation in Native States says that "among individual States, the first place may be given to Mysore." "Almost every valley contains a chain of tanks, the first overflowing into the second and so on until the terminal tank is filled." Irrigation is practised in Mysore from tanks, canals or channels and wells, and to a small extent from the rainfall in the *Malnād* regions.

Development
of Irrigation.

The only works before the nineteenth century, which can be classed as having any extensive public utility, are the tanks which stud the whole surface of *Maidān* taluks and river channels. Most of the river channels are in the south of the State connected with the Cauvery and its tributaries.

At what particular period the tank system attained its full development, it is now impossible to say: but judging from the necessary conditions of its growth, the progress could not fail to have been extremely slow, and most probably it expanded with the natural increase of population. It may be conjectured that the first civilized inhabitants, taking possession of the higher grounds, constructed the small tanks or *kattes* on the minor rivulets, and then step by step followed these down to the larger streams, arresting and impounding the water at every convenient site by throwing earthen *bunds* across the valley. As, according to the plan followed, it

was possible to advance only steadily downwards from the watersheds of the various streams to their extremities, it may be conceived how vast a time would be expended in creating a single series of several hundred, and in some cases over a thousand reservoirs, linked together in this fashion, and forming such continued chains of works that not a single drop of water falling on the catchment is lost in seasons of drought, and but little in ordinary seasons. This vast series of works, individually varying in size according to local circumstances, from the great Sulekere tank extending over 14 square miles, down to small *kattes* or village reservoirs, grew into existence necessarily without reference to scientific principles, and were purely experimental. As instances of large old tanks besides Sulekere, may be cited Ayyankere, Madagkere, Vyāsasamudra, Rāmasāgara and Mōtitalāv.

Major Sankey, one of the first Engineers of the State, who devoted his attention to the systematic repairs of tanks, has stated that "to such an extent has the principle of storage been followed that it would now require some ingenuity to discover a site within this great area suitable for a new tank. While restorations are of course feasible, any absolutely new work of this description would, within this area, be almost certainly found to cut off the supply of another, lower down the same basis, and to interfere in fact with vested interests."

Although there are many isolated tanks in particular localities, the vast majority are constructed on a connected system of streams and their feeders which are abundant in this undulating high level country. In fact, most of these tanks have been classified according to the main valleys, sub-valleys, etc. The map shows the country divided into Main River Basins. As an instance of the chain of tanks may be mentioned the Pālār system, which has 1,000 tanks in the valley, the last one being the large Rāmasāgara Tank.

As belonging to the same early period, the channels drawn by means of *anicuts* from the Cauvery, Hemavati, Lakshmantirtha and other streams must here be noticed. The designs of these works are attributed to rulers of olden times, and even to certain beneficent deities and precise dates are assigned for the construction of several of them. But whatever the facts, it is at least clear that they are extremely ancient, and that however defective as tested by modern ideas in these matters, their original construction exhibits a boldness and an appreciation of the conditions of structure, which, in view of the circumstances of the times, excite the greatest admiration. In addition to the *anicuts* now in use, the remains of probably more than three times as many others are still visible when the rivers are low. From some of these, the original excavations made for the old channels are still apparent, while from others, channels do not appear to have been excavated. It is, therefore, clear that the success which resulted from the construction of the works that are still in use was not obtained without a very large proportion of failures, and the perseverance displayed by the constructors in spite of these failures is none the less remarkable, and shows the high value placed in former ages on irrigation works.

The following statement shows the length of the principal streams, the areas of their catchment basins, as also the portions actually utilised under the tank system :—

Mysore river system	Total length of the main rivers with their principal affluents within the State	Area over which the drainage is intercepted by tanks	Total area of each catchment basin	Percentage of whole area under the tank system
	Miles	Sq. Miles	Sq. Miles	
I. Tungabhadra river	611	6,217	11,696	56·47
II. Palar ...	47	1,036	1,115	100·00
III. North-Pennar ...	167	1,946	2,628	85·35
IV. South-Pennar ...	32	1,319	1,424	85·80
V. Cauvery ...	646	5,769	11,340	51·75
VI. Sharavati and west coast rivers.	103	...	1,252	...
Total ...	1,606	16,287	29,455	56·16

It will be observed that of the 29,455 square miles covered by the State, nearly 60 per cent has by the patient industry of its inhabitants been brought under the tank system.

During the Regency of Dewan Purnaiya, 312 lakhs were devoted to irrigation works. This sum was to a great extent absorbed in the repair of old tanks and channels, the majority of which had fallen into a ruinous condition during the reigns of Haidar and Tīpu. A further expenditure of 172 lakhs was incurred on the project of a canal, now known as Purnaiya's Nāla, whose object was to bring the waters of the Cauvery into Mysore and also Nanjangud, but which entirely failed in its intention.

Restoration
of works
during
Purnaiya's
time.

From 1831 to 1856, a sum of 304 lakhs was spent on irrigation works. Individual works were much improved, and many almost wholly reconstructed from the ruinous condition into which they had fallen, yet little advance was made on the old method of maintenance, because the interdependence of the tanks, and the necessity for dealing with them in series, were not sufficiently recognised and acted upon. So also with river channels, although some improvements were introduced, such as the construction of brick facings to some of the *anicuts* when under repair, yet most of the radical defects in these works were left without remedy.

Improve-
ments effected
during the
Commission
Period.

After the formation of the Public Works Department in 1856, the expenditure under irrigation for twenty years was about 523 lakhs, exclusive of establishment charges. The following are some of the principal works that were executed:—

Progress
since the
formation of
the Public
Works
Department.

	Cost in Rs.
1. Re-building the Sriramadevar anicut on the Hemavati and improving the channel below.	2,78,504
2. Re-building the Maddur anicut on the Shimsha, and improving the channel below ...	85,365

3. Re-building the Marchihalli anicut on the Lakshmantirtha, and improving the channel below	Cost in Rs.
	29,339
4. Aqueduct over the Lokapavani on the Chik-devaraya-Sagar channel	22,265
5. Re-building the Lakshmanpura anicut on the Nugu	12,878
6. Re-building the Halhalli anicut on the Gundal.	10,424

The work of remodelling and improving irrigation works in the State was started about the year 1856, the year in which a regular Department of Public Works was organized under the British Commission. Special attention was directed to irrigation between the years 1872-78, because a separate Irrigation Branch of the Public Works Department was constituted. In 1872-73, a grant of 108 lakhs, inclusive of establishment charges, was assigned for expenditure on irrigation in the next twelve years, namely 72 lakhs for tanks and 36 for channels.

Up to the time of the Rendition in 1881, a sum of Rs. 26 lakhs was spent on original works in the State.

Progress
since the
Rendition.

Since the Rendition of the State in 1882, grants for this class of works have been considerably increased and a liberal public works policy has been pursued. From 1881-1882 to 1922-1923, Rs. 527 lakhs have been spent on irrigation.

In November 1913, on the recommendation of the Chief Engineer, the Government raised the annual grant for irrigation from 6 lakhs to 10 lakhs for the next five years and its distribution was directed to be as under:—

(1) Major tanks	4½ lakhs
(2) Minor tanks and Malnād tanks ...	3 „
(3) Canals and channels ...	2 „
(4) Irrigation and investigation ...	½ „

Classes of
Irrigation.

Irrigation works may be conveniently divided into three great types, *viz.*, lift, storage and river works, which

are represented by wells, tanks, or reservoirs and canals. In lift irrigation, the water is raised from a lower level to that which will command the area to be irrigated, the raising being effected either by manual labour or by animal or mechanical power. The source of supply is usually the subsoil water into which wells have been sunk, but lift appliances are often erected on the banks of rivers or pools from which water is raised to the lands to be irrigated. Storage works are reservoirs, formed by the construction of dams across streams for the purpose of storing the supply which passes down after every heavy fall of rain, for subsequent use during long breaks in the rains or in seasons of drought. The river works consist essentially of canals drawing their supplies from rivers which are in continuous flow during the whole or greater portion of the year.

The total irrigated area in 1881 was 761,243 acres and the gross revenue was Rs. 34½ lakhs. The area under irrigation in 1923-24 was 11,99,138 acres and the revenue about Rs. 40 lakhs. The expansion of irrigated area during the 30 years ending with 1911 from 1881 was 118,683 acres, the increase of revenue Rs. 5½ lakhs.

On account of the undulating character of the country and side-long ground, the channels generally command narrow strips of country unlike in the deltaic tracts. The length of each channel and the area irrigated by it will be found in another part of this chapter.

The area irrigated by river channels in 1887-88 was 77,832 acres and the revenue was Rs. 4,07,278. In 1916-17 the area was 114,981 acres and the revenue Rs. 6,89,175. During the 30 years ending with 1916-17 and commencing from 1887-88, the expansion of irrigated area was 37,149 acres and the increase of revenue Rs. 2,81,897.

Tanks, as already stated, vary in size from small ponds to extensive lakes. There are in all 24,896 tanks, large

and small, irrigating an extent of 766,314 acres of land. Thus on an average, there is one tank for every 15 of a square mile.

In the *Malnād*, where the rainfall exceeds 90 inches, irrigation depends exclusively upon rains. Where it is less than 90, innumerable small tanks, locally known as *Kattes*, have been constructed to supply water whenever rains hold off long. The *Malnād* tanks are small with mere earthen bunds, natural weirs and no sluices. Water is drawn for irrigation only occasionally by making a small cut either in the bund or in the weir and closing the same temporarily.

Irrigation is to a limited extent carried on by means of wells. There are in the State 40,464 wells irrigating 78,096 acres.

Attempts are at present being made to introduce pumping plants for irrigation. The pumping outfit installed near Kankanhalli Section House of the Electrical Department has been in operation since June 1917. Water is pumped from the experimental well on the banks of the Arkavati and the same is used for cultivating sugar-cane on a piece of ground in co-operation with the Agricultural Department to demonstrate to the public the advantages of this system of irrigation.

The two reservoirs of large magnitude are :—

(i) The Vānivilās Sāgara, and (ii) the Krishnarājasāgara.

The modern practice of storing very large quantities of water by throwing a dam, in favourable sites, of masonry, at times towering up to a height of even 300 feet having been put to a successful test on the European continent, the Engineers of Mysore have in recent years availed themselves of the opportunities and constructed reservoirs of large magnitude. The first to be undertaken was Mārikanave lake, now called Vānivilās Sāgara, across the Vedavati in Chitaldrug District. The site,

which is a gorge between two hills, attracted attention from the beginning of the 19th century as one of the finest natural sites for the construction of a reservoir dam. But there were doubts from the beginning as to the character of the foundations, the sufficiency of the river supply and the prospects of irrigation in the valley. These doubtful features tended to delay the undertaking for many years. After discussions extending over 44 years, a project, estimated to cost Rs. 39 lakhs, was at last sanctioned by His Highness' Government on the 18th April 1899 as a great famine protective work in an arid district. The reservoir and canals, in accordance with the revised project subsequently sanctioned, have been constructed and completed at a cost of Rs. 44,72,000. The reservoir has the largest storage capacity of any artificial lake yet built in India and in this respect, is second only to the Nile Reservoir at Assuan. The dam is 1,330 feet long and 172 feet high above the lowest foundations with a water spread of nearly 34 square miles. The top width is 15 feet and the bottom width at foundation level 150 feet. The storage capacity is 30,025 million cubic feet. Another such work in progress is the Cauvery Reservoir at Kannambādi, which was in 1917 named the Krishnarāja Sāgara after His Highness Sir Sri Krishnarāja Wadiyar IV. The construction of this reservoir has been undertaken with a three-fold object:—

- (a) To provide a proper supply of water for hot weather crops in areas which formerly received a precarious supply.
- (b) To ensure a constant supply of water for the Electric Power Installation at Sivasamudram and to increase the output of power, and
- (c) To increase irrigation by another 150,000 acres.

The reservoir, if completed as designed, will cost the State Rs. 365 lakhs in all. It provides for a dam

124 feet high to impound 41,500 million cubic feet of water and a high level canal which after crossing the range of hills (Karighatta) dividing the Cauvery and the Shimsha basins, by means of a tunnel nearly a mile long, is designed to irrigate 150,000 acres of land. On account of its magnitude, the work has been divided into two parts. That which is in progress now contemplates the raising of a dam to the height of 80 feet with a storage capacity of 11,030 million cubic feet, with extensions to the Electric Power Installation to generate additional power up to 5,000 H. P. This part of the work is estimated to cost about Rs. 105 lakhs excluding the Electric Power Scheme.

For purposes of irrigation under the Mārikanave Reservoir, the Block System of Irrigation has been introduced and it is working fairly satisfactorily. The principle of this system is to spread out irrigation over a large area in blocks of specified limits in selected soils and situation at some distances apart and to practise it in triennial rotation on a third of each block, the remaining two-thirds being cultivated with semi-dry crops. Its object is to obviate the evil effects of continuous concentration of irrigation to any large extent in a particular locality and to distribute the benefits of irrigation over a large number of villages. The area irrigated and the revenue derived under the Reservoir up to 1922-23 were 6,658 acres, and Rs. 38,995, respectively.

Construction,
Restoration
and
Maintenance
of works.

The dams called "Anicuts" thrown across the rivers to raise the water to a higher level are, as already remarked, works of great antiquity. The large Talkad *anicut*, the lowest dam on the Cauvery, is said to have been constructed a thousand years ago; while the most recent, with few exceptions, are not less than three centuries old.

The dams as constructed in the early days consisted

entirely of packed stone without the requisite coherence and carried with them the elements of destruction, while they allowed nearly all summer water to escape through, unutilized. In most recent years, the rough stone dams were gradually replaced by line masonry solid water-tight *anicuts*.

Of river channels, an additional length of over 200 miles has been opened out, and this has increased the total length to 946 miles. The maintenance charges of these channels amount to about Rs. 84,000, which works out at Rs. 89 per mile.

In process of time, many of the tanks breached, silted up or became otherwise useless and the foresight and the industry of the cultivators which brought tanks into existence were not forthcoming later on for the task of repairing or restoring them. Not much is known of the endeavours made in this direction before the beginning of the 19th century, though doubtless there must have been considerable, if spasmodic, activity on the part of early Rulers. During the administration of Dewan Purnaiya (1800-1810), tank restoration was energetically pursued and the records show that annually a sum of 11 lakhs on the average was utilised for the purpose. No special activity was visible in the early days of British Administration. From 1831 to 1856, when a Public Works Department was constituted, the money annually spent was about Rs. 80,000. The duty of carrying out the work was entrusted to Revenue Officers, a duty which they continued to perform even after the constitution of the Public Works Department. The need for associating the Public Works Department in the work of restoration was not definitely recognised till 1863, when it was laid down that all major works involving an outlay of Rs. 500 and more should be entrusted to the Public Works Department, while the minor repairs were left in the hands of Civil authorities as before. In 1872, a separate Irrigation

Department was formed and the task of dealing with tanks serially was put in hand.

In October 1873, with a view to the better conservancy of tanks and other irrigation and water-supply works in the State, rules were published and were made applicable from 1st November 1873 to all tanks and other works that may, on or after that date, be formally handed over to the raiyats for up-keep.

The serial restoration of tanks had advanced sufficiently by the time of the Rendition to allow of an abatement of the expenditure on it. In 1886, it was resolved to make over the minor tanks, or those yielding a revenue not exceeding Rs. 300 to the Revenue authorities, the raiyats doing the earthwork themselves and Government paying for masonry works where necessary. The other tanks were styled as "Major." The restoration of these was to be done by Government with the help of contribution from the raiyats. The raiyats' obligation to do ordinary maintenance in the case of all restored tanks, Major and Minor, was unaffected by these arrangements. The scheme was at first introduced tentatively into one taluk in each district, and after trial was extended to all parts. A Tank Inspector was appointed to each taluk to assist the Amildar in the work, and a trained Sub-Overseer to each district to instruct and supervise the Tank Inspectors. Under this scheme, about 2,500 tanks have been restored. There being still a large number of tanks to be restored, the establishment entertained for the purpose under the Revenue Officers has been recently strengthened, the rules revised and a definite programme laid down, so that about 1,000 tanks may be dealt with every year.

Under the revised rules of 1904, the raiyats are required to contribute one-third of the total cost of restoration including earth work, the other two-thirds being met by Government. In selecting tanks, preference is given to

such of them where raiyats come forward with their contribution and the cost of restoration does not exceed 20 years' revenue. The selection of Major Tanks for restoration is also guided by the same principles. With a view to make the Minor Tanks Restoration Scheme more effective and extensive and to secure the hearty co-operation of the raiyats in the execution of repairs to tanks classed as Minor, it was decided:—

(1) that larger State grants should be made for the improvement of such tanks;

(2) that the distinction between tanks having an *atchkat* of Rs. 100 and those having an *atchkat* of above Rs. 100 be removed and all irrigation tanks classed as Minor treated alike;

(3) that when the amount of earthwork to be done by the raiyats is deemed an unreasonable burden on them, or exceeds the proportion of two to three, it may be relaxed at the discretion of the Deputy Commissioner with the approval of Government; and

(4) that in cases of hardship such sums of money as may be deemed reasonable for carrying out their share of the work be advanced to the raiyats and be recovered from them in easy annual instalments.

During 1914-15, the responsibility for working the Minor Tanks Restoration Scheme and the entire control of the operations were vested in the Revenue Commissioner.

In regard to maintenance, the raiyats are responsible for doing the earthwork and turfing so as to keep the bunds to standard condition, which is fixed at the time of restoration. The repairs to stone revetment and masonry are done by Government.

With a view to provide for the obligations of raiyats in regard to the maintenance of Major tanks and the restoration, repair and maintenance of Minor tanks, Government in 1911 passed a Regulation called the "Tank Panchayet Regulation" (No. 1 of 1911). The

Panchayets constituted under this Regulation have control over the tanks as also the power to administer the funds that may be assigned for their restoration, repair and maintenance.

The preparation of serial maps and tank registers has been undertaken and a good part of the work has been carried out.

In 1916, the Minor Tank Restoration Regulation XIII of 1916 was passed, providing for the recovery of the raiyats' share of cost of restoration compulsorily. In spite of the measures taken, the progress in the restoration of the Minor Tanks has been very slow and the results obtained so far not satisfactory. The Minor Tank Restoration scheme was again transferred to the Public Works Department in G. O. No. R. 1299-1309—L.R. 15-22-1, dated 8th September 1922 and the Regulation of 1916 was also revised in September 1923. Under the existing rules, the raiyats' contribution is fixed at one-fourth of the actual cost of restoration.

Distribution
of Water.

The distribution of water is in the hands of the raiyats and controlled by the Revenue Officers, except under certain river channels. Scientific distribution, with a view to prevent wastage of water, which has become almost normal, is made specially under channels drawn from rivers and large reservoir tanks and notably in the Cauvery Valley.

The management of the river channels, during the irrigation season, was for the first time, in 1887-88, transferred to the Amildars of the taluks through which they run. It was considered that under this arrangement, complaints regarding the equitable distribution of water would be more speedily attended to and that the *Manegārs* and *Saudis* would better attend to the wants of the raiyats, if placed under the direct control of the Revenue Officials residing near the channels. Prevention

of wastage of water was still felt the prime necessity. In 1912, the then Chief Engineer remarked that "in numerous places water, which might do service in increasing the produce, is running to waste. To utilise these resources, a reasoned policy and sustained efforts are necessary." The following recommendations made by him were generally approved by Government in 1913, and are being given effect to as far as possible gradually :—

(1) Improvement and extension of the canals in the Cauvery Valley which will benefit by the Krishnarājasāgara Reservoir and the settlement of the area and the manner in which the new irrigation should be practised ;

(2) The introduction of scientific methods of administration and management under the more important canals and tanks maintained by Government and the selection of some 8 tanks and 2 canals for experimental working by a mixed agency of Government Officers and Local Committees ;

(3) The restoration and improvement of minor tanks including *Malnād* tanks ;

(4) The constitution of Tank Panchayets ;

(5) Observation of river, canal and tank discharges at a few selected places and the systematic collection of hydraulic facts and data ;

(6) The completion of tank registers and maps and the maintenance of correct statistics ; and

(7) The passing of an Irrigation Regulation.

Mysore being primarily an agricultural country, its numerous irrigation works are of great use to it. They not only enable raiyats to raise valuable crops of sugar-cane, cocoa-nut, areca-nut, etc., but also supply water for domestic purposes, without which villages cannot exist. The maintenance of these works is thus of paramount importance.

Protective
and financial
results.

These works will be of greater benefit to raiyats, if they will take to growing more of sugar-cane and other valuable crops. The country will be more prosperous, if,

in bad years, irrigation under tanks is limited to the quantity of water available in them.

The revenue that could be obtained from the irrigation works in the State may be thus exhibited :—

		<i>Area irrigated.</i>	<i>Assessment.</i>
Tanks	...	388,302	18,11,396
		378,012	14,74,351
Channels	...	115,009	7,01,617
Wells	...	78,096	3,87,954
Total	...	9,59,419	43,75,318

Scope for
extension of
irrigation.

Projects for new reservoirs have been investigated and are to be undertaken as funds become available. The best form of a work suggested would comprise a reservoir to store the rainfall from the Ghāts and Malnād regions and a canal or canals to lead the water to the irrigation of Maidān parts. As an instance might be cited the project which is under consideration of a reservoir at Lakkavalli, across the Bhadra, where there is a splendid site. The channel would command large areas of thirsty lands in the Shimoga and Chitaldrug Districts. There is still scope for the construction of such large reservoirs.

Private
Irrigation
Works.

There is no private enterprise in regard to the construction of large irrigation works. The tanks in *Inām* and *Jōdi* villages belong to private individuals who look after their maintenance, etc. Well irrigation, however, is almost entirely due to the efforts of private land-owners.

Famine works
and
Programmes.

An investigation of the existing facilities for future developments was made in 1901-02. About 50 large irrigation projects calculated to afford protection against famine were selected, of which 34 projects estimated to cost Rs. 1,02,59,617 have been sanctioned and placed on the famine programme.

APPENDICES.

STATISTICS RELATING TO IRRIGATION WORKS.

I. The following are large works in progress or approaching completion :—

	<i>Estimate Rs.</i>
1. Sowlanga tank, Honnali Taluk ...	1,39,000
2. Maralwadi tank near Mavatur, Kankanhalli Taluk ...	3,92,000
3. Hairege tank, Hunsur Taluk ...	2,20,000
4. Nidasale tank, Kunigal Taluk ...	1,10,000
5. Chamaraja right channel, Mysore District ...	14,30,000
6. Mandagere channel extension, Mysore District ...	6,67,000
7. Hemagiri channel extension, Mysore District ...	1,60,000
8. Halsur anicut, Mysore District ...	2,91,000
9. Gopala anikat, Shimoga District ...	8,55,000

II. The following are some of the large irrigation works executed, each costing over a lakh of rupees including establishment and tools and plant charges :—

<i>Name of tank.</i>	<i>Estimate Rs.</i>
1. Borankanave reservoir, Chiknayakanhalli Taluk ...	2,79,657
2. Mavatur tank, Tumkur Taluk ...	3,62,843
3. Ranikere tank, Challakere Taluk ...	2,68,877
4. Kalhalli tank, Challakere Taluk ...	92,266
5. Kathral tank, Chitaldrug Taluk ...	90,526
6. Venkatesa Sagara Tank, Siddlaghatta Taluk ...	88,610
7. Srinivasa Sagara Tank, Chikballapur Taluk ...	1,70,807
8. Ramasamudra Tank, Siddlaghatta Taluk	1,40,439

III. The following tanks and channels have been restored or improved :—

(A) TANKS.

<i>Name of tank.</i>	<i>Cost Rs.</i>
1. Sulekere tank, Malvalli Taluk ...	1,89,010
2. Kottebetta tank, Nagamangala Taluk...	82,588

<i>Name of tank</i>	<i>Cost Rs.</i>
3. Rekalgere tank, Challakere Taluk ...	1,38,502
4. Mudvadi tank, Kolar Taluk ...	1,67,539
5. Kyathagankere tank, Pavagada Taluk.	96,729
6. Kuksandra tank, Kadur Taluk ...	1,61,567

(B) CHANNELS.

<i>Name of channel</i>	<i>Cost Rs.</i>
1. Sriramadevar dam and channels, Hassan District	5,40,000
2. Krishnaraja anikat and channels, Hassan District	2,88,000
3. Chamaraja anicut and channels, Mysore District	4,81,000
4. Kalhalli anikat and channels, Mysore District	2,43,000
5. Devaroy anikat and channels, Mysore District	1,98,000
6. Hulhalli channels, Mysore District ..	6,57,000
7. Chikdēvarāya Sāgara channel, Mysore District	4,90,000
8. Rampur channel, Mysore District ..	2,86,000
9. Rāmaswāmi channel, do ..	2,24,000
10. Rāmasamudram channel, do ..	1,48,000
11. Virjanadi channel, do ..	1,62,000

IV. The following statement shows the river-fed channels in the State giving the following particulars:—(1) Name of channel; (2) Length; (3) Area irrigated; and (4) Revenue realized for the year 1923-24.

River			Name of channel	Length in miles	Area irrigated in acres	Revenue realised
Main	Branch	No.				
Cauvery	:	1	Chamaraja series ...	53	4,867	49,496
		2	Mirle ..	38	6,318	42,538
		3	Ramasamudram ...	41	6,219	37,729
		4	Tippur ...	22	1,010	6,141
		5	Rajaparameswari ...	23	3,767	21,640
		6	Ramaswamy ...	40	8,674	57,346
		7	Mahadevamantri ...	26	3,503	18,330
		8	Chikdevaraya Sagar ...	65	14,253	92,368
		9	Devaraya ...	18	2,023	14,515
		10	Virjanadi ...	27½	7,728	47,681
		11	Bangar Doddi ...	5½	761	5,412

River			Name of channel	Length in miles	Area irrigated in acres	Revenue realised
Main	Branch	No.				
Cauvery	Suvarnavati	12	Bandikere ...	9	227	999
		13	Hongalvadi ...	15	2,112	11,103
		14	Sargur ...	3½	228	1,212
		15	Maralahalli ...	3	306	1,632
		16	Alur new ...	4	155	1,271
		17	Hemma ...	4	411	2,067
		18	Hosahalli ...	3¾	145	1,014
		19	Kudlur ...	2	99	535
		20	Alur old ...	2½	128	1,087
		21	Honganur ..	12½	1,798	8,371
Lakshman- tirtha	...	22	Hanagod series ...	70½	5,256	21,923
		23	Kattemalalavadi ...	11	593	2,803
		24	Husanpur ...	11	813	3,402
		25	Seruyur ...	11	581	1,955
		26	Marchalli ...	7	405	2,403
		27	Anandur ...	20	241	1,244
		28	Ayarhalli ...	4	236	1,261
Kab- bani	...	29	Rampur ...	33½	6,393	36,955
		30	Hulhalli ...	36½	5,585	29,119
		31	Lakshampur ...	5½	470	2,240
Shimsha	Maddur tank	32	Maddur Ane ...	12	1,588	8,694
		33	Kemmannu ...	5½	955	6,254
		34	Vaidyanathapur ...	3¾	249	1,555
		35	Bairan ..	2	280	2,023
		36	Chamanahalli ...	2¾	609	3,836
Hemavati	...	37	Mandagere ...	27	3,702	25,462
		38	Hemagiri ...	17	1,854	13,005
		39	Akki Hebbal ...	7	381	2,498
		40	Kalhalli ...	16	891	6,458
		41	Kannambadi ...	14	1	7
Cau- very	...	42	Kattepur ...	36	3,969	21,996
		43	Ramanathapur ...	19	1,757	8,543
Hemavati	...	44	Sriramadevar North .	80½	7,987	43,119
		45	Do South ...	21½	1,390	4,921
...	Bringi ,,	46	Halvagall ...	6	282½	1,452
		47	Changaravalli ...	13	1,259	9,201
Yagachi	...	48	Chakratirtha ...	2	125	781
		49	Arahalli ...	2	143½	920
		50	Kittur ...	8	574½	1,688
Yagachi	...	51	Old Kudlur ...	6	200¾	1,129
		52	Madagatta ...	8	500½	1,784
		53	Shankatirtha ...	9	665½	3,716

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CHAPTER IV.

FORESTS.

THE subject of Forests has been dealt with under "Forest Flora" in Volume I, Chapter IV. This section aims at describing 'Kans' and Amrut Mahal Kavals only. The term *Kan* cannot be properly defined as it has been used indiscriminately for ever-green or deciduous forest. Generally, as at present used, a *Kan* denotes an evergreen forest, dry or moist, yielding such produce as pepper, toddy, coffee, leaves and branches (for manure). There are two kinds of *Kans*: one, the dry type of the Sorab Taluk, over which Government have complete control, and the other, the moist evergreen type, preserved for the production of toddy, pepper and coffee. These forests are entered as assessed lands in the Revenue Department, but large portions are still unoccupied. Even in the occupied area, the State has certain rights with reference to the timber on the ground, while the holders are entitled to various articles of produce only. The latter kind of *Kans* exists mostly in the Shimoga District (1,034 square miles) though it is also found to a small extent (118 square miles) in Kadur. The reservation of these *Kans* is an old contested question. Government have decided (in their Order No. R. 319-30—Ft. 101-08-9, dated 12th July 1917) that, though it is not expedient to acquire occupied areas, there is no objection to the unoccupied *Kans* being reserved as State Forests.

Area, classes
and types of
Forests.

The Amrut Mahal Kavals form the store-houses of good sandal growth and are also valuable as fuel and

The Amrut
Mahal Kavals.

fodder reserves. At present, they are used only as grazing grounds for the Government Amrut Mahal cattle. (See Volume IV, Chapter IX). The area of State Forests at the end of the year 1923-24 stood at 3,312·6 square miles. The present extent of Forest is about 13 per cent of the area of the State. It has been recently suggested that the forest area can, without any inconvenience to the local people, be increased to at least 20 per cent, the additions being made chiefly from the Amrut Mahal Kavals and other lands in the Kadur and Shimoga Districts. Government, however, consider that the question cannot be dealt with on the principle of proportion, as reservation should be made only when it can be undertaken with advantage to the State and without inconvenience to the local population and have therefore ruled that the selection of areas for reservation should be strictly in accordance with the orders of Government on the scheme of Minor Forests.

Sylviculture.

Sylviculture literally means the culture of forest trees. It differs from arboriculture inasmuch as while the latter deals with the growth of trees as such, the former treats of trees as individuals forming a crop. The Science is based primarily on vegetable physiology, and for a study of Forest Production, a considerable knowledge of the influence or relation of the atmosphere, the soil and other factors on the growth of trees is essential. Advantage has been taken of this Science all along in Mysore. Endeavours are being made—

(a) to bring about and assist the natural reproduction of important species,

(b) to adopt a system of artificial reproduction when necessary to supplement natural regeneration,

(c) to attend to the coppice growth of fuel trees,

(d) to increase the number of regular plantations, and

(e) lastly to attend to hoeing, thinning, cleaning and weeding operations.

The underlying aim in exploiting the forests is to obtain sufficient natural regeneration in these so as to ensure the production of a sustained annual yield without encroaching upon the capital. The high forests are worked mostly under regular silvicultural methods of treatment with sufficient provisions, in the light of local conditions, to attain natural reproduction. There are, however, many difficulties in the way of getting up a natural crop of seedlings of the valuable species. Fellings are generally so conducted as to create desirable interruptions in the canopy and thus to secure the admission of light and the decomposition of humus essential to the creation of a suitable seed bed. The area thus operated upon is then fire protected. Successful fire protection is often no easy task in a fairly populous country, especially when a scanty rainy season is followed by prolonged summer and drought.

When efforts are made to encourage the reproduction of the few important species, hosts of other inferior ones avail themselves of the benefit and their luxuriant growth often chokes the regeneration of the valuable species. Weeding is often both costly and impracticable over large areas.

Drought is as bad as excess of moisture. Generally, the natural reproduction of *Honne*, *Beete* and other species, the seeds of which easily germinate, is good in almost all forests, but when the dry season is prolonged and accompanied by serious fires, the seedlings succumb.

Another serious impediment is the bamboo. Since 1912-13 when bamboos seeded and died, numerous Teak saplings have come up in the mixed deciduous forests of Kadur and Shimoga. But the dense thickets of young bamboo seedlings that have resulted have made some areas almost impenetrable.

The 'Selection' method of marking exploitable trees singly for removal was in vogue for a long time. As,

however, the creating of appreciable gaps was found to give better results as regards reproduction by seed, the method is slightly varied and fellings are now carried out in small groups. Hoeing and scraping of grass and herbaceous vegetation to a radius of two feet round natural seedlings of *Honne* and *Beete* to give the seedlings a fair chance to push themselves up above the weeds was done in Mysore in 1907-08. The beneficial results justified its continuation and extension to Teak as well.

Artificial regeneration is obtained in several ways. One method is to raise seedlings of the valuable species in nurseries and plant them out in gaps in the forest, caused by the felling of trees or otherwise. Seeds are also sown in patches, ploughed up areas or under bushes according to the nature and requirements of the species. The sowing of teak in well burnt patches has produced remarkably good results and is now largely resorted to, especially as the operation is very cheap.

In view of the quick and steady increase of demand for wood of all kinds and to encourage the raising of plantations and *topes*, Government have ordered that, in all districts except Shimoga and Kadur, nurseries of indigenous species should be opened out and seedlings raised and supplied to the raiyats.

Special attention is being paid to Teak, the demand for which is ever on the increase and its extensive reproduction has become a matter of vital importance. In addition to the efforts made to secure its natural reproduction in the forests, suitable areas are selected and clear-felled; the ground is carefully prepared and nursery raised and teak seedlings planted out. Weedings in the early stages and periodical thinings, recurring generally after five years, to provide room for the prominent trees to develop and prevent unhealthy competition, are then effected.

The most valuable of the forest products in the State is Sandal, since it produces about two-thirds of the forest revenue. Sandal growth and its protection have been dealt with separately in Volume I, Chapter IV.

The regeneration of this species is generally good, but its subsequent tending against being grazed or burnt over is a matter of some difficulty as it is found mostly in the open District Forests used by villagers. On account of its high value, dibbling and sowing of sandal seeds in suitable localities is being carried out regularly throughout the State with the particular object of increasing its percentage in the State Forests, where it can be expected to enjoy a comparatively higher degree of immunity from injuries.

A few words on the history of Sylvicultural operations in the State may be added here. In the early sixties of the last century, when the Forest Department was established, the forests were found to be inadequately stocked. Teak plantations were started in the Mysore, Kadur and Shimoga Districts. A fair amount of work was done, but for various causes, it soon came to a stop. Between 1879 and 1885, the Forest Department was not in existence, having been abolished as a measure of retrenchment and so no work worth mentioning was done during that period. From 1885 to 1895, quite a considerable amount of activity was evinced in the formation of plantations in all the districts of the State, while little or nothing was done in the forests themselves. The production of young stock for the permanency of the forests was left entirely to Nature and no sylvicultural operations were carried out in the exploited areas of the forest. This state of affairs continued till about the beginning of the present century when regular plans and working schemes were prepared for all the important forests of the State, and cultural operations prescribed for all exploited coupes. But

owing to paucity of establishment, the work turned out has not been quite satisfactory. The cultural operations carried out consisted chiefly of (1) clearing and weeding round advance growth of valuable species in the exploited coupes; and (b) sowing and planting of teak in patches where gaps were created by the removal of over-mature or exploitable trees. The removal of unsound and other trees, for which there is no market value but which interfere with the growth of the more valuable species, was, however, not attended to. Energetic action in this respect is urgently called for.

Forest
Organisation
and
Exploitation.
(a) Exploitation.

Exploitation may be effected—

- (1) departmentally, or
- (2) by purchasers or consumers.

Both these agencies are utilised in Mysore.

Many of the forests in the State cannot be worked profitably at present for want of easy means of extraction and transport. Timber from Malabar, Coorg and elsewhere is placed on the market at cheaper rates, so that large tracts of wooded areas in the State, situated in the Ghats far away from Railway Stations, have to be exploited only to a fraction of their yield capacity. The important work of providing easy and cheap means of communication is receiving attention and till railways are extended to the neighbourhood of forests and industries, like the manufacture of match, pencils, wood-pulp, sleepers, etc., are started, there is no possibility of working the forests with anything like financial success. Exploitation is therefore confined, at present, to such forest areas as are within reasonable distances of railways and good markets and can be worked profitably.

The method of treatment generally applied in the case of deciduous high forests is 'Selection' with suitable modifications in the light of local requirements. The

yield is generally fixed by the number of trees after careful valuation of the growing stock in sample areas. The exploitable age is determined after a mature consideration of the rate of growth and the silvicultural requirements of the species and the girth corresponding to this age is then deduced. The area having been divided into suitable sub-divisions technically termed "Working Circles" and Felling Series, the exploitation is carried on. The pole and scrub forests are worked under the system known as "coppice with standards" or "improved fellings." The exploited areas are sown over with sandal or other seeds and closed to grazing for five to ten years. In the case of sandalwood, extraction is generally confined to dead and fallen trees, owing to the large quantities of dead trees, stumps and buried roots available and the absence of data relating to rate of growth, etc. In 1917-18, Government sanctioned a staff consisting of two Sub-Assistant Conservators and six Rangers to conduct a Sandal Valuation Survey of the whole State, to estimate the stock under different girth classes, nature of distribution, etc., and to collect sufficient statistics to enable a definite method of treatment being prescribed and the exploitation being placed on a sure and scientific basis. Fair progress has been made in the work.

In recent years, the policy of encouraging the removal of timber from the forests by purchasers has been practised in order to enable the departmental staff to bestow more attention on their legitimate work of conservation and improvement.

Steps are also being taken to further the intensive working of forests. Large and unwieldy district charges like Mysore and Shimoga have been split up into two divisional charges each, and the Range charge is also considerably reduced in extent. The executive and protective staffs have been strengthened and better and cheaper mechanical means of transport are being rapidly

introduced. As a first instalment towards the abolition of the departmental system of extraction, it has been ordered that contractors should be more largely employed in future for the collection of sandalwood which is now done mainly by the Department.

Collection of Minor Forest Produce is generally leased out to purchasers by auction. Grazing of cattle is permitted in areas not closed to grazing on payment of prescribed license fees. The cutting and removal of grass in several plantations, as also in some of the more important reserved areas, are leased out to local and British Military Departments. The Department takes care to see that the terms of agreement are attended to, and that no damage is done to tree growth.

(b) Protec-
tion.

Protection forms one of the most important duties of a Forest Officer. Not only has he to safeguard his charge against injury by fire, illicit grazing, felling, lopping and other abuses, but he has also to prevent theft of timber and other produce both inside the forests and during its transit.

The importance of fire protection has long been realised. It has been reported that fire is beneficial in the Teak forests of Burma, where it is mixed with *Bambusa aurindinacea* as it consumes injurious weeds and insects and prevents the development of teak areas into non-teak evergreen forests. But the injuries from it far outweigh the benefits. On the whole, it may be safely stated that forest fires are inimical, in a majority of cases, to natural reproduction. Many of those valuable timber trees which give to forests their importance from a financial point of view are highly susceptible to injury by fire and require therefore to be carefully guarded against. Arduous and trying though the task is, successful fire protection has been aimed at in Mysore for a long time. February to May is regarded as the fire

season. Owing to the monsoons, no forest fires are anticipated until the end of January.

The State Forests are isolated from the surrounding unprotected tracts by broad belts of cleared fire traces. These are supplemented by a series of interior fire lines to localise any fire that may accidentally break out in the forest. The regular protective staff is strengthened by the employment of a large number of special fire patrols during the fire season to prevent the occurrence of fire and extinguish any fires that may arise. As an additional precaution, the services and co-operation of the wild tribes, who inhabit the forests, are enlisted by offer of rewards for successful protection. The Standing Orders on the subject have been printed and issued in 1910-11 in a concise and readily intelligible form to guide all officers concerned, and sufficient provision has been made in the Forest Regulation against wanton incendiarism and negligence.

In spite of these precautions, unalloyed success in this direction is a very difficult matter. Roads and numerous cart tracks run through the forests and many rights of way have been admitted. Most of the forest works have to be conducted during the fire season, as hardly anything can be done during the wet weather of the monsoons. Surreptitious burning of grass under gallnut trees to facilitate collection of the fruits, and setting fire to grassy areas to secure an early supply of fresh grass or to facilitate tracking of game, are not infrequent.

Lastly, the remoteness of villages from some forest areas is a disadvantage. In many places labour to extinguish fires cannot be brought to the scene until long after they have spread wide.

During the year 1923-24, the area attempted to be protected against fire was 1,945,405 acres as against 1,959,352 acres in the previous year. The percentage of success secured was the same as in the preceding year, *viz.*, 99·4 and this result must be accounted creditable.

The total cost of protection during the year was about Rs. 33,786.

Next to fire, indiscriminate grazing is harmful to forest conservancy. Section 27 of the Mysore Forest Regulation provides for the grant of grazing and other privileges, consistent with the due maintenance of the forests, which may be cancelled without assigning any reason. Such privileges can be exercised by persons entitled thereto only to meet their own requirements and not for purposes of merchandise or trade. To minimise, as far as possible, the ill-effects of grazing and to check an unlimited use, fees are levied for cattle admitted for grazing in State Forests and the grazing season is fixed from June to December, when, owing to the abundance of grass, least damage to tree growth is expected to result. The licenses issued are of two kinds :—

(a) ordinary and

| (b) nomad,

the rates for which are laid down in the *Mysore Forest Manual*.

Goats are specially harmful to the well-being of forests as they eat away the leading shoots even above breast height and indiscriminately devour almost all species. They are not admitted into the State Forests as a rule, but where unavoidable, suitable areas are selected from time to time in the *Maidān* Districts of Kolar, Bangalore, Tumkur and Chitaldrug, not exceeding 200 acres in extent in convenient localities, and set apart for goat browsing. This concession is revocable at any time and is subject to the conditions laid down in the *Forest Manual*. Steps have also been adopted in regard to injuries sustained from natural causes. The spike disease, prevalent in Mysore, Hassan and Bangalore Districts, has been under close investigation. Lantana continues to be a pest in the Mysore and Bhadravati Divisions. In the latter division, an attempt has been made to eradicate it.

In the Kolar District, prickly-pear is much in evidence and its periodical destruction has claimed attention. Teak borers do considerable damage in the Mysore District. In the Sagar Division, some slight damage is reported to teak plants by moths which bore right in their stumps. In the Bhadravati Division, fuel billets have been attacked by borers, the damage caused being reported to be severe. Elephants cause damage to the tender teak growth in the Mysore District. Climbers interrupt the free growth of valuable species of trees, including the Sandal tree. A fairly vigorous campaign of cutting down these climbers has been attempted in recent years by the department in almost every part of the State.

These restrictions can be relaxed at the option of Government in times of famine. Where there is likely to be a serious failure of pasture and fodder in any district entailing loss of cattle, the Deputy Commissioner may, in consultation with the Conservator of Forests, throw open to grazing any portion of forest land subject to the conditions laid down in the Famine Code.

Penalties for trespass or damage in State and District Forests are provided in Sections 24, 25, 36, 38, 55, 74 and 78 of the Mysore Forest Regulation of 1900, as amended by Regulation IX of 1901.

The measures adopted for the protection of game and fish have been described in Volume I, Chapter V—Zoology.

To conserve game, suitable forest areas in the Mysore, Tumkur, Kadur and Shimoga Districts have been constituted into "Game Preserves" under the control of a Gazetted Officer. In them, shooting is forbidden except with the special sanction of His Highness the Maharaja.

A Working plan sets forth the lines on which a forest should be managed so as to meet the best interests and therefore the wishes of the owner and indicates the means by which this purpose may be accomplished. In other

(c) Working plans.

words, it is a Forest Regulation prescribing the application of certain cultural rules and the execution of certain works in order to produce a given desired result. In a forest worked on economic principles, the desideratum is generally to obtain perpetually a regular supply of produce in the greatest quantity, that is, a maximum sustained annual yield. A working plan indicates how this is to be done.

The first step, and the most essential one, in the direction of forest management, is the preparation of working plans. Working plans are prepared only for forests which have been completely demarcated and settled. Other considerations also would enter in the matter. The demand for timber and other forest produce would have to be of sufficient importance and if possible continuous; and the rate of growth, the character and requirements of the principal species comprising the forest should have been sufficiently studied and the lines of export to a certain extent developed.

The importance of equipping all forests with suitable working plans having been realised, Government appointed, in 1914-1915, an Assistant Conservator of Forests as Special Working Plan Officer for the State Forests in Shimoga District as a temporary measure. In 1916-1917, a Sub-Assistant Conservator was also appointed as an additional Working Plan Officer. To secure a better rate of progress and bring this most important work to completion early, Government appointed a third Working Plan Officer since 1920.

The following statement shows the progress made in the preparation of working plans till 1920-1921 :—

Areas for which working plans have been sanctioned by Government till the end of 1920-21	Areas for which working plans are being compiled	Areas for which working plans have still to be taken in hand	Total State forest area
Sq. Miles 1,293	Sq. Miles 275	Sq. Miles 1,716	Sq Miles 3,284

When all the conditions required to render the compilation of working plans possible do not exist in a forest, its working is regulated by what is known as a Provisional Working Plan. Such plans remain in force for short periods only. They regulate fellings, thinnings, collection and transport of forest produce, grazing of cattle and provide for the proper carrying out of works of reproduction and improvement.

To ensure systematic working of the forests, plans of operations are prepared by the District Forest Officers annually and the sanction of the Conservator is obtained before the operations are permitted in the forests. In recent years, the question of remodelling working plans based on old ideas, with a view to take advantage of the results of modern investigations, has received some attention. The suggestion has also been made that a Forest Officer should be deputed to specialise in this branch of work both in India and elsewhere. According to Section 45 of the Forest Code, working plans are prepared for the revenue year and are based on the provisions of the working plan, where working plans exist. For forests for which no regular working plans exist, they are based generally on recognised principles of forest conservancy, detailing therein the working of each forest for the year with necessary and sufficient provisions for fellings, thinnings, export of produce, grazing of cattle, protection against fire and the execution of works of reproduction and improvement.

The extraction and transport of forest produce, particularly timber, is often attended with much difficulty. A major portion of the deciduous forests of the State is fairly accessible, but the most richly wooded Ghāt regions are very hard to negotiate. Except for a few blocks, the regions lie at an average distance of about 70 to 80 miles from the nearest rail-head or the sea-coast. The forests

Extraction,
transport
and disposal.

occupy for the most part steep hill slopes badly cut up by *nallas* and ravines. Extraction of timber from those regions involves engineering problems demanding a high degree of technical skill. Efforts are being made by appointing specialists to overcome these difficulties and to open up the country.

The aim has always been to encourage private capitalists to work the forests so that the department may be able to devote sufficient attention to works of improvement, but as private enterprise is slow to come forward, most of the work of exploitation is being done departmentally. Of late, however, private people are coming forward as the profitable nature of the work is being demonstrated to them. Timber is exploited either in the round or after partial conversion in the forests. Most of the teak sold in the market is first roughly dressed in the forest to save unnecessary expenditure in extraction. A Saw Mill has been set up in a convenient central place to convert timber which cannot be profitably disposed of in log into scantlings, sleepers, etc.

The transport methods employed vary greatly according to local conditions. They may be described under the two main heads of land and water transport.

Transport by land is effected in either of the following three ways:—

(i) *By human agency*:—Except for small quantities of fuel and other Minor Forest Produce that is brought out in head-load, this agency is not very widely resorted to.

(ii) *By animals*:—Most of the partially converted timber is dragged down to places accessible to carts by elephants and where suitable roads exist, its further conveyance to the markets is effected by bullock carts.

(iii) *By mechanical appliances*:—In places which are expected to give a sustained yield of forest produce to permanently feed a Tramway, Tramways are laid out and appreciable saving of both time and money has thus been effected. Lines over a distance of 72 miles are now in working order.

Ropeways and such other contrivances necessary for bringing out forest produce from steep hill sides or land-locked valleys have not yet been introduced but investigations regarding the necessity for their introduction are in progress. To facilitate transport of heavy logs in places where no Tramways have been laid out, road trains consisting of traction engines and waggons are employed and these have been working satisfactorily since 1909.

Facilities for transport of forest produce by water exist only in the Mysore, Shimoga and Kadur Districts. Timber and bamboos are rafted down rivers in these districts for about four months in the year. Most of the rivers are too shallow during the summer and floating can be effected only during the monsoon months when the rivers are in flood. Another impediment in the way of utilising these water courses is the frequent occurrence in them of boulders which makes navigation both dangerous and difficult.

For the disposal of the forest produce, the following methods are in vogue :—

The auction system.—As regards the major forest produce, which is chiefly timber, the trees are marked out for felling by trained officers in accordance with the prescriptions of the working plans and they are then sold standing either by auction or “tender.” If no suitable man is forthcoming to purchase the coupes, the extraction is done departmentally and the produce collected at a conveniently situated sale dépôt. In such dépôts, the timber is sold out periodically by auction sale after giving due publicity to the contemplated sale, in the *Mysore Gazette* and the Newspaper. Provision also exists for selling out timber in such sale dépôts in retail to suit the requirements of small merchants and *bona fide* house builders.

Not to inconvenience the local population by binding them over to purchase timber for their requirements in sale dépôts, the license system is adopted. Exploitation by the license holders of dead and fallen timber on payment of certain rates of seigniorage is thus permitted and the concession is readily availed of by many.

Major Forest
Products.

Under the head of "Major Forest Products" come timber and fuel. The valuable species composing the forests are carefully arranged in two classes; the reserved kinds comprise 21 species, while the classified trees are fairly numerous. Of the reserved trees, the following are the most important :—

Sandal	Satinwood.
Teak	Ebony.
Rose Wood.	Ironwood.
Kino	Poonspar.
Gallnut	Chittagong Wood.
Benteak	White Cedar.

Of the many valuable trees which might be described, 114 species have been selected by the Forest Department and details of these are given in the *Commercial Guide to the Economic Products of Mysore*.

As regards Sandal, only dead trees are at present uprooted and, after a rough dressing in the forest, are brought down to *kotis*. In the course of preparation in the Sandal *Kotis*, of which there are the marginally noted nine in the State, the heartwood is separated from the white-wood and assorted into 18 classes, as sanctioned in Government Order dated 1st April 1898. These are given at page 131 of the *Forest*

Manual.

The best parts of the Sandal tree are used in the manufacture of boxes, cabinets, desks, walking-sticks, photo-frames, watch-stands, plates and other useful and ornamental articles. The roots which are the richest in oil and the chips go to the still. The oil forms the basis of many scents and is also used for medicinal purposes. Wealthy Hindus use sandalwood sticks for the funeral

pile as a mark of respect for their departed relatives. The wood when rubbed with water on a circular piece of mortar stone gives a fine paste which is extensively used by Hindus in temples and daily worship in their houses and on marriage and festive occasions, mixed generally with rosewater. Parsis also use sandal in their worship.

The principal minor forest products are gallnut, tanning barks from Tangadi (*Cassia Auriculata*) and Kakke (*Cassia Fistula*), Lac, Soapnut, Gums, Honey, Bees-wax, Tamarind and the Oil-Seeds, Honge, Hippe (*Bassia Latifolia*) and Dhupa (*Veteria Indica*). Minor Forest Products.

The collection of minor forest products is leased out by auction to the highest bidder. The sales are conducted by Talukwar and leases last for a period of one or two years. The revenue from this source during the year 1923-1924 was about Rs. 9 lakhs.

Honey and wax are obtainable from almost all the forests in the State. There are about four species of bees, viz:—

- (i) Hejjenu,
- (ii) Thudavejenu,
- (iii) Kaddijenu or Kirijenu and
- (iv) Torigajenu.

The first two are the most important ones. The first, which is abundant and common throughout the State, builds its hive on high trees and over inaccessible rocks. The second builds its hive generally in the hollows of trees. The insects are not offensive and do not sting. The third is generally found in the village fences and on small twigs of trees in open places and scrub forests. The honey is highly valued for medicines. The last is found in abandoned ant-hills and the yield from this source is very small.

Forest
Industries.

The extensive forests of the State are destined to play a very important part in the industrial and economic development of the country. They contribute to the general commercial welfare of a country and provide employment for its population. If statistics were available regarding the number of persons employed in working up the raw material yielded by the forests, they would show that, apart from the jungle population directly dependent on the forests, and a number of wood cutters, sawers, carriers, raftsmen and others working in or near them, employment on a large scale is also provided to persons engaged in working up the raw materials. Among the latter may be mentioned, carpenters, wheel-rights, coppers, boat builders, tanners, ropemakers, lac-manufacturers, basket makers and many other classes of skilled labourers. Though the forests are of a very mixed nature, incapable of supplying any one material to a large extent as in other countries, yet they have been found to contain enough material of every kind to meet the requirements of the State for its industrial activities. In January 1917, Government appointed a Special Forest Officer to deal with Forest Industries. The following paragraphs deal briefly with a few of the most important Forest Industries.

First as to sandalwood. The rough wood that is received in the *kotis*, is cleaned and cut up into 3' billets and after dividing them into 18 classes, is stacked in lots. The far greater portion of the sandalwood, sold yearly in Mysore, used to be taken to Bombay, wherefrom it found its way principally to China, France and Germany. After the establishment of the two factories for the distillation of the Sandal Oil at Bangalore and Mysore, the old classification of sandalwood into 18 classes was done away with, as it was found unnecessary, and the wood is now sorted out into 5 classes. The annual auction sales of sandalwood were also put an end to and all the wood

is being supplied to the two factories at Bangalore and Mysore. When these factories are developed to their full working capacity, it is expected that they will be able to absorb the entire out-put of sandalwood within the State. The quantity of sandalwood supplied to the Sandalwood Oil Factories during the year 1923-1924 was 1,496 as against 606 tons in the year previous, the larger supply being due to the increased demand for oil and the reopening of the Factory at Mysore. The total revenue from sandalwood amounted to nearly Rs. 13½ lakhs, showing an increase of about 4½ lakhs over that of the previous year.

A Wood Distillation Plant has been installed at Bhadravati in connection with the Iron Works there. The Plant is capable of dealing daily with 240 tons of Fire-wood and yields about 50 tons of Charcoal and the bye-products, *viz.*, Calcium Acitrate, Wood Alcohol and Tar. It is under contemplation to expand the plant for a further distillation of Tar.

The Forest Department has for some years past been preparing Railway Sleepers, and during the year 1914, supplied the State Railway with a large number of them. Sleepers of inferior wood were treated with antiseptics and the treated sleepers were sent to the Railway Construction Department for testing them. The results are not yet to hand.

The only tree that is now being utilised for lac culture is *Shorea Talura* in the Mysore, Tumkur, Kolar and Bangalore Districts. The farming of lac has been taken over by the Forest Department with a view to revive this valuable industry. The cultivation of lac is now (1923-1924) being carried on in thirty different localities in eleven different ranges. During 1923-1924, 412 *maunds* of lac were collected. The revenue realized from its sale was about Rs. 10,000.

Investigations regarding the prospects of paper-pulp industry, the match industry and the manufacture of

pencils and straw boards were conducted by the Special Forest Officer mentioned above. Large quantities of bamboos are available for starting a pulp and a paper mill of moderate capacity and a working plan for certain specified bamboo areas of the State has been compiled, as a preliminary step towards the starting of the industry. Woods suitable for making matches and pencils are found in quantities sufficient to start these industries and only the necessary machinery has to be obtained before starting them. (Since this was written a Match Factory worked by a Joint-Stock Company has been put up at Bhadravati and is now in working order. Government have granted certain concessions to this Company in regard to supply of wood, etc.). Straw boards were manufactured under the supervision of the Special Forest Officer and fairly good prices were realised for them. Recent investigation of resources of Ghat Forests has disclosed the fact that they contain sufficient quantities of woods suitable for cabinet and furniture making and railway sleepers and other industrial purposes. The manufacture of catechu from Kagli (*Acacia Catechu*) was started in 1923-1924 on a modest scale in the Forest of Arsikere Range, Hassan District.

Forest Tribes.

The forest tribes found in Mysore possess the common characteristic of viewing with intense jealousy any interference with the habits and customs of their primitive life. The policy of the State is to permit no sudden imposition of restrictions that may alter the accustomed mode of life of these tribes, but rather to win their confidence by kindness and thus gradually to create self-supporting communities acknowledging the State as arbitrator of questions hitherto decided among them by might rather than by justice. Forest tribes, with some exceptions, depend on agriculture to supplement their food supply even though hunting, fishing and the collection

of forest products may form the most important part of their occupation. Most of them are nomadic out of necessity. They move in quest of game and practise shifting cultivation at their temporary head-quarters. They are armed with weapons which they can manufacture or procure.

In the Mysore District, jungle tribes known as Jenu Kurubars, Betta Kurubars and Shōligars furnish efficient labour for forest works. These people roam about the jungles in search of roots and honey, clear their way through long grass, sometimes by firing it surreptitiously. In the Kadur District, Woddars can be had for timber work. In the Shimoga District, the Lambanis form the chief source of labour supply. The system of paying rewards to wild tribes for the successful protection of forests has been tried with satisfactory results.

Research work is necessary to co-ordinate and elaborate the scientific knowledge so necessary to successful economic working. Valuable scientific work has, it is true, been carried out from time to time as the result of individual efforts in special branches but much useful work might have been lost for want of systematised methods.

Research
Work.

In order that the working of the forests may be placed on a more scientific basis, the then Conservator of Forests submitted, in 1915-1916, proposals regarding the constitution of a Research Division with head-quarters at Bangalore in charge of a full-time Forest Officer and also for the establishment of a Forest Economic Museum, where forest products may be exhibited so as to be available for inspection by firms, traders, etc. Government, in their Order No. R. 5997-9—Fl. 97-16-2, dated 13th December 1916, sanctioned the establishment of a small Library with necessary appliances at a total cost of Rs. 3,000, in addition to the utilisation of a

working table offered to be provided by the Director of Agriculture in the Mycological Laboratory for Botanical and Histological work.

Financial
Results.

The direct value of forests to the State may be gauged by the financial results of their working. While the gross revenue of the department was only about 13½ lakhs in 1895, it reached the highest figure of 45 lakhs in 1917; and while the surplus annual average for the decade ending with 1842-1843 was about Rs. 1,28,000, in the decade ending with 1912-1913 it was nearly Rs. 14,25,000. The most valuable source of forest revenue is sandalwood, then follow timber and minor forest produce in the order named. The following tabular statement contains particulars of receipts, charges and surplus for decades commencing from 1833-1834 :—

Decade	Receipts, annual average	Charges, annual average	Surplus, annual average
	Rs.	Rs.	Rs.
1833-34 to 1842-43	1,46,795	18,905	1,27,890
1843-44 to 1852-53	1,67,456	21,773	1,45,683
1853-54 to 1862-63	2,08,520	32,635	1,75,885
1863-64 to 1872-73	3,42,403	1,10,930	2,31,473
1873-74 to 1882-83	5,34,954	2,17,128	3,17,826
1883-84 to 1892-93	10,93,386	3,77,159	7,16,227
1893-94 to 1902-03	12,71,139	4,34,056	8,37,083
1903-04 to 1912-13	20,87,267	6,62,654	14,24,613
1913-14 to 1922-23	34,13,670	11,04,069	23,09,601
Actuals for 1923-24	36,18,568	19,34,248	16,84,320

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CHAPTER V.

MINES AND MINERALS.

I. MINERAL PRODUCTS.

Chief Mineral
Products in
Mysore.

THE chief mineral products in Mysore are the metallic ores of gold, iron, manganese and chromium, and the non-metallic minerals, mica, asbestos, magnesite, corundum and garnets. Such of the minerals as are useful in the manufacture of pottery and mineral pigments, in the preparation of earth salt and soda, and in the production of lime and cement can also be obtained to a limited extent. Ornamental building stones, potstones and limestones occur in fair abundance in very many parts of the State.

Twenty years ago, gold was the only mineral systematically raised from the mines, but since then, work has been started on the iron, manganese and chrome ores and to some extent on some of the non-metallic minerals.

II. METALLIC ORES.

Gold.

The Kolar
Gold Field.

Of the minerals in Mysore, gold holds the premier place, and it occurs in the crystalline schists of Dharwar age. The principal occurrence is in the Kolar schist belt, which is composed of a series of dark hornblendic rocks stretching North and South for about 40 miles, with a maximum width of 4 miles, and bounded on the east and west by younger granitic rocks. The Gold Field itself, however, is limited to a length of 5 miles towards the southern end.

Old workings
in the Kolar
Gold Field.

The presence of numerous old workings along the strike of the schists in the auriferous locality indicates

that the inhabitants must have carried on gold mining operations from the remote past. It is said that Tīpu Sultān caused the mines to be worked through the agency of one Rāja Rāmachandra for some time, but abandoned the enterprise as the produce of gold just balanced the expense. Lieut. John Warren of H. M. 33rd Regiment, while surveying the eastern boundary of Mysore, immediately after the fall of Seringapatam, heard vague reports of the find of gold near Oorgaum and Marikuppam and in 1802 he seems to have noticed gold in those places.

Nobody appears to have paid any serious attention to this till 1873, when Mr. M. F. Lavelle came forward and applied to the Government for the exclusive privilege of mining in the Kolar District. His request was granted on certain terms. The Wynād gold 'boom' of 1878 brought in its wake several companies which started vigorously to purchase and to work the mines of the Kolar Field, but not having grasped fully the mode of occurrence of gold, much money was wasted in the beginning. It was only the dying effort of the Mysore Company in 1885 that discovered the rich 'Champion' lode and thus saved the situation. The adjacent Companies which were on the verge of extinction, now resumed mining operations at deeper levels and succeeded in coming upon rich lodes. Ever since, the Kolar Gold Field operations have been successful, though considerable anxiety is caused from time to time by the intermittent character of the richer shoots of ore. Air blasts and quakes also cause a considerable amount of damage and dislocation of work and owing to their frequency some portions in the Champion Reef Mine are now completely shut down. The deepest workings are now over 5,000 feet vertically below surface and over 6,000 feet on the underlie of the lode and they continue to disclose valuable

History of
Gold Mining
in the Kolar
Gold Field
since 1873.

veins of auriferous quartz. Practically all the gold produced in Mysore has come from this field.

Extraction of
Gold.

The ore body which consists of reef quartz is crushed under stamp batteries, and the gold is extracted by amalgamation and cyanide processes. Within the last four or five years, special plants for treatment of slimes have been installed and so it has become possible to re-treat considerable portions of the old tailings dumps which have been through the amalgamation and cyanide processes in former years and to obtain almost all their gold contents.

The introduction of electricity generated at the Cauvery falls, 92 miles distant, to work the power plants has tended to reduce working expenses and the completion of the Kannambādi (Krishnarājasāgara) Dam will ensure the steady supply of this power even more to the mines.

Gold in other
parts of the
State.

Besides this occurrence in the Kolar Gold Field, gold has been noticed in several parts of the State, the old workings always furnishing a clue in the first instance. Quite a number of old workings have been found in close proximity to one another along the strike of the Dharwar rocks and in caught-up patches of the schists in gneiss. Most of them are shallow excavations with irregular dumps all round. Some of the deeper ones have been recently prospected for gold, but owing to the smallness and lack of continuity of the lenses or veins of ore, successful mining has not been established. Among such the following mines may specially be mentioned:—

In the Shimoga District.

(1) The Kudrekonda mines, close to the village of Palavanahalli, on what is known as the Honnali Gold Field. In the neighbourhood, a gold nugget weighing 4·82 ozs. was found in 1911.

(2) The Honnehatti mine, on the left bank of the Bhadra river and 13 miles south-east of Shimoga. The workings on this hill and to the west near Thambadihalli and Shinganmane are very extensive and much money has been spent on exploration work though without success.

In the Kadur District.

(1) The Ajjampur mines, and (2) the series of deep old workings to the south and south-west of Tarikere. The latter occur in or in close proximity to the Calc-Chlorite Schists (*Keratophyres*), and extend all the way from Nandi to Lakvalli, not far from the gneissic contact. Recently, at Shiddarahalli and Jalagargundi some deep prospecting work was done and at the latter place a small body of fairly good ore has been located.

Considerable attention has been paid to many old workings that are found in the long Chitaldrug Schist belt. The Kotamaradi region, near Gonur, lying about 4 miles north-east of Chitaldrug, the Bodimaradi hills near Iplara, and the Bellara mining areas, which are located amidst the crushed gray traps, have been prospected for a number of years and the country in their vicinity shows gold on washing the soil.

Other interesting places along this belt of schist are:—

- (1) Ajjanhalli and Ramanhalli near Javanhalli, (2) Kalinganahalli where the old workings occupy a considerable area with dumps all round, and (3) Honnabetta hill $1\frac{1}{2}$ miles south by west of Nagamangala.

Among the schist patches in gneiss numerous old workings have been observed, and there is no doubt that they all represent gold diggings. Commencing from Halekal and Anekonda, the auriferous localities in the North, the series can be followed at intervals to the Amble and Woolagiri mines in the South. Considerable amount of mining activity has been exhibited at the Haranhalli, Kempinkote and Woolagiri mines but unfortunately without any great success.

The total value of gold bullion produced from the commencement of mining operations up to the end of 1918 is about £50,816,397, on which a royalty of Rs. 400,75,335 has been realised. Ever since the year 1900, an average

Value of gold
bullion
produced.

Iron smelting
in the past.

It is evident from the numerous old workings for iron ore and from the large and widely distributed heaps of slag that iron smelting has at one time or another been widely practised in the State. In several parts of the State, slag heaps are met with in places now overgrown with jungle and where practically no traces remain of the habitations which existed at the time the industry was abandoned. There can be little doubt that some of these slag heaps have taken centuries to accumulate and that the production of iron by the direct reduction of iron ore in somewhat primitive charcoal furnaces was known to the people of Mysore from very early times.

In some of the old workings on the Kolar Gold Fields, iron tools such as the head of a broken drill, and blunt hammer heads have been found and these doubtless belong to the period at which the workings were discontinued.

Iron smelting
in Chitaldrug
District.

There are reasons to believe that the process of the production of iron bloom, wrought iron and steel in charcoal furnaces (now practised on a small scale) in a few localities in the Chitaldrug District is still the same as of old. The hills in the Sandur State (Kumārsvāmi betta) and the Chitaldrug range of schist hills furnished the ore to the smelters and the forests close by afforded the necessary charcoal. Formerly a nominal tax was paid for each furnace and this enabled them to get wood free from forests for conversion into charcoal. The labour employed being cheap, it was possible for each smelter to make as much as Rs. 100 profit per ton in the wrought iron industry.

Steel making was carried on only in the village of Gattihoshalli, Chitaldrug District, and it has been reckoned that a profit of Rs. 145 to 200 per ton may have been obtained. Pieces of wrought iron bloom were placed in crucibles with chips of wood bark and leaves

and heated by a charcoal fire urged with bellows. The iron was converted into steel by a sort of cementation.

The cheapness of the imported articles is responsible for the decay of the indigenous iron and steel industry in Mysore and it is doubtful if it can be revived.

Decay of the indigenous industry.

For some time past, Government had under their active consideration the question of utilising the large iron deposits in the eastern summits of the Bābābudan Hills in the Kadur District. The investigations made from time to time by the Mysore Geological Department in regard to the feasibility of the manufacture of iron from these deposits having yielded favourable results, Government in 1915 engaged the services of Mr. C. P. Perin, Consulting Expert of the Tata Iron and Steel Company, Limited, for advising and formulating a workable scheme for the manufacture of iron by smelting the ore with the aid of charcoal to be obtained by distillation of wood from the forests of the Shimoga and Kadur Districts. Mr. Perin accordingly drew up a report and after a careful consideration, Government decided in 1918 to start the manufacture of iron in the State in accordance with Mr. Perin's scheme.

Prospects of an Iron and Steel industry.

Having regard to the expert knowledge and special experience possessed by the Tata Iron and Steel Company, Limited, in the manufacture of iron, the Government decided to employ that firm as their managing Agents and entered into an agreement with them under certain terms. The management of the Company was originally subject to the control of five Directors, three of whom were nominated by Government and two by the Company. The Board of Management was, however, reconstituted in June 1923, in consequence of the cancellation, by mutual consent, of the Agency Agreement of 1917 with the Tata Iron and Steel Company. All the members of

the Board are now nominated by Government and they have full and effective powers of control over all parts of the scheme. The Board is presided over by a Chairman and includes a Government Director who co-ordinates the work of the several agencies—Forest, Geological, Railway, etc.—who have most to do with the works. The works are located at Bhadravati, in the Shimoga District, originally known as Benkipur but now changed to Bhadravati under the orders of Government.

Manganese Ore.

Distribution
in the State.

The manganese ores of the State are widely distributed in the highly decomposed chloritic schists. They are chiefly psilomelane, pyrolusite and wad, and occur as hard lumps and lenses in the ferruginous and siliceous banded ochres as the result of impregnation and replacement by oxides of manganese. Associated with them are various iron ores which are mostly limonite and earthy hæmatite and in places the ores occur in or are associated with laterite or “lateritoid” material.

Occurrence in
the Shimoga,
Tumkur and
Chitaldrug
Districts.

In the Shimoga District, it is the heavy and compact silvery-white or lead-like psilomelane averaging 48 per cent of manganese (1st grade) that is mined, while in the Tumkur and Chitaldrug Districts, it is largely pyrolusite ore of low grade under 40 per cent of Manganese. The latter deposits have proved comparatively uncertain in character.

Production of
manganese
since 1906.

The mining of manganese ores in Mysore commenced in the year 1906 and the total quantity of ore production during the period 1906-18 was 340,792 tons on which a royalty of Rs. 1,40,094 has been realised. The maximum quantity of 69,725 tons was exported in 1907. Owing to the sudden fall in prices about that time, the production of manganese ore in Mysore decreased gradually and in

1918 it was only 22,660 tons. The quantity of ore extracted during 1922-23 was only 22,029 tons and that exported 93,491 tons against 16,430 and 16,937 tons respectively in the previous year. The royalty paid to Government on the ore exported was Rs. 35,222 as against Rs. 8,249 in the previous year. Most of the ores have come from the Kumsi and Shankargudda blocks in the Shimoga District owned by the Workington Iron and Steel Company, Limited (now called United Steel Companies, Limited, Shimoga), who export the ore to their furnaces in Cumberland.

The cost of raising the ore from open quarries is low, but the cost of cartage to the nearest railway station, the freight to the coast and thence to European or American ports often stand in the way of ore production. The low grade ores can only be mined and exported if the rates and prices become favourable. As to the utilisation of such ores in the manufacture of ferro-manganese, etc., success would depend on the quantity of charcoal available, and that is at present a doubtful matter owing to the large demand which the smelting of iron ore will entail.

Cost of
production ;
utility of
the ore.

Chromite.

The mineral chromite is found largely in the Districts of Mysore and Hassan associated with altered ultrabasic rocks such as Dunites and Amphibolites. The most important deposits are situated near Shindhuvalli, Mysore Taluk, where the chromite occurs in thin narrow veins or as large wide lenses. The quantity of the ore is fairly good with 48 to 53 per cent of Chromite. There is also a good deal of lower grade material. During the year 1907-09, there was considerable mining activity at this place but afterwards for nearly four years the chromite production was at a standstill owing chiefly to the fall in prices. The total quantity of ore production up to the

Occurrence in
Mysore and
Hassan
Districts.

end of 1918 was 21,242 tons of an estimated value of Rs. 6,31,896. There has been recently a revival in the industry. In 1922-23, there were 9 mining leases and 2 prospecting licenses current for chrome ore as against 8 mining leases and one prospecting license in the previous year. The quantity of ore collected during the year was 17,783 tons and that exported 36,496 tons as against 4,306 and 8,323 tons respectively in the previous year. The royalty paid to Government on the ore exported was Rs. 29,478 as against Rs. 6,243 in 1921-22. The greater portion of the output and export of this ore is from the Bhaktarhalli Mining Block in the Hassan District.

In the Hassan District, over a length of about 20 miles from Nuggihalli to Arsikere, chromite patches occur in a schist belt. The ore consists of small grains of chromite embedded in a talcose matrix (amphibolite) with much variation in the amount of chromite present. Here and there segregated chromite lenses occur associated sometimes with the iron ores. Except in a few places, as at Bhaktarhalli and Bairapur, where the ore analysis shows 49 to 51 per cent of Chromite, the majority of the chromite in the area is of comparatively low grade, being not more than 42 per cent of Chromite. The advent of the late War created a great demand for Indian chromite and several thousand tons were mined and exported from this area. The total quantity of ore exported from Hassan District was 24,652 tons. This realised a royalty of Rs. 18,182. During 1922-23, the output in the Mysore District totalled 2,316 tons while the quantity exported was 2,435 tons and in the Hassan District the total quantity extracted was 5,367 tons and that exported 7,843 tons. The royalty realised in these districts was Rs. 9,815.

Copper,
Antimony and
Lead Ores.

Besides these metallic minerals, Copper, Antimony and Lead Ores have been noticed sparingly in the Chitaldrug

and Mysore Districts but not in sufficient quantity for commercial work.

III. NON-METALLIC MINERALS.

The mica produced in Mysore belongs to the variety Mica. of Muscovite and it is found in pegmatite veins traversing gneiss. Clean sheets of mica 8 inches square can be obtained, but the average size is much less than this and there is much waste or defective material. Since 1911 mica mining is on the increase, and in the eight years ending 1913 about 22,878 lbs. of mica was exported, realizing a royalty of Rs. 583. The principal producer was the Kabbur Mine in the Hole-Narsipur Taluk, Hassan District. Other localities where mica has been exposed in open quarries are at Kikri in the Sringeri Jagir, at Vadesamudra and Katteri near French Rocks, and at Tagadur, Nanjangud Taluk. During 1922-23, the number of prospecting licenses current for mica was four against three in the previous year. The quantity extracted during the year was 11,718 lbs. raw mica; 4,220 lbs. sheets; 1,524 lbs. and 16 cwts. of waste mica and that exported was 4,484 lbs. 3 oz. sheets; 6,857 lbs. discs; and 606 lbs. round. Almost the whole output of the year was exported to Gudur and came from the Mysore and Hassan Districts.

Attempts have been made from time to time to work Asbestos. this mineral but without much success. Recently, in Mysore City, an asbestos industry for the preparation of heat insulating covers for boilers, steam pipes and stills has been started and it is reported that the concern is working satisfactorily. The low grade asbestos from the Kabbur Mines, Hole-Narsipur taluk, was unearthed and in the four years, 1914-18, the total quantity of production was 420 tons valued at Rs. 40 a ton. The royalty realized amounted to Rs. 625. In 1922-23, there was only one mining lease current for asbestos and the

numbering of prospecting licenses fell from 6 to 5. The quantity of asbestos extracted was 256 tons against 184 tons in the previous year. The entire output came from Hassan and was utilized for the manufacture of mill-boards, boiler composition, etc.

Magnesite.

Magnesite occurs in conjunction with chromite in the Kadakola area, Mysore District, where a good deal of prospecting work has been done. The quantity exported, however, is very small. During 1922-23, there were only four mining leases current for magnesite and the number of prospecting licenses fell from 4 to 2. The quantity of ore extracted was 121 tons and that exported 1,224½ tons against 1,775 and 1,852 tons in the previous year. The royalty paid to Government was Rs. 640 against Rs. 1,157 in the previous year. Experiments are being conducted with a view to utilize the Mysore material for the preparation of burnt magnesite and magnesite bricks for use in the steel furnaces.

Corundum.

In very many places in Mysore, pink and grey Corundum pieces and crystals lie scattered over the fields. For a long time past, they have been collected by local people under collecting licenses. Some deeper prospecting work for the mineral has been done notably in the Madhugiri, Goribidnur and Bowringpet Taluks. Since 1910, the export of the mineral steadily continued to increase as can be seen from the following statement; but from 1914 onwards, owing to the slack market (probably as the result of the war), the export of the mineral has fallen considerably. The reservation of this mineral for State purposes was ordered by Government in 1920 but the reservation was withdrawn in 1923. The following is a statement showing the quantity of corundum exported, the value at the mine and the rent and royalty realized thereon during the years 1910-18:—

Year			Quantity exported in Cwts.	Average value at the mine	Royalty
				Rs.	Rs.
1910	...	...	2,152	8,608	1,134
1911	...	...	2,505	12,525	1,020
1912	...	...	2,926	14,630	1,522
1913	...	...	4,150	20,750	2,179
1914	...	...	1,604	8,020	845
1915-17	...	...	..	...	...
1918	...	...	243	1,032	128

Ruby Corundum can be obtained from the taluks of Bowringpet, Mandya, T.-Narsipur and Hunsur and from the Sringeri Jagir, but the quantities available appear to be very limited.

The mineral garnet occurs in many of the crystalline schists and gneisses, but clear and transparent varieties are rare. In 1907, a prospecting license was taken out for collecting the pink garnets from Kemphole, Manjara-bad Taluk, but only 825 lbs. were collected and sent abroad as a test sample. Further than this, no attempts have been made for its exploitation. Garnet.

Besides these, among the non-metals, apatite, beryl and rock-crystal have been noticed in Mysore but they do not occur in sufficient abundance for economic development. Varieties of felspar useful for pottery purposes can be obtained from the pegmatite veins in the State, notably in the Hassan District. Graphite is met with sparingly at Ganacharpur, Bowringpet Taluk, and at Mavinhalli and Sargur in the Mysore District. These deposits are being prospected. Occurrence of graphite, apatite, beryl, rock-crystal and felspar.

IV. MISCELLANEOUS MINERALS.

Kaolin.

Through alteration some of the pegmatite veins and the coarsely crystalline gneisses have given rise to kaolin deposits suitable for the manufacture of pottery, earthenware and to some extent porcelain. Such deposits have been found at Melkote in the Mysore District, at Bagade in the Hassan District, at Golhalli and Hindiganal and a few other places in the Bangalore District, also in the Kolar District and in the Sringeri Jagir. Except in the last named locality, there is a deficiency of good water for washing the Kaolin and this would restrict the output to comparatively small dimensions. In the neighbourhood of Sringeri, the proximity of the Tunga river may afford facilities for washing on a larger scale, but the distance from the railway is at present a bar to profitable work. During the past few years attempts have been made to make use of the Kaolin occurring round about Bangalore in the manufacture of firebricks and some classes of porcelain or pottery ware.

Ochres.

On the Bababudan hills and in the Shimoga, Chitaldrug and Tumkur Districts, red and yellow ochres and coloured ferruginous clays are found in close association with the iron ores, and may one day be of use for the manufacture of mineral pigments if greater transport facilities come into existence. From some of the ochres obtained from Tumkur and Chitaldrug Districts, paints are being prepared locally. During 1922-23, there were four prospecting licenses for ochres as against nine in the previous year. The Mysore Pioneer Paints Company, Ltd., a local concern, has been granted exclusive rights for the quarrying of paint materials in an area of about 400 square miles in the Shimoga, Chitaldrug and Tumkur Districts.

Earth Salt
and Soda.

Saline efflorescent products are obtained from the soil in various parts of the State, especially along the water

courses on the river Vedavati and its tributaries in the Chitaldrug and Tumkur Districts, and in the Mandya Taluk, Mysore District. Out of earth salt thus obtained, some impure salt is being manufactured to meet the local demand. Formerly, earth soda was prepared and used for making bangle glass. Attempts are being made to produce earth soda on a commercial scale from the efflorescent products round about Mandya and Sira.

The irregular lumps of calcareous concretionary matter Kankar. called *kankar* are found in several parts of the State usually in dark coloured soils. The substance is collected largely and burnt in specially constructed kilns to produce lime. The burnt lime from Mandya is considered exceptionally good.

V. BUILDING STONES, ETC.

More than half the area in Mysore is covered by compact crystalline rocks which present different grades of texture, structure and mineral composition and it is therefore not a matter for surprise that a great diversity of useful and ornamental building stones should be found in the State. Among such, special mention may be made of (1) the various porphyries and felsites in the Seringapatam and Mandya Taluks, Mysore District, and (2) the mottled and porphyritic granites constituting the Closepet range of hills. The ordinary gneiss of the State is very largely used and is a good and cheap building stone. Ornamental building stones.

The dark talcose trap rocks in the Hassan District Potstone. take a very good polish and being fairly soft have been used largely in temple architectures at Belur, Halebid, etc., and also in the New Palace at Mysore in which many of the more ornamental building stones find appropriate settings.

Limestone.

Extensive deposits of calcareous and dolomitic limestones occur in the schist runs in the Tumkur, Chitaldrug and Shimoga Districts. Many of them, however, are highly siliceous and purer varieties are comparatively scarce, and on this account, they are not used for mortars and cements.

VI. MINING ROYALTIES.

Gold mining
Leases and
Royalties.

In 1873, the Chief Commissioner in Mysore granted Mr. M. F. Levelle, the exclusive privilege of mining in the Kolar District on certain terms, of which the following three may be mentioned :—

(1) The lease of each block of land was to be for 20 years and was to convey an exclusive right to work and mine within the limits named.

(2) A royalty of 10 per cent on the net sale proceeds of all ores, coal, etc., extracted and about 20 per cent on that of precious stones was to be paid to the Mysore Government free of all deductions.

(3) If the block of land selected happens to be arable waste, a premium of 30 times the assessment was to be paid in addition to an annual rent which was to be determined by the revenue authorities.

In consequence of the representation made by the Concessionaires that the terms of the lease provided for in the concession were not sufficiently favourable, they were further allowed in 1880, to obtain the lease of lands selected by them for a period of 30 years instead of 20, and the royalty stipulated for 10 per cent and 20 per cent which was complained of as very high, was reduced to 5 and 10 per cent respectively, with a provision for its being further reduced in the event of the Government of India fixing a lower rate for British India. At the same time, on the application of the Concessionaires, permission was given for commuting the claims of Government to royalty and rent by a present payment of Rs. 55,000

per square mile. The Concessionaires were allowed one year's time from the date of the lease to avail themselves of this commutation.

In 1881, there was a rush for gold and numerous applications were received. On the 26th July 1881, rules were laid down for the grant of mining leases, somewhat on the lines of the terms described above, but with the view of keeping out applications made upon mere speculation, the lessees were required, in addition, to make a deposit of Rs. 1,000 with Government for every square mile of land applied for and to pay an assessment of 8 annas per acre on all unarable land, subject to the condition that after the expiry of two years, in the event of the Government not being satisfied with the working or its results, an assessment of Rs. 5 per acre shall be levied instead of the royalty and other payments.

As the above rules were found ineffective in some respects, Government in their Notification No. 107, dated 5th September 1887, revised the rules which differ from the old rules in three important particulars:—

(i) In the provision made for the grant of prospecting licenses.

(ii) In attaching to the lease a condition that within two years of its grant, a company should be formed with a paid-up working capital of not less than £ 5,000 per square mile.

(iii) In the express reservation of the right of the Government to limit the aggregate area to be granted for the time being and to dispose of mining leases for such area by public auction.

In accordance with an agreement entered into in 1901 between the Government and the several gold mining companies holding rich properties on the Kolar Gold Field, the mining leases have been renewed for a period of thirty years from the 22nd March 1910 on which the earliest lease was to expire. The renewed leases give the Government the advantage of a royalty of $2\frac{1}{2}$ per cent of

all declared dividends in addition to the royalty of five per cent on the output payable under the original leases.

In 1903-04, the general rules for the grant of prospecting licenses and mining leases were revised and with a view to provide for the encouragement needed by the gold mining industry, especially in its earlier stages, royalty on gold was abolished so long as the operations did not result in any profits to the lessee and the levy of a royalty of 5 per cent on the gross sale effected of the gold and silver was prescribed for each calendar year in which the operations resulted in a balance of net profits to the lessee with an additional royalty of five per cent of all net profits in excess of £ 25,000.

Minor
minerals.

The existence of a number of minor minerals having been noticed during the course of the Geological Survey of the State, and a large number of applications having been received for their exploitation, revised rules regarding licenses and leases as affecting them were issued in 1905-06 as the rules of 1904 were chiefly meant for gold and other metals requiring a large amount of capital for successful working.

One other important change effected in the rules of 1904 was the limiting of the area to be granted to an applicant for prospecting. In order to avoid large areas being indiscriminately applied for on mere speculation and to assure some good work being done within the short period of one year during which the licenses are in force, it was decided to limit the area under each license to 10 square miles.

In the case of large scattered deposits of corundum, it was found that the terms of the ordinary prospecting licenses and mining leases which provide for the payment of acreage rental on the area leased, in addition to royalty, were prohibitive and it was therefore decided to grant short term licenses over a taluk or group of taluks to

search for and collect the mineral on a minimum guaranteed royalty.

In October 1910, some changes were introduced in the rules of which the following two are the most important:—

(i) That prospecting licenses and mining leases were to be granted for specified minerals instead of for all minerals in general as previously.

(ii) That royalties on minerals should be fixed from time to time by notification in the official *Gazette*, as experience of the working of each mineral is acquired.

A table showing the minimum rates of royalty leviable on different ores is given below:—

Rates of
royalty.

<i>Name of mineral.</i>			<i>Rate per ton.</i>		
			Rs.	a.	p.
Chromite	...	...	1	0	0
Raw Magnesite	...	...	0	10	0
Calcined Magnesite	...	...	1	4	0
Dead burnt Magnesite	...	...	1	8	0
Manganese Ore	...	...	0	10	0
Manganese Ore containing not more than					
44 per cent of Manganese	...	...	0	6	0
Crude China clay	...	...	0	12	0
Kaolin washed or prepared from China					
clay	...	...	1	8	0

As regards precious stones, thirty per cent on the net profits of each year taken separately.

On all other minerals not specified above, 5 per cent on the sale value at the pit's mouth or on surface of the dressed ore or metal convertible at the option of the lessors to an equivalent charge per ton to be fixed annually or for a term. Other conditions as to royalty are:—

(i) The royalty is payable quarterly.

(ii) On all ores despatched during the quarter, royalty has to be paid within ninety days of the close of the quarter.

Payment of
royalty in
England.

Before the outbreak of the War, the gold extracted from the mines was being shipped to England, melted, assayed and refined there and the royalty due paid by Messrs. John Taylor & Sons, the Companies' Agents in London, to the State Bankers. Since the commencement of the War, however, consignments of gold from the mines are deposited at the Bombay Mint to the order of the Bank of England. On being so deposited, their assay value is certified by the official assayers of the Mint, and the gold is purchased by the Bank of England at £3-17-9 per standard ounce. On such values being ascertained and communicated to the Bank of England by cable, the Bank pays 98½ per cent of the value, leaving a balance of 1½ per cent to be adjusted subsequently.

According to the terms of the lease, royalty is payable by the Companies within nine days after the sale of gold or within six months from the time of the extraction of the ore.

Prospecting
and mining
in State or
District
Forests.

The Government have prescribed rules for the conduct of prospecting and mining operations in the State Forests and such District Forests as may be specially brought within the scope of the rules and lands under special protection. The following are the more important of the rules :—

The licensee or lessee shall :—

(a) Pay a lumpsum compensation for damage and disfigurement of the surface on all areas operated upon at the following rates :—

- | | | |
|---|---|--|
| (1) In State Forests, reserved lands,
or in District Forests: | { | (i) Rs. 100 per acre for high
and pole forests.
(ii) Rs. 50 for other forests
including scrub ; |
| (2) For Railways and tramways and for roads on which traction engines are used, at the foregoing rate ; | | |
| (3) For ordinary cart-tracks and foot-paths at the rate of Rs. 25
er mile ; | | |

(b) undertake not to cut sandalwood except with permission of the Forest Department and on payment of an extra charge to be fixed by the Conservator ;

(c) make over to the Forest Department all trees felled in the area operated upon.

In February 1919, Government directed that certain minerals required for industrial purposes in the State, or certain areas containing such minerals so required, might be reserved and notified in the *Mysore Gazette* from time to time, and that prospecting licenses subject to such reservations and the condition that Government should have the first refusal of the mineral collected, might be freely granted to applicants who are Mysoreans by birth or domicile and in exceptional cases to others also, preferably those who have already worked in the State for not less than five years. In 1922-23, Government sanctioned the withdrawal of the reservation of certain ores and minerals in the State notified in April 1920, so as to provide greater scope for private enterprise to carry on mineral exploitation and prospecting work on commercial lines. At the same time, the Government ordered the reservation exclusively throughout the State of iron ores, limestone, dolomite, manganese and chrome ores which are in the nature of "essential" or "key" minerals, as it was considered desirable that the resources of the State in these minerals should be conserved as far as possible for possible use in connection with the Mysore Iron Works. In the case of certain other minerals such as kaolin, China clay, asbestos, etc., the Government have directed that licenses and leases should be granted only to such persons as are willing to give an undertaking to start a manufacturing industry in the State in these minerals. The rules for the grant of prospecting licenses were also slightly amended during the year so as to permit the levy of full fee in the case of applications for renewals of certificates of approval and also in the case

of prospecting licenses where applications for renewals are not submitted within the time prescribed. As the question of the proprietary right in the ores owned but not removed during the currency of licenses was not clearly understood, Government issued definite orders laying down that all such minerals should be considered as belonging to Government unless the previous permission of Government was obtained for their removal after the expiry of a license. In 1924, the restrictions regarding reservation of chrome were relaxed to some extent and permission given for the issue of licenses for prospecting for this mineral subject to certain conditions, for a period of one year at a time, and not exceeding three years in all.

Revenue.

The revenue earned by the State from the royalty on minerals other than gold during the year 1922-23, was Rs. 69,556 as against Rs. 17,993 in the previous year.

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CHAPTER VI.

ELECTRIC POWER.

The Cauvery falls: their situation.

THE Cauvery falls are situated on the Cauvery river in latitude 12—16'—47" to latitude 12—17'—36" and longitude 77—12'—30" to longitude 77—13'—33." As regards the origin, etc., of the Cauvery river, reference may be made to Volume IV, Mysore District. It may, however, be stated here that the river Cauvery, after flowing from Karrigal in a generally south-easterly direction for about 150 miles, divides into two branches forming the island of Sivasamudram, and it is across these branches that the falls are situated, one on the eastern or British side, called the Bar Chukki, and the one on the western or Mysore side, the Gagana Chukki. This is divided into two by the small island of Ettikur. About 1½ miles below the falls, the two branches unite. Thus the Cauvery river at and for some distance about the falls is partly in British and partly in Mysore territory.

Origin of the Cauvery Power Scheme.

In 1894, Mr. Edmund Carrington, an Electrical Engineer, applied for a concession of the water-power at the falls. He was connected with Mr. Holmes of Madras, one of the pioneers of Electric lighting in India. These gentlemen and Colonel Henderson, the then British Resident in Mysore, who took a keen interest in the scheme, recognised that long distance transmission of power might be carried out. Mr. Holmes even suggested the supply of power to the Kolar Gold Mines.

Then the Mysore Government considered it advisable to investigate the practicability of generating power at the falls, and obtained the loan from the Madras Government,

of the services of Colonel Pennyquick, R.E., then Chief Engineer at Madras, for the purpose. In his report, he took a most favourable view of the capabilities of the falls.

In June 1899, Captain A. J. DeLotbiniere, R.E., Deputy Chief Engineer of Mysore, after studying the account of the installation at the Niagara Falls, conceived the idea of working the machinery at the Kolar Gold Mines with electricity generated by the power of the Cauvery Falls, and this scheme received the hearty support of Sir K. Seshadri Iyer, the then Dewan of Mysore, and Colonel D. McNeil Campbell, the Chief Engineer. Messrs. Taylor and Sons of London, who have the general management of the mines in the Kolar Gold Fields, also supported the scheme.

Government decided in 1899 to utilize the Falls for the production of electric power and its transmission for the service of industrial undertakings in different parts of the State, including the Kolar Gold Mines. In embarking upon this great undertaking, the Government were influenced wholly by the consideration that the supply of a cheap motive power of the kind and on the scale proposed, was likely to greatly foster private industrial enterprise throughout the State and thus to indirectly increase the wealth and general prosperity of the country. Captain A. J. DeLotbiniere, Deputy Chief Engineer, was deputed to Europe and America to investigate and mature the project in consultation with experts and to arrange details.

Further progress and completion of the scheme.

The Mysore Government acquired from the Government of Madras, the right to utilize the whole of the water-power at the Falls under certain conditions.

Captain Lotibiniere returned to India in February 1900, and the sanction of Government of India for the various details, such as the concession from the Government

of Madras, the agreement with Messrs. J. Taylor & Sons and the individual Mines, entering into a contract with the General Electric Company of Schenectady, United States, America, and Messrs. Escher, Wyss & Co., Zurich, was received in March 1900. In June 1900, the agreement with Messrs. Taylor & Sons was signed and Captain Lotbiniere again left for England and America in July 1900. Arrangements were made with the General Electric Company of New York for electrical plant and Messrs. Escher, Wyss & Co., Zurich, for hydraulic plant, the former taking the entire responsibility for installing the plant and working for a period of one year. The works were completed by 1902 and on the 30th June of that year, the current (30,000 volts) was successfully transmitted for the first time to the Kolar Gold Fields.

Quantity of
power.

The power developed by the first installation was 6,000 E.H.P., but owing to the increased demand for power at the Gold Fields and in Bangalore (including the Civil and Military Station) and Mysore Cities for both power and lighting, the Generating Station was extended by the 2nd installation in 1903, the 3rd installation in 1907, the 4th installation in 1914-15, the 5th installation in 1918 and the 6th installation sanctioned in 1919. A seventh installation costing about Rs. 3½ lakhs was sanctioned in January 1925. The total power generable was raised by the sixth installation to 34,000 H.P. The seventh installation provides for an extra 14,000 H.P., thus making the total power generated under the seven installations reach the total of 48,000 H.P.

The Head
works.

The head works at Sivasamudram are located at a point approximately two miles above the Cauvery Falls and the water is diverted by a masonry dam about 9'

high by 2,400' long across the river, the flow of water being controlled (completed in 1924) by suitable gates into the channels.

Two parallel channels each 3.375 miles in length have been constructed for supply of water to the forebay above the Generating Station where are located the control gates for the regulation of flow of water through the penstock or pipe lines connected to the water wheels in the Generating Station. The channels.

The head under which the turbines operate is 423' between water level in the Forebay and Tail race. The total head.

There are 10 turbines, six of 5,600 B.H.P. Bowing & Coy's Francis turbines each direct connected to 3,530 K.V.A. 3 phase alternators, one of 5,600 B.H.P. Escher Wyss Francis turbines direct connected to 3,530 K.V.A. alternator, three of 2,700 B.H.P. Escher Wyss impulse turbines each direct connected to 1,760 K.V.A. alternators. All the generators are of the International General Electric Company's manufacture of New York, the speed regulation and penstock pressure rises being controlled by suitable automatic governors and relief valves. Water turbines.

The excitation for the generators is obtained from two Turbine driven and two motor driven exciters, each of 250 K.W. capacity at 110 Volts. Excitation.

The power from the generators is conducted by cable to the busses and connected to the step-up Transformer station situated at the Generating Station and the voltage is stepped up by means of transformers to 78,000 volts for transmission to Kolar, distant 92 miles, and to 35,000 volts for transmission to Bangalore, distant 60 Electrical supply.

miles, and to 35,000 volts for transmission to Mysore, distant 37 miles.

Transmission
circuits.

The transmission lines to each of these places are in duplicate and to Kolar each line is on separate posts.

Supply to
Kolar Gold
Fields.

Energy received in the Government Transformer Station on the field is reduced from the line pressure to 2,300 volts at which pressure it is supplied to the Mines over their own distribution system for operating the several classes of mining, milling, pumping, etc., motors.

Supply to
Bangalore.

Current is similarly received in the Main Sub-Station at Bangalore City and reduced to 2,300 volts, for distribution for power and street lighting. For Bangalore lighting, Motor Generator sets are installed in the first and two additional Transformer stations, where the frequency is raised from 25 to 60 cycles.

Supply to
Mysore.

A step down Transformer station at Mysore is installed for receiving energy and distributing the same for power and street lighting and similar Motor Generator sets are installed and operated for supplying the bungalow lighting.

Miscella-
neous.

Penstock pipes in the Krishnarajasagara Dam to generate electric power to serve as a reserve for the Mysore power supply and for other purposes have been fixed.

The experimental installation for pumping water by means of electric power established on the banks of the Arkavati near Kankanhalli having proved successful, the question of establishment of such installations by private enterprise along the valley has been taken up for consideration.

Power and
Plant.

The total quantity of power generated at Sivasamudram during the year 1924-25 was 166,244,452 Units. Of

the power generated, 122,537,800 units were supplied to the Mining Companies at the Kolar Gold Fields, 30,291,808 units to Bangalore including Civil and Military Station, 8,091,720 units to Mysore City, the balance being Station and Local consumption.

At the end of the year 1924-25, there were 271 power service installations in all, exclusive of those at the Mining Companies in the Kolar Gold Fields. Of these, 197 were in Bangalore including Civil and Military Station, 65 in Mysore City, and 9 in the Kolar Gold Fields. The total number of interior lighting installations was 8,286. Of these, 6,480 were in Bangalore including Civil and Military Station, 1,627 in Mysore City and 179 in the Kolar Gold Fields. The total number of street lights were as follows :—

Lighting and
Power
Installations.

In Bangalore, including Civil and Military Station	...	...	...	2,955
In Mysore City	...	...	...	2,049
In Kolar Gold Fields	...	...	...	233

There were 20 additional power installations of which 14 were in Bangalore, 2 in Mysore City and 4 in Kolar Gold Fields during the year 1924-25.

The aggregate outlay on the Cauvery Power Scheme from the beginning to the close of 1924-25 was Rs. 1,82,37,636. The gross earning from the scheme amounted to Rs. 5,52,55,362. Of this, a sum of Rs. 21,06,717 represents the interest charged at 4 per cent on the depreciation fund deposited with Government. Deducting from these gross earnings, a sum of Rs. 3,73,82,251, of which Rs. 2,02,38,134 represented the working expenses, Rs. 77,98,356 Depreciation Fund set apart and Rs. 93,45,761 the interest at 4 per cent on Capital outlay, the net profit realized from the Scheme for the 23 years was Rs. 1,78,73,111 or an average of Rs. 7,77,092 per year.

Financial
results.

Statistical
Tables.

In the appendices to this Section will be found statistical information bearing on the works as a State venture worked out on a commercial basis.

Appendices.

Statements I to VI.

STATEMENT I.

STATEMENT OF CAPITAL CHARGES, GROSS AND NET REVENUES AND NET RESULTS FROM THE COMMENCEMENT OF THE DEPARTMENT TO END OF 1923-24.

YEAR	Capital charges	REVENUE		
		Gross Revenue	Expenditure including the amount credited to K. R. S. works and Depreciation charges	Net Revenue
1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.
1900-01 ...	23,361,72	...	33,420	—33 420
1901-02 ...	21,50,228	...	1,23,815	—1,23,815
1902-03 ...	1,89,227	7,35,608	2,76,188	4,59,420
1903-04 ...	4,23,177	11,33,893	1,09,061	10,24,832
1904-05 ...	9,55,379	11,45,014	2,16,630	9,28,384
1905-06 ...	1,03,188	19,09,454	2,41,413	16,68,041
1906-07 ...	3,36,049	20,11,554	2,88,661	17,51,893
1907-08 ...	13,56,359	17,58,346	2,35,600	16,01,666
1908-09 ...	1,47,455	17,46,295	13,03,732	4,12,563
1909-10 ...	2,31,602	19,49,282	10,18,709	9,69,674
1910-11 ...	32,32,860	15,99,179	6,29,505	9,69,674
1911-12 ...	50,221	16,65,692	6,31,094	10,34,598
1912-13 ...	30,317	17,05,781	6,43,693	10,62,088
1913-14 ...	9,37,234	17,03,888	7,30,397	9,73,491
1914-15 ...	10,70,701	17,44,349	7,05,889	10,38,460
1915-16 ...	3,96,221	20,07,632	8,63,369	11,54,263
1916-17 ...	3,30,708	19,59,907	7,27,829	12,32,081
1917-18 ...	5,82,745	22,83,521	8,76,599	14,06,922
1918-19 ...	3,74,579	23,32,529	9,89,019	13,43,510
1919-20 ...	10,12,769	19,49,161	10,90,561	8,58,600
1920-21 ...	12,23,934	26,12,456	12,53,366	13,59,090
1921-22 ...	25,19,310	32,39,080	12,75,026	19,64,054
1922-23 ...	3,66,012	35,11,708	14,00,847	21,10,861
1923-24 ...	3,76,927	44,83,113	14,46,773	30,35,340

STATEMENT I.—*concl'd.*

YEAR	Interest at 4 per cent on capital outlay less interest on Deprecia- tion Fund	NET RESULTS INCLUDING INTEREST		
		Of excess Revenue	Of excess expenditure	Rate per cent excluding interest
	6	7	8	9
	Rs.	Rs.	Rs.	Rs.
1900-01 ...	45,723	...	80,143	—6·83
1901-02 ...	1,36,451	...	2,60,266	—7 63
1902-03 ...	1,83,241	2,76,179	...	—6·03
1903-04 ...	1,95,489	2,29,343	...	16·97
1904-05 ...	2,23,060	7,05,324	...	12·65
1905-06 ...	2,44,231	14,23,810	...	23·32
1906-07 ...	2,33,016	14,96,377	...	23·69
1907-08 ...	2,86,864	12,14,802	...	16·94
1908-09 ...	3,16,940	1,25,623	...	1·58
1909-10 ...	2,34,288	6,46,285	...	7·97
1910-11 ...	2,61,866	7,07,808	...	8·57
1911-12 ...	2,62,168	7,82,430	...	8·41
1912-13 ...	2,42,433	8,19,655	...	9·62
1913-14 ...	2,49,975	7,23,516	...	8·21
1914-15 ..	2,78,598	7,59,562	...	7·34
1915-16 ...	2,97,117	8,57,146	...	7·97
1916-17 ...	3,01,167	9,30,614	...	8·40
1917-18 ...	3,09,468	10,97,454	...	9·41
1918-19 ...	3,17,308	10,26,202	...	8·52
1919-20 ...	3,42,091	5,16,509	..	3·95
1920-21 ...	3,90,441	9,68,649	...	6·73
1921-22 ...	4,90,591	14,73,463	...	8·76
1922-23 ...	6,35,947	14,74,914	...	8·59
1923-24 ...	6,63,312	23,72,028	...	12·90

STATEMENT II.

STATEMENT SHOWING REVENUE AND EXPENDITURE FOR
AND UP TO END OF THE YEAR 1923-24.

ACCOUNT HEADS	FOR THE YEAR 1923-24		
	Final Grant	Revenue demand	Gross receipts and expenditure
1	2	3	4
Gross Receipts—	Rs.	Rs.	Rs.
Sivasamudram-Kolar Section ...	28,36,000	28,31,637	27,96,340
Bangalore Section ...	11,15,000	11,78,620	11,97,057
Mysore City Section ...	5,16,000	5,05,385	4,88,716
Total ...	44,67,000	45,15,642	44,82,113
Working Expenses—			
Sivasamudram-Kolar Section ...	9,66,000	...	9,40,781
Bangalore Section ...	3,35,200	...	3,44,679
Mysore City Section ...	1,66,000	...	1,62,313
Total ...	14,67,200	...	14,52,758
Capital Account—			
Sivasamudram-Kolar Section Works Net Stores Credit and other Suspense.	5,02,500	...	{ 3,36,836 —13,902
Bangalore Section Works Net Stores Credit and other Suspense.	1,86,500	...	{ 91,614 —34,923
Mysore City Section Works Net Stores Credit and other Suspense.	80,000	...	{ 49,772 —52,460
Net Stores Credit ...	—50,000	...	...
Total ...	7,19,000	...	3,76,937
Grand Capital and Working Expenses.	21,86,200	...	18,24,710

STATEMENT II—*concl'd.*

ACCOUNT HEADS	TO END OF THE YEAR 1923-24		Arrears revenue at end of the year
	Revenue demand	Gross receipts and expenditure	
	5	6	7
Gross Receipts—	Rs.	Rs.	Rs.
Sivasamudram-Kolar Section ...	3,89,66,759	3,86,61,321	3,05,438
Bangalore Section	72,55,905	72,25,353	10,522
Mysore City Section	27,84,876	27,53,204	31,663
Total ...	4,89,87,530	4,86,39,878	3,47,653
Working expenses—			
Sivasamudram-Kolar Section ...	...	1,38,08,147	...
Bangalore Section ... ..	...	34,96,208	...
Mysore City Section ... ..	...	14,66,079	...
Total ...	...	1,87,70,434	...
Capital Account—			
Sivasamudram-Kolar Section Works Net Stores Credit and other Suspense.	...	1,35,70,936	...
Bangalore Section Works Net Stores Credit and other Sus- pense.	...	27,31,971	...
Mysore City Section Works Net Stores Credit and other Sus- pense.	...	12,43,886	...
Net Stores Credit ... ..	...	...	...
Total ...	...	1,75,46,793	...
Grand Capital and Working Expenses.	...	3,63,17,227	...

STATEMENT III.

GENERAL BALANCE SHEET FOR THE YEAR 1923-24.

LIABILITIES.			Rs.	Rs.
1. Capital outlay as per Appendix XI	...	...	...	1,75,46,793
2. Depreciation Fund	...	...	...	45,67,499
3. Outstanding Liabilities—				
(1) On materials	...	...	1,15,539	...
(2) Demands payable	...	...	958	1,16,497
4. Sundry Creditors—				
(1) Deposits payable	...	...	45,821	...
(2) Miscellaneous advances as per contra	...	...	371	46,192
5. Excess assets over liabilities	...	...	...	3,47,653
Total			...	2,26,24,634

ASSETS.			Rs.	Rs.
1. As per Appendix XI—				
(1) On works	...	...	1,59,30,270	...
(2) Stores on hand	...	...	13,96,848	...
(3) Sales	...	...	4,345	...
(4) Miscellaneous Advance (Capital).			2,15,330	1,75,46,793
2. Sundry Debtors—				
(1) Miscellaneous Advance (Revenue).			371	...
(2) Due for current supplied	...	...	3,47,653	...
(3) Other suspense as per contra	...	...	1,16,497	4,64,521
3. Balance with Government—				
(1) Depreciation Fund	...	...	45,67,499	...
(2) Other deposits	...	...	45,821	46,13,320
Total			...	2,26,24,634

STATEMENT IV.

DEPRECIATION FUND ACCOUNT.

Sections	Total balance at commencement of the year	Depreciation charges for the year 1923-24	Total including the balance	Payments made on works during the year
1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.
Sivasamudram-Kolar.	30,53,591	4,75,161	35,28,752	1,86,549
Bangalore ...	7,90,780	1,03,696	8,94,476	24,196
Mysore City ...	3,10,134	48,064	3,58,198	2,171
Total ...	41,54,505	6,26,921	47,81,426	2,12,916
Sections	Total balance at credit of the fund at end of the year	Interest at 7 per cent on the balance at commencement of the year and 4 per cent at end of 1919-20	Total interest on depreciation fund Account to end of the year	Total depreciation charges set apart since the commencement to end of the year
	6	7	8	9
	Rs.	Rs.	Rs.	Rs.
Sivasamudram-Kolar.	33,42,203	1,05,750	...	57,16,182
Bangalore ...	8,70,280	39,642	...	10,27,385
Mysore City ...	3,57,027	14,591	...	4,06,936
Total ...	45,69,510	1,59,983	19,17,751	71,50,503

STATEMENT V.

STATEMENT OF GROSS AND NET REVENUE OF THE DEPARTMENT FOR 1923-24 AFTER TAKING INTO ACCOUNT DEPRECIATION AND INTEREST ON CAPITAL AND DEPRECIATION FUND.

Sections	Gross Revenue Demand from Mining Cos. and Power and Light- ing Instal- lations	Gross Revenue Receipts from Mining Cos. and Power and Light- ing Instal- lations	Interest at 7 per cent on the balance at credit of Deprecia- tion Fund Account at end of 1922-23	Total	Deduct Working Expenses including depreciation charges set apart, etc
1	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.
Sivasamudram-Kolar	28,31,637	27,96,340	1,05,750	29,02,090	9,40,781
Bangalore ...	11,78,620	11,98,057	39,642	12,37,699	3,44,679
Mysore City ...	5,05,385	4,88,716	14,591	5,03,307	1,62,313
Total Results of the whole Scheme.	45,15,642	44,83,113	1,59,983	46,43,096	14,47,773
Sections	Net Revenue	Deduct Interest at 7 per cent on capital outlay during the year	Net Profit	Capital outlay to end of the year 1923-24	Rate per cent on capital outlay
	7	8	9	10	11
	Rs.	Rs.	Rs.	Rs.	Rs.
Sivasamudram-Kolar	19,61,309	6,44,699	13,16,610	1,35,70,936	...
Bangalore ..	8,93,020	1,19,400	7,73,620	27,31,971	...
Mysore City ...	3,40,194	59,196	2,81,798	12,43,886	...
Total Results of the whole Scheme	31,95,323	8,23,295	23,72,028	1,75,46,793	13'48

(a) Calculated at 4 per cent on the accumulated amount at end of 1919-20 and at 7 per cent on the subsequent net additions to the Fund year after year.

(b) This net return is arrived at by taking only the Capital outlay of Rs. 1,75,46,793 on the Cauvery Power Works. The expenditure on the Krishnaraja Sagara Reservoir is not considered in this connection. Under G. O. No. P. W. 115-126—K. S. S. 723-24, dated 1st September 1924, the Capital and Revenue accounts of the Electrical Works and the Krishnarajasagara Scheme have been directed to be combined for purposes of judging the financial results on account of their intimate and almost inseparable association with each other. The combined Capital outlay on the Cauvery Power and Krishnarajasagara up to end of 1923-24 is about Rs. 409½ lakhs. Deducting the working expenses, the net revenue realized during the year under review on the investment amounted to Rs. 30,29,000, which gives a return of 7.39 per cent on the combined capital investment of Rs. 409½ lakhs.

STATEMENT VI.

INTEREST ON CAPITAL OUTLAY.

Sections	Capital outlay			Interest at 7 per cent for the year and 4 per cent at end of 1919-20	Total Interest on the capital outlay at end of the year
	Capital outlay at the end of 1922-23	Half of the outlay during the year 1923-24	Total		
	Rs.	Rs.	Rs.	Rs.	Rs.
Sivasamudram-Kolar	1,32,48,384	1,57,701	1,34,06,085	6,44,706	...
Bangalore ...	26,74,797	28,345	27,03,142	1,19,418	...
Mysore City ...	12,46,574	1,344	12,45,230	59,196	...
Total ...	1,71,69,755	1,84,702	1,73,54,457	8,23,310	84,84,617

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CHAPTER VII.

ARTS, INDUSTRIES AND MANUFACTURES.

I. INTRODUCTORY.

THE State is favourably situated in regard to the production of most of the raw materials needed for the development of its industries. Agricultural raw materials of considerable value are raised every year and the most important of these are cotton, coffee, oil-seeds, mulberry, and sugar-cane. Cotton, wool and silk and other fibres constitute the raw materials required for the textile industries. The forest products are also valuable. Besides sandalwood, the forest yields different kinds of timber that may be used for a variety of purposes. The minor forest products consist of tanning barks, myrabolams, gums, soap-nuts, bamboos, etc. Amongst the minerals of the Indian Empire, gold from the Mysore Mines stands second in point of value. Iron ores are widely distributed throughout the State, while other mineral resources include manganese, chromium, mica, asbestos, corundum and different kinds of building stones and clay. The Cauvery Hydro-Electric Works supply power annually to the extent of about 48,000 H.P. There are other water falls in the State which also possess large power potentialities. There are no deposits of coal in Mysore and its distance from the important coal-fields in India and its land-locked position add considerably to the cost of transporting coal into the State. But the resources of wood fuel are extensive and in recent years numerous plantations of casurina have been coming into existence in most of the *maidan* districts.

Position of
Mysore for the
development
of arts and
manufactures.

Of the indigenous industries, the most important is the hand-loom weaving which is dealt with in a separate

section. Next to it in importance is silk rearing and reeling. The most generally practised industrial arts are those connected with metallurgy, pottery, carpentry, tanning, manufacture of jaggery, extraction of oil and the manufacture of earth salt. The chief artistic industries are sandalwood carving, ivory inlaying and toy making. Mention may also be made of other small industries, as basket making, carpet making, coir making, rattan works, manufacture of scents, etc. The artistic industries, when practised on a large scale, have shown a tendency to become centralised in a few important towns, where special facilities for their development are available.

II. INDIGENOUS ARTS AND INDUSTRIES.

(a) Textiles
(1) Cotton
Weaving.

Next to agriculture, hand-loom weaving is the most important industry in the State and is also one of the oldest. With the extension of the cheap and rapid means of communication, hand-loom has found a very formidable rival in the power loom. It is to be noted that after so many years of competition with power-looms—Indian and European—hand-loom weaving is still the most important industry, not only in respect of the value of the raw material consumed but also of the number of persons engaged in this industry. The total production of textile fabrics by the hand-loom weaver is estimated to be worth on the average about a crore of rupees and nearly a third of the local demand for piece goods is met by the production of these looms.

Accurate information regarding the number of hand-looms in the State, the total value of output, etc., cannot easily be obtained. As the industry is scattered all over the country, detailed and definite enquires can only be made with great difficulty. It is, however, estimated that there are nearly 30,000 looms in the State for the manufacture of cotton cloth. Besides these, there is also a large number of hand-looms for the weaving of silk and

woollen fabrics. Nearly four-fifths of the hand-loom used for cotton and silk weaving in the State have been fitted with the fly shuttle slays and such slays have also been adopted for weaving woollen *kumbli*s in a few places.

The spinning of cotton into yarn or thread was at one time the occupation of large numbers of women. Before the cotton was ready for the spinning wheel, it was cleaned or separated from the seed by passing through a rude gin and then, as it was too lumpy for spinning, it was fluffed up with a bow. It was then corded into rolls handy for the spinner. The wheel was turned by means of a handle with the right hand whilst with the left which held the cotton, the thread was spun on to the reel. After the bobbin was full, the yarn was rewound on to a swift. This was done by placing the axle of the swift perpendicularly on the ground and keeping it in rapid motion by a touch with the third and fourth fingers of the left hand. The thread was then reeled off on to a bigger reel and finally into a large skein passing round five small stakes set up in the ground in the form of a square. The skein was next dressed for the loom. The requisite number of threads was fastened firmly to fixed points and being separated by small sticks was supported by cross sticks. The cleaner then took a brush of cocoa-nut fibre and dipping it in a preparation of flour and water, passed it steadily up and down the entire length of the skein, using at the same time one of the small dividing sticks to facilitate the operation. The loom was usually placed over a kind of well or hole, large enough to contain the lower portion of the machinery, which was worked on the pedal principle with the toes, the weaver sitting with his legs in the hole for the purpose. The combs were supported by ropes attached to beams in the roof, working over pulleys and stretching down into the well to the toes of the weaver. In his right hand he held the shuttle which contained the thread

Cotton spinning.

and which, when passed rapidly through the spaces created by the combs, formed the pattern. The principal comb was held in the left hand. As the cloth was coarse, it was wound on the beam by slightly easing the rope on the right hand and turning round the lever.

Hand-loom
fabrics, their
local distri-
bution.

Hand-loom weaving in cotton is carried on in all the *maidan* districts of the State, nearly 40 per cent of the industry being concentrated in the Bangalore District. The fabric turned out of these looms constitute mainly *saries*, *kiriges*, *kanas*, in cotton or mixture of cotton and silk, *panches* with or without silk border, *duppatties*, checks, *vastras*, tape and tent cloth. Preparation of *saries* is concentrated at Bangalore, Dod-Ballapur and Anekal in the Bangalore District, at Molakalmuru in the Chitaldrug District and some places in the Tumkur and Kolar Districts. *Panches* are made at most of the looms in Melkote and Kikkeri in the Mysore District and at Hole-Narsipur in the Hassan District. *Duppatties* are woven in Hole-Narsipur and in several parts of the Bangalore, Mysore and Tumkur Districts and checks in the Bangalore, Hassan and Kolar Districts. Tent cloth of strong texture is made in the Central Jail, Bangalore. Yarn used generally varies with the nature of the cloth to be prepared out of it. 20s and 30s are highly in demand for *saries* and 40s for an admixture of silk.

Condition of
the weavers.

At present, the weaver is illiterate, ignorant and hopelessly conservative. He does not devise new patterns and even if they are brought to his notice, he does not readily adopt them. Some important changes have, however, come over the condition of the hand-loom weavers. They have now begun to buy supplies of either European or Indian mill spun yarn as the spinning of yarn as a domestic industry is fast disappearing.

The introduction of the fly shuttle on an extended scale in recent years is chiefly due to the efforts made by Government to improve the hand-loom weaving. Attempts are also being made to devise better appliances for winding, warping, sizing, beaming, etc. Along with the introduction of new methods in weaving and of new appliances for preliminary operations, every effort is being made to emancipate the weavers from the control of the middlemen, as they have no organisation among themselves. The Section headed *Miscellaneous* gives a brief account of the help rendered to the weavers by Government through the Department of Industries and Commerce.

In the State, there is only one variety of silkworm, and that is mulberry silk of the multivoltine breed. The silk produced in the State is noted for its good qualities and is partly consumed in it and partly exported outside. The waste-silk is chiefly exported to European countries, preferably France and Italy. The total yield of cocoons every year roughly amounts to 10,000,000 lbs. capable of being reeled into 7,00,000 lbs. of raw silk. The annual value of silk produced exceeds a crore of rupees and the total number of persons engaged in the several branches of the industry is 1,50,000. The quantity of raw silk exported by rail during the year 1921-22 was 7,790 Bengal *Maunds* valued at Rs. 77,04,000. The export trade in silk waste came up to 6,700 *Maunds* valued at Rs. 5,92,000.

(2) Silk,
varieties and
production.

The silk industry is wholly a cottage industry. The worms are reared in the producers' houses and are fed with bush mulberry leaves plucked from the fields. Mulberry, on which the worm feeds, is grown as a field crop in the State and nearly 40,000 acres are under mulberry cultivation every year. The cocoons are spun on trays and are killed by being dried in the sun. The reeling is done by means of simple appliances over a fire, two threads of uneven thickness being drawn at a time.

The methods of reeling in vogue at present, are capable of considerable improvement. The market for Mysore silk is very much limited at present chiefly owing to defective reeling. There is no doubt that any improvement in reeling will fetch higher prices for the silk in outside markets. The looms generally used in weaving silk are the primitive pit looms and it is only recently that fly shuttles have been introduced in several places. The chief operations prior to weaving are twisting, degumming, dyeing and warping. Silk fabrics of stout texture and excellent designs are made chiefly by *Pattegars* and *Khatris* in Bangalore, Molkalmuru, Dod-Ballapur, Anekal and a few other places. Silk fabrics produced in the State consist of *Saries*, *Kanams* and articles of conventional dress as *Vastrams*, etc. Silk *Saries* and *Kanams* with gold and silver or gilt lace borders are largely manufactured in Bangalore. Owing to the improvement in the hand-loom industry and the introduction of new designs, the export trade of the State in silk fabrics has been steadily expanding.

(3) Wool.

Wool is the next important textile raw material. The chief areas of production of wool are the taluks of Pavagada, Sira and Chiknaykanhalli in the Tumkur District, Hole-Narsipur and Arsikere Taluks in the Hassan District and almost all taluks in the Chitaldrug District.

The fleece is shorn twice a year, once in the cold season known as *mage coonne* and the other before the rainy season known as *kare coonne*. Before the sheep are shorn, they are well washed. The wool, when it has been shorn, is teased with the fingers and then beaten with a bow, like cotton, and formed into bundles for spinning. This operation is performed both by men and women, partly on the small cotton wheel and partly with the distaff. Some tamarind seeds are bruised, and after

having been infused for a night in cold water, are boiled. The thread when about to be put into the loom is sprinkled with the cold decoction. One main defect in the local wool supply is that it is composed of a mixture of the inferior varieties.

The shearings from nearly three million sheep in the State constitute the local source of supply. In addition to this, wool is also imported into the State. During the year 1921-22, 18,943 *maunds* of wool were imported valued at 3.50 lakhs of rupees. The import is mostly of wet wool from the tanneries from the Madras Presidency. As this is of low grade and inferior in quality, it is used mainly for preparing the cheaper kinds of *kumblies* for the use of coolies in the coffee and other plantations in the *Malnad*.

Of woollen fabrics, *kumbli* is an indispensable article of covering for almost all classes. Its manufacture is the staple industry of the Chitaldrug and Kolar Districts and of Mandya and Hunsur taluks in the Mysore District. The finest kinds are made only in the Chitaldrug District, and as these are of superior value are rarely made except to order. The fleece from the first shearing when the sheep are about six months old, must be used in making these *kumblies*. The high price of the finer kinds is primarily owing to the great trouble taken in selecting wool sufficiently fine, the quantity of which in any one fleece is usually small. There are about 6,500 looms in all for weaving *kumblies* for use in and outside the State.

Woollen
Fabrics.

The loom is of the same simple type as that used in cotton weaving. *Dhāvalies* or thinner *kumblies* of finer wool, with or without fine silk borders, are woven at Mandya and these are largely exported to places outside the State. *Ujju kumblies* or thicker *kumblies* are made at Hunsur and Chiknaykanhalli, and these are used as

warm blankets. The *kumblies* vary in size from 6 cubits long and 3 cubits wide to 8 or 10 cubits long and 3 cubits wide.

The bulk of the demand for *kumbli* comes partly from the *malnad* areas in the State and partly from the Nilgiris and Ceylon. It is a recognised custom that the coolies employed in the plantations should be presented with *kumblies* every year before the commencement of the monsoon season.

(4) Carpets.

Bangalore carpets are well known for their durable quality and for the peculiarity of having the same pattern on both sides. The number of men generally engaged in this industry varies with the demand for carpets and the number of looms now in use for making carpets may come up to a hundred. From a commercial standpoint, the industry is not a big one. The total value of carpets manufactured every year by cottage owners does not exceed Rs. 2,00,000. Owing to the fact, however, that the woollen mills have each a department for the manufacture of carpets, the output is at present likely to be increased on a large scale. For making low grade carpets, aniline colours are used and the vegetable dyes are used for the better quality. There is not much demand in the local market for plush or pile carpets, though the plain carpets find a ready sale locally. In foreign countries, as England, the United States of America, Australia, etc., there is a steady demand for high grade Bangalore carpets.

Bangalore
Central Jail
carpets.

The Central Jail at Bangalore has had a reputation for many years for production of carpets of good weave and attractive soft colouring. They are made in many excellent old patterns. About 70 convicts are now employed at carpet making. There are 16 looms of different sizes varying in width from 21 to 29½ feet. The wool

used in the jail is of local origin and is supplied by a contractor. Vegetable dyes are mostly used. The sizes in great demand are 6 feet by 3 feet and 7 feet by 4 feet. Some of the good designs usually demanded are 'Sirdar,' 'Peacock,' 'Hashamkhani,' etc.

The following commendation of Bangalore carpets by Sir George Birdwood may be usefully quoted from his sumptuous work prepared for the Austro-Hungarian Government :—

Testimony of
Sir George
Birdwood.

"The wonderful carpets of Bangalore probably approach in their bold scale of design and archaic force of colouring nearest to their Euphratean prototypes.....The Italianesque style introduced in the treatment of modern Persian carpets, and, with local modification, of the Masulipatam and other denominations of Indian carpets, is a departure from the traditionary Euphratean mode, is yet undeniably pleasing, and on account of its broken patterning and generally diffused colouring, better adapted to carpets intended for European rooms, where they are overcrowded and overshadowed by the furniture, than the several co-ordinated designs and immense masses of clearly-defined, deep-toned colours of the carpets of Ushak, Koula and Bangalore.

"Notwithstanding, however, the sweet charm of the Abbasi Persian carpets of modern trade, the palm for pre-eminent artistic merit above that of all other denominations of Oriental carpets now manufactured for merely commercial gain must be awarded to those of Masulipatam and Bangalore, to the former for their perfect adaptability to European domestic uses, and to the latter on account of the marvellously balanced arrangement of their colossal proportions and the Titanic power of their colouring, which in these carpets satisfy the feeling for breadth, and space and impressiveness in State furniture, as if they were indeed made for the palaces of kings and the temples of the gods; and these Southern-Indian carpets, the Masulipatam, derived from the Abbasi-Persian, and the Bangalore, without a trace of the Saracenic, or any other modern influence, are both relatively to their special applications the noblest designed of any denominations of carpets

now made, while the Bangalore carpets are unapproachable by the commercial carpets of any time and place."

(b) Metal-
lurgical arts.

The various metallurgical arts form an important group of indigenous arts next to the textile industry. Every large village and every town has its own goldsmiths and ironsmiths. There are no means of ascertaining accurately the number of persons engaged in these industries nor the total value of the several articles manufactured by them every year. Gold and silver have always been employed to a very large extent in making jewellery and this has been the favourite method with the masses, of investing their savings. There are certain areas in the State where a very small quantity of gold must once have been obtained from washings of the alluvial soil. At present, there is a regular trade in gold and silver bullion. In ornaments proper as manufactured articles, there is hardly any carrying trade worthy of being noticed and the import of such articles by private persons for their own use does not constitute an important item of trade in them from a commercial point of view.

The common agency for the distribution of the precious metals inside the State is that of "shroffs," an indispensable complement to the goldsmith's trade and in many cases, the shroffs act as capitalist middlemen between the intending customers and the goldsmiths.

The Village
Goldsmiths.

The village goldsmith often works alone and sometimes takes his near relations to work as apprentices. He confines himself generally to the manufacture of simple ornaments and a single artizan will often turn his hand to what would in large centres of trade be looked upon as separate occupations as embossing, chasing, etc.

Further, the goldsmith and the silversmith are almost universally the same in rural parts and there has been no clear distinction between the two branches of trade except

in large towns. The village goldsmith is not always appreciated by his customers and the popular ideas about him are never flattering. His procrastination is proverbial. He is as often as not in debt and the silver or gold placed in his hands with today's order is invariably utilized in making ornaments ordered months ago.

Goldsmiths as a class are not always in a prosperous condition and most of the members of the class in the interior parts of the State are poor and it is this poverty that may compel them to have recourse to doubtful practices often complained of by their customers. Such of the goldsmiths as are prosperous have acquired their wealth by money lending or agriculture or some other occupation.

Goldsmiths are generally paid for their work at a fixed rate per *tola* on the weight of the finished article, the material on which they have to work being usually supplied by the customer. The remuneration of a goldsmith is, therefore, practically the payment for his labour only and it is regulated according to the nature of the labour required. The actual profits of the trade—if any—constitute a matter on which it is very difficult to get definite information. The wear and tear of tools, consumption of charcoal and the like, form the outlay to be incurred by the goldsmith. When he is employed by the customer to procure him gold and silver on which to work, as well as to do the work itself, he will have greater opportunities for making profits.

The chief instruments used by the ordinary goldsmith are hammer, blow-pipe, forceps, mould, different kinds of pincers, stamp dies, crucible, anvil, chisels, files, scissors and compasses, bellows, and brushes. Besides the above, there is a variety of instruments which are practically moulds or instruments of the form to which the metal is to be shaped. Most of these are made in iron or steel or bell-metal. The stock of materials commonly required

for his trade are salt, saltpetre, red earth, alum, calomel, sulphuric and nitric acids and borax. He needs for his fire, charcoal, cow-dung and wood.

The commonest method of assaying gold is by rubbing it on the touchstone and the quality of the gold is recognised by the shade of the mark on the touchstone or by comparing it with marks made by pieces of gold of known purity. The purer the gold, the redder will be the tinge of the streak made but an experienced eye is required to estimate the amount of alloy used. Gold, if alloyed, will give a paler and yellower colour than pure gold. A copperish tinge in the mark indicates the presence of copper in the gold and a white streak that of silver. Silver is roughly tested by its ring in the manner wellknown for testing coins or it may be rubbed on the touchstone in the same way as gold.

The Indian method of purifying gold is, to take equal quantities of brickdust and common salt, a good handful, which is put between two pieces of potter's ware and into it the gold. These are placed in the midst of a heap of dried cow-dung (*brathis*), and lighted at top in a place where the wind cannot produce a strong fire. The pieces of gold when taken out appear incrustated with a black crust, which must be removed and the process as often repeated as the same is reproduced.

It is rather difficult to arrive at any estimate approaching precision as to the proportion of the value and amount of gold ornaments to those of silver already in use. Gold is confined mainly to the richer classes and numerous ornaments are largely worn by their womenfolk on festive or other special occasions. The ornaments of the lower classes are made by silver and a good portion of it is in daily and constant use. The following are some of the ordinary gold and silver ornaments worn by the people :—

Gold and
silver
ornaments,
vessels, etc.

Ragate, Kyadige, Jedebille, Chauri, Cuppe, Bavali, Vole, Padaka, Addike, Kankani, Vanki, Bajuband, Dābu, Ruli, Kālu-gejje, Pilli, Udidhara, Karadige, Tayiti, Sunnada Kāyi, etc., etc.

Vessels made in silver or gold such as cups, plates, dishes, tumblers, attar dannis, etc., are largely used by the richer classes and are given as presents on festive occasions. The images in the big Hindu temples are often made of gold and silver. Besides these, the temples receive as offerings from the worshippers, silver-plated lamps, *lotas* and other service vessels, ear-rings, necklaces, belts, bangles, bracelets, gold umbrellas, silver sticks, cases for holding torches, etc.

Observances relating to the use of ornaments vary from place to place. The use of one kind of ornament rather than another is at times enough to distinguish different sects or grades of society. But what constitutes a distinction in one area may be no distinction in another. Invariably, every woman, Hindu or Moslem, if not a widow, will have some ornaments on her body. During marriage occasions, the brides are often bedecked with a vast amount of jewellery.

The ornaments now in use are lighter and more fanciful in workmanship than those of a generation ago. They are also lighter in make-up. Mangalore patterns and designs have been widely in vogue in the Cities of Bangalore and Mysore. There has been no great change, however, in the prices of the ordinary ornaments used by the middle class people. Ornaments set with precious stones are chiefly used by the higher classes. False jewellery is largely sought after by the poorer folk.

From an economic point of view, the excessive use of ornaments has done great harm to Indian society generally. A large amount of wealth is locked up in jewellery and is thus not available for its employment in profitable channels. There is no doubt that the economic development of the society can be materially accelerated if a diminution in the stock of ornaments in use is effected. The spread of education among the masses, development of trade and manufactures, opening up of better

Hoarding and
its economic
effects.

opportunities for investment, etc., may reduce to some extent at least, the desire for and the use of ornaments.

Iron work
and Steel.

Iron ores are widely distributed in the State and the supplies are ample to meet all demands that may be made upon them. As the ores are variable in character, it is only in a few places they can be had in sufficient abundance and purity so as to facilitate their being worked on a commercial scale. In past times, iron smelting was carried on in most parts of the State. The production of iron by the indigenous method is now almost extinct. This is due to the fact that the local iron cannot successfully compete with the imported iron and steel received in the form of bars, rods, sheets, plates, etc.

Every village has its own blacksmith who generally works in or near his dwelling place. The more common articles of iron made by him are agricultural implements as ploughshares, scythes, axes, and tyres for carts. The chief domestic utensils are frying pans, laddles and vessels of different sizes to draw water. The manufacture of most of these things is now being abandoned as the imported articles turned out on a large scale with the aid of machinery sell at cheap rates.

Iron
foundries.

There are four foundries in Bangalore, where some casting work is done and articles like ornamental railways, stands for garden seats, etc., are prepared. The old foundry at Chick-Ballapur is now only a workshop for repairs.

Musical wire
drawing.

Musical-wire drawing is an industry peculiar to Channapatna. It dates from the days of Haidar Alī, who, it would appear, created a demand for it by sending the wire to Delhi. The special character of the wire was due to the peculiar tempering and the high class local steel used,

viz., the old Indian "Wootz." The industry declined owing to decrease in demand for the wire and the difficulty of getting a proper kind of good steel; the local industry of making steel from the Mysore made superior wrought iron has practically died out. The workers have decreased in number and the skill is also being practically lost. A substitute for the steel is now used as attempts are being made to revive the industry in a small scale. The present process may be thus briefly described:—The workmen buy some good imported steel, beat it into thin rods and draw them out thinner and thinner, through various sized holes in a wire drawing plate, just as they draw silver in Bangalore. After the required thinness is obtained, the wire is tempered by being heated in a butt of molten tin and cooled slowly in a dry chamber. It is kept free from rusting by being immersed in quicklime powder. It is stated that the German piano makers prize it highly and that there is demand for it all over India.

Brass and copper vessels play a very large part in the ordinary daily life of both Hindus and Muhammadans. Gifts of utensils made in these metals are usually made on the occasion of weddings, festivals and ceremonies. In the Hindu temples, vessels of brass and copper are largely employed and their shape and design differ according to the sect to which the temple belongs. It is only in some rich temples that vessels made of gold and silver are employed and that too only to a limited extent. With the exception of a few copper vessels used either for sanctity or for ceremonial purposes, vessels made of pure copper are not generally used by Hindus, whereas, Muhammadans use copper vessels more freely than those made of brass or bell-metal.

Manufacture of brass and copper vessels used to be carried on formerly by a particular caste known as the

Brass and copper.

Manufacture of brass and copper vessels.

Bhogars, but at present persons belonging to other castes as well have taken to this business. Though the industry is localized to a great extent, every large town has usually a shop or two for the sale of these vessels, and generally pedlars go from village to village or visit important fairs to sell their wares to the people.

The casting
process.

The casting process falls into two sub-divisions, moulding and casting proper. A core of mud is first made of the shape of the inner surface of the intended hollow casting of metal and turned true. A lining of bees-wax of the thickness of the casting required is then laid over this turned surface and also turned true under a bow lathe. Lastly, an outer layer of mud is superimposed on to this wax lining. Two openings are left, one at the bottom for the melted wax to be run out and the other near the top for the molten metal to be poured in. A coating of rough mud is now put on the mould and the whole carefully dried. The mould is then heated and the bottom opening is left open to allow the molten bees-wax to run out. The molten brass is next run in through the opening on the top and after it is cooled, the earth inside and outside is removed. The cast article is then filed by hand and turned under a strong lathe worked by two men.

Casting and sheet metal work are carried on to some extent at four places in the State, namely, Magadi, Nagamangala, Sravana Belgola and Sitakal. The casting work at Nagamangala is more extensive and varied than at Magadi. The casting is mostly in brass and to some extent in bell metal. The articles prepared from castings of brass are images of the various Hindu Gods, *Vāhanams* or riding animals of different Gods, lamp-stands, candle-stands, tumblers, sounding bells, cups and boxes.

The beating
process.

In the beating process, the imported sheet metal is chiefly used. If old vessels are utilized, they are cast into

plates locally and from these plates new vessels are beaten. The beating process is in vogue both at Sravana Belgola and at Nagamangala. At Sravana Belgola, brass vessels beaten from sheet metal constitute the greater bulk of production, while those from copper sheets come next. The articles prepared out of sheet metal at Nagamangala are *prabāhvalis*, platings over doorways in temples, *sūrya-haras*, *vimānas* and *mantapas*.

The following table shows the total quantities and values of brass and copper, unwrought and manufactured, imported into the State during the last two years. To facilitate comparison, similar figures for the year 1913-14 are given. It has been possible to obtain accurate statistics of the internal movements of brass and copper ware from district to district within the State :—

Trade in
brass and
copper.

	1913-14		1919-20		1920-21	
	Mds.	Rs.	Mds.	Rs.	Mds.	Rs.
Brass Unwrought	4,400	1,72,800	2,127	1,65,099	6,589	4,45,363
do Manufactured	8,900	5,33,200	6,867	7,57,753	10,742	9,52,773
Copper Unwrought	3,100	1,59,900	640	50,119	2,658	1,79,938
do Manufactured	5,200	3,74,209	3,350	3,66,639	3,784	3,36,684

It will be seen from the above table that the imports of brass and copper articles are greatly in excess of the total weight of brass and copper imported in an unwrought condition. Formerly, the alloys used to be mostly mixed here in the country and vessels used to be made mostly out of old utensils melted down or of plates cast locally. The demand for vessels has outgrown the supply of old vessels, and local casting and moulding has suffered owing to the large imports of ready made articles and also the manufacture here of vessels, etc., by beating out imported brass sheets. With regard to copper, imported sheets have been mostly in demand from the beginning, as copper cannot be melted easily.

Pottery.

The potter as a member of the village community is found in almost every large village. Owing to the brittle character of the ware and the difficulties of transport in the way of exploiting distant markets, the industry has not been localized. The numbers of potters in the State as returned at the Census of 1921 is 23,457 as against 26,229 in 1911 and 24,182 in 1901. The principal tools employed by them are the wheel, a convex stone and a series of flat bat-like mallets for tapping vessels. The clay is usually obtained from the beds of tanks, rivers and *nālas*. The articles most commonly manufactured are vessels of different shapes and sizes, having narrow or wide mouths, cooking plates and dishes, stoves, flower pots, tobacco-pipes, rough images of Gouri and Ganesha. Bricks are made in the usual wooden moulds. Country roofing tiles are also made on the wheel in the form of cylinders and are afterwards divided into two parts by a wire or a knife. Reference also may be made to the manufacture of large jars for storing grains, six feet or more in height.

Sculpture.

For sculpture, potstone or soapstone is the common material used. From this stone superior cooking vessels are also made, besides images of the Gods, and various ornamental articles. The Jain statue of Gummatēśvara at Sravana Belgola, 57 feet high, standing on the summit of a rocky hill, which rises to 400 feet, is one of the most remarkable works of Indian art. In the opinion of Fergusson, the decorative sculpture of the Halebīd and Belur temples offer "the most marvellous exhibitions of human labour to be found even in the patient East;" such labour as, he believes, "never was bestowed on any surface of equal extent in any building in the world." The erection of the New Palace at Mysore has afforded an opportunity of reviving the artistic skill of local and other sculptures. (See Volume II, Chapter I—*Architecture*).

Of the art of engraving, the best examples are to be found in the numerous inscriptions on copper or stone scattered over the country. Some of the oldest on stone (as those of the Bāna kings at Srinivasapur) are deeply and heavily cut, on ponderous and massive slabs, as if by the hands of a giant race. But the Kadamba inscription of the fifth century on a stone pillar at Talgunda is a beautiful example of a regular and ornamental engraving in the so-called box-headed character. Some of the old rock inscriptions at Sravana Belgola are also fine specimens. The Ganga grants on copper of the fifth to the eighth centuries are most artistically incised both as to form and execution. Many of these are the work of a Visvakarma, and as the Kadamba inscription of about the third century on a stone pillar at Malvalli, in the Cave characters, was also engraved by a Visvakarma, it is evident that there was a family of this name attached to the court as engravers, first under the Kadambas and then under the Gangas. With the Chālukyas the style improves, and later on, the Chōlas covered some of the eastern temples with inscriptions in old Tamil deeply and well cut. But it is under the Hoysalas, perhaps, that we find the most perfect specimens. Their inscriptions, on beautifully polished slabs of hornblende, are masterpieces of the art. The letters are of ornamental design, varied to suit their positions, and the whole so well fitted and harmonized together that no space is left where a single additional letter could be introduced. Sometimes, the initial letters are formed into designs imitating birds or other animals.

Engraving.

Sandalwood carving is an old indigenous art peculiar to Mysore. It is done by a class of workmen called Gudigars, about 400 in number, who live in Sagar and Sorab taluks of the Shimoga District. The designs with which they entirely cover the boxes, desks and other articles made, are of an extremely involved and elaborate

Carving in wood and inlaying : Sandalwood carving.

pattern, consisting for the most part of intricate interlacing foliage and scroll work, completely enveloping medallions containing the representation of some Hindu deity or subject of mythology, and here and there relieved by the introduction of animal forms. The details, though to some extent incongruous, are grouped and blended with a skill that seems to be instinctive in the East, and form an exceedingly rich and appropriate ornamentation, decidedly oriental in style, which leaves not the smaller portion of the surface of the wood untouched. The material is hard, and the minuteness of the work demands the utmost care and patience. Hence the carving of a desk or cabinet involves a labour of many months, and the artists are said to lose their eyesight at a comparatively early age. European designs are also imitated to perfection.

The articles that are usually prepared are:—images of the various Hindu deities, animals, combs, fans, caskets, boxes, desks, photo frames, walking sticks, etc. A good deal of elaborate carving is introduced into almost every one of these articles and the details of the ornamentation are sometimes so elaborate and costly that they fail to attract the attention of modest purchasers. The Gudigars cannot always keep a large stock of articles for sale. They show their skill only when especially large orders are placed with them and the requisite money is paid in advance. The bulk of the articles manufactured by them is now sold through the Government *Depôt* organized to provide a market for all artistic products in the State.

Many old Hindu houses possess beautiful specimens of ornamental wood-carving in the frames of doors, and in pillars and beams.

Inlaying.

The art of inlaying ebony and rosewood with ivory, which seems to have been cultivated by Muhammadans and of which the doors of the mausoleum at Seringapatam

are good examples, has been recently revived at Mysore. As a result of this, several many useful and ornamental articles are being turned out. Similar work is also met with in choice musical instruments, especially the *Vīna*. The Muhammadan workers are advanced either money or ivory and the articles prepared delivered to a central depôt which advances a part of the price to enable the workman to produce the articles, the full price being paid when the article is sold.

The manufacture of *Tambūri*, *Vīna* and *Sitār*, at costs varying from Rs. 15 to 60 each, according to the nature, quantity and quality of the material used, is being carried on to some extent at Magadi in the Bangalore District. The *Sitārs* are in great demand in Hyderabad, while the other two are disposed of locally. Halasu or jack wood is mostly used and the nature of the work is such as to demand manual skill and the use of machinery does not offer any special advantages.

Musical
instruments.

This art is, principally, if not entirely, applied to the manufacture of bangles or glass rings, worn on the wrists like bracelets by all classes of women. Till very recently, glass for bangles was being prepared in several places of the State, *viz.*, Molakalmuru, Muttod and Anivala in the Chitaldrug District, Julupalya and other villages in the Bagepalli taluk, Thimmasandra, Gazalahosahalli in the Sidlaghatta taluk, Kattapalli, Koratagere and Pavagada in Tumkur. The decline of this once flourishing industry is chiefly due to the scarcity of cheap fuel and alkali earth and the importation at low prices of bangles of much higher quality from Austria and Japan. Bangle glass of three different colours, deep cobalt, blue, deep emerald, green and deep black was being manufactured at Molakalmuru in the Chitaldrug District. The industry is now practically extinct.

Glass making.

The furnace
at Molakal-
muru.

The furnace at Molakalmuru is situated in the open country, about a mile to the east of the town and about a furlong to the south of the road to Rayadurg. The furnace used in making glass is approximately in the form of a cylinder surmounted by a truncated cone of a short height, the smaller section of the cone constituting the top. The height of the cylindrical part is 12' 6" and its diameter 15' 0" whereas the height of the conical part is 4' 6", the diameter measuring 2 feet, 2 inches. A small circular opening about 9 inches in diameter lies in the centre of the furnace. At the height of about 4 feet from the base of the furnace, there is a circular platform projecting from the inner walls and towards the centre of the furnace leaving an opening at the centre. There is a small opening to one side in the lower part of the walls of the furnace between its base and the platform and through this opening the furnace is lighted. Inside the wall of this top and from the mouth of the furnace is lined with potstone, the thickness of the lining being about 18 inches and the outside is built of roughly burnt bricks.

The pots fully charged are piled up on the circular platform so as to form eight rows, one above the other, the pots in each row breaking joint with those in rows above and below. The mouth of each pot is exposed to the centre of the furnace while its base is turned towards the wall, the entire pot having a downward tilt towards the base. Twenty-two pots make up a row, those forming the topmost row being of smaller size than the rest. One hundred and seventy-six pots thus piled up fill the furnace to a height of about eight feet above the circular platform.

Fuel used is the ordinary jungle wood. The furnace is kept under a steady fire. Firewood is introduced in regular quantities and none put in till that in the furnace is completely burnt up into ashes. Irregular or imperfect burning of firewood is stated to retard the melting of the

charge or to spoil the colour of the glass produced. The fire in the furnace is gradually raised and kept for eight days continuously, night and day, and is worked by shifts. When coloured glass is to be produced, the furnace is worked for 12 days. Three weeks are allowed for cooling, after which period the pots are taken out through the mouth of the furnace, which is now widened out.

The materials used in the preparation of glass are earth-soda, quartz and colouring matter, as oxide of copper, and oxide of cobalt.

The different kinds of glass made are the following:—

(1) By using a mixture of impure varieties of soda and quartz in the proportion of 2 to 1, a pale greenish yellow glass is obtained which is called *bija*, meaning seed.

(2) Deep cobalt glass is prepared by fusing a mixture in the proportion of 18 seers of the yellowish glass, 24 of the purer variety of earth soda and 12 of quartz with 12 tolas of cobalt oxide.

(3) Green glass results from fusing a mixture of 18 seers of yellow glass, 24 of the purer variety of earth soda, and 12 of quartz; with 6 tolas of the colouring matter, black oxide of copper.

Four charges of 176 pots each are taken out every year. The average weight of the glass in one pot is about one and one-sixth maunds of 24 lbs. per maund. The total quantity of glass produced per year from this furnace is 821 *maunds* or slightly less than 9 tons.

The village carpenters working in the rural parts are chiefly engaged in providing the *raiyat* with agricultural implements and also building materials. To a limited extent they undertake the construction of bullock carts. A few factories for working in wood have recently come into existence in different parts of the State.

(c) Carpentry and turning.

Saw-mills.

Power driven saw-mills have been established in the Kolar Gold Fields and in Bangalore City and to a smaller extent in the two industrial schools worked by Missionary bodies in the towns of Tumkur and Kolar and in the Chamarajendra Technical Institute at Mysore. The Kolar Electrical Saw Works were started with a view to meet the needs of the Gold Mines. The two Mission Industrial Schools work their sawing plant by oil engines, using all the types of saws, *viz.*, the circular, the frame and the hand saws. These power-worked saw-mills have been established with a view to afford useful and practical training to the students. Agricultural implements are, however, being prepared in the Kolar Industrial School in addition to meeting occasional demands for furniture.

Carpentry,
workshops,
etc.

Carpenters' workshops and country cart factories are in existence at Bangalore, Tarikere, Hunsur, Tiptur and other trade centres. They supply the local demands for country carts and other articles required by the *raiyat*. Each factory produces, on an average, about 30 to 50 carts per year. The demand for carts appears great, considering the number of carts in use in the State. A few furniture factories are also working in Bangalore and a few other large places where good cabinet work is turned out, mostly copied from English designs. Coach and carriage building is also being successfully carried on.

Lac-turnery.

Lac-turnery is an old indigenous industry in Mysore, practised chiefly at Channaptna, by a class of people called *Chitragārs*. The wood used is *Hale* or *Eiji* which grows abundantly on waste lands round about Channapatna. It is soft and of fine grain, admitting of being turned under a bow-lathe, worked by one hand. The people cut the logs and thick branches of the wood into smaller pieces, turn them under the lathe and apply variously coloured lac, by pressing it gently against the

articles under the bow-lathe, in which process the lac melts and coats the toys. By dexterous handling, various shades of colour are imparted to the different parts of the toys turned by the lathe.

Since the introduction of the subject in the local industrial school, boys of other classes trained in the school have taken to the profession and are earning an independent living. The introduction of power driven lathes has facilitated the increase of production and training of men of different classes in the manufacture of these toys.

The toys for which Channapatna is noted are remarkably well suited for their purpose and much sought after by all classes of people, including the Europeans. These toys are of brilliant colours, smooth and hard and the colour never comes off. Large toys, representing various animals, are made from a soft wood like touch-wood *bhurige-mara*. They are elaborately painted by hand; the birds especially, and some fruits, being very fairly modelled and painted to imitate nature.

The old rural industry of curing hides has been very largely replaced by organised bark or chemical tanning on a large scale.

(d) Leather dressing.
Bark tanning.

The indigenous process of tanning is the same in all places. The salted hide is immersed in *chunam* or lime water for 6 or 8 days, after which the hair is removed. It is again immersed in fresh solution for about 4 days, after which the fleshings are scraped off. The hide is then immersed in water charged with the bark of *Thangadi* (*Acacia Auriculata*) and the process is repeated thrice. Three days of further immersion in bark water and gallnut completes the tanning process, by which time the tanning extracts would have permeated completely throughout the thickness of the hide. It is then scraped, washed and oiled with *honge* oil (*Pongamia glabra*). Rubbing with oil and fat is the next process

after which it is dried, and when half wet, American flour is spread and a plank run on with some more fat and oil. One day's final drying finishes the whole process, after which the leather is packed ready for transit.

The materials generally used in the bark tanning process are *thangadi* bark (*Acacia Auriculata*), *chunam* gallnut, oil, fat and lastly flour. On an average, $22\frac{1}{2}$ lbs. of bark are required for every 10 lbs. of the tanned hide or about 25 lbs. of the raw hide. One and a half measuring *seers* of *chunam* are consumed in the process of unhairing the above quantity of hide, $3\frac{1}{2}$ lbs. of gallnut, about $\frac{5}{8}$ lb. of oil, half a pound of fat and $\frac{5}{16}$ lb. of flour.

The work of collecting hides and skins from the various parts of the State is almost entirely in the hands of the *Labbes* or Tamil speaking Muhammadans from Vaniyambādi and Vellore excepting at a few places where the local Muhammadans replace them.

In all towns and in almost every important village, store houses for hides and skins, known as *Mandis*, have been established by the *Labbes* who work both as wholesale merchants and retail buyers and sellers. Every *Mandi* employs a number of hands who roam about the country and collect the hides by buying them from the *Culavādis* and *Talayāris*.

Red Morocco
Tanning.

A very pretty kind of red morocco is manufactured at Harihar by a set of people called *Muchikars*.

It is in the first place tanned. The goat skins (these only are employed) are dried in the sun for one day; next day they are washed in the river, rolled up and put into a pot, with a mixture (for each skin) of one handful of common salt, as much water, and half of that quantity of the milk of wild cotton (*Asclepias Gigantea*). After the skins have been soaked in this mixture for four days, the pot is filled up with water, and the leather suffered

to remain four days longer in it: the hair now comes easily off the skins when scraped by a piece of broken pot. The leather thus cleaned is laid in the shade, and when dry is rolled up and kept in a house for two or three days, in a place secure from smoke and from insects; it is then soaked for eight hours in pure water, and scraped with a piece of earthenware till it becomes quite white. Before the leather is dyed, it is soaked for one night in a *pakka seer* of water which has been mixed with a handful of cholam meal (*Holcus Sorghum*) and warmed on the fire; in the morning, it is taken out and dried with a piece of cloth: when well dried, it is soaked again for half an hour in water with which one seer of tamarinds has been mixed; it is then spread on a mat and the colour applied.

For the red colour, take $\frac{1}{4}$ *kachcha seer* of lac (18 drams); *alli toppalu* (leaves of the *Mimecylon Capitellatum*) $\frac{1}{8}$ of a *dub* weight; and the same quantity of the salt extracted from washerman's earth (carbonate of soda); pound these ingredients together; boil $\frac{1}{4}$ of a *seer* of water in a place where there is no wind; put the pounded mass into it and keep it for a quarter of an hour over a slow fire. To ascertain whether it has acquired the requisite consistence, dip a cholam straw into it; if the liquid does not run down the straw when turned up, it is sufficiently done, but if it runs, the boiling must be continued for some time longer.

The leather (previously extended on a mat) is, at three different times, rubbed over with this liquid; it is then thrice sprinkled over with tamarind water, and lastly it is steeped for five or six days in a liquid composed of 3 *seers* of water and one *seer* of pounded *tangadi* bark. Every morning it is taken out, washed a little, and again replaced, till at last it is well washed in clear water and dried: thus prepared, it has a fine crimson colour, and is very soft.

(e) Oil Mills.
Oil-pressing—
“*Gānas*.”

The indigenous oil pressing industry scattered all over the country is practised by the class of people called *Gānigars*. The work of crushing the oil seeds is done mostly in the primitive wooden or stone oil mills, called *gānas*. These are in the form of an immense mortar and pestle. In the kind driven by two bullocks, the mortar is a block of granite 6 feet 9 inches above the ground, with a pedestal let into an equal distance under ground. A wooden beam, 17 or 18 feet long, pressing at one end closely against the foot of the mill has an arm projecting upwards at about a third of its length, which is attached to the head of the pestle. The mill is driven by oxen yoked at the farther end of the beam, who pull it round and round.

The stone *gānas* are in use mainly in parts of the Kolar District. At Tiptur, besides oil seeds, copra is also milled in these *gānas*. On an average, about 50 measuring *seers* or about four local *maunds* of seed are crushed in one *gana* per day with an average yield of one *seer* by weight of oil for one measuring *seer* of about 2 pounds, *i.e.*, 30 per cent of the weight of the seed used.

There were about 3,572 *gānas* 30 years ago and the number has fallen to about 2,500 in 1921, owing partly to the introduction of power oil-mills and partly perhaps to the increasing export of oil seeds.

Screw
presses and
power mills.

There are four screw presses at Bangalore and Arsikere, used solely in extracting oil from castor seeds and four Anderson Oil Expellers, three in Bangalore and one in Davangere. Another Anderson Oil Expeller is in the course of erection at Mysore.

Rotary mills.

Rotary mills have also been started in various places in the State. About half a dozen of such concerns using rotary mills varying in number from two to about twelve are now working successfully in the State.

Full data are not available for estimating the quantity of production of the various kinds of oil in the State, as the capacities of local *gānas* vary as to the rate of yield of oil. Moreover, several kinds of seeds are used, *viz.*, gingelly, *hutchellu*, *honge*, *Hippe*, (*bassia latifolia*), ground-nut and even castor, the same mill using the different seeds in different parts of the year.

Tinsel of silver white and golden yellow colour is woven into tapes in Bangalore City. Tapes of breadths varying from nine to forty threads of the tinsel are woven, *kōra* silk and mercerised cotton being used for the weft. Most of the production in Bangalore is of 20 threads. Each tape woven is termed a “*thān*” and is 35 yards in length.

There is only one factory in Bangalore weaving tinsel with the aid of electric power while about 170 looms are worked by hand. The weavers work for wages, the raw materials being supplied by the merchants. The daily outturn in handlooms is reported to be $22\frac{1}{2}$ *thāns* per loom, being 75 per cent of that from the power loom.

This is the smallest textile industry engaging about 20 families of Muhammadans in Bangalore City. Tape is largely sold in the market and is used for cots, tents, horses' girth, etc. The State Military Department consumes a large quantity of tape annually.

At Sindaghatta, Krishnarajpet taluk, there is the small industry of weaving silk threads which are styled *udidāra*, or *nadukattu* (waist bands) as well as silk twists for borders of *panches*, *kumblis* and for ornamental work on the military uniform and for *namdas* over horses, elephants, etc. The silk used for all this work is either what is spun by hand by women from the silk waste or *kōra* silk. These are sorted into various grades of fineness, dyed and woven or worked as above.

(f) Other industries.
Tinsel.

Cotton tape and rope.

Silk thread, etc.

Pierced cocoons are reeled to a certain extent in the State at present, the silk so spun being used in making sashes, etc. Silk waste is almost entirely exported.

Dyeing.

Dyeing is largely carried on with the help of artificial dyes, though in the case of silk, natural dyes are still preferred.

Calico printing.

Calico printing is another industry that is carried on on a small scale.

Sisal and other fibres.

The fibre from sunnhemp is woven on a large scale at present for making sacks, etc. The methods are very primitive. Though jute is not grown in Mysore, other fibres of great commercial importance can be produced in the State. The country is naturally suited for the growth of sisal hemp and very valuable results have been attained at Mr. Brigg's Factory near Bangalore. The pulp of this plant has been found suitable for paper pulp and straw boards. About 500 acres of land have been planted and the question of providing a sufficiently large area of land to start a large factory is being investigated by the Department of Industries.

III. FACTORY INDUSTRIES.

(1) Cotton, etc., Mills. Factory employees.

Mysore is primarily an agricultural country. According to the Census of 1921, the total population engaged in agriculture is 47,03,846 and that in industries 54,922. Of these, 40,032 are employed in factories and the others in minor industries.

Large industries.

The number of large industrial concerns at the end of 1920-21 was 133. The most important of them are:—Gold Mining Works, Cotton, Woollen and Silk spinning and Weaving Mills, one Hydro-Electric Works, Mangane and Chrome Works, Sandal Oil Factory, one

Essenflour Products Company, one Asbestos Works, one Pharmaceutical Works, one Metal Factory, four Brick and Tile Works, four Saw Mills, two Carpet Factories, Cotton Ginning Factories and Presses and other miscellaneous industries using mechanical power.

Of these industries, the Hydro-Electric works which have been installed at Sivasamudram are owned by Government. The Sandal Oil Factory, which is dealt with in detail below, is also a Government concern. Government have also recently started a large Iron Works at Bhadravati in the Shimoga District.

As cheap electric power is easily available, in the Cities of Bangalore and Mysore, a large number of small concerns such as Flour Mills, Ground-nut Decorticators, Rotary Oil Mills, pumping presses, etc., have come into existence. The total quantity of electric power used by large industries such as Gold Mines, Cotton Mills, etc., is 29,000 H.P. and that by small industries is 5,740 H.P. Small industries.

In the year 1913, with a view to encourage the adoption of machinery for various industrial purposes within the State, a system of loans was introduced and various other concessions began to be extended. As a result, a large number of industrial plants, owned chiefly by individuals, using about 7,000 H.P., were installed in different parts of the State. The power is derived from oil, gas and steam and the industries in which such power is used consist chiefly of pumping installations, sugar-mills, oil and flour-mills, ginning factories, rice mills, etc.

Bangalore is one of the most important distributing centres for the textile trade in Southern India. The total value of such goods is estimated at 1.30 crores of rupees. The climate of Bangalore, which is more or less

(1) Cotton, etc., Mills.

The two premier mills in Bangalore.

uniform throughout the year, is eminently suited for the establishment of large cotton mills. The first mill to be started in the Mysore State was in the year 1884, now known as the Mysore Spinning and Manufacturing Mills. It is also known as the Maharajah's Mills. The next mill was started in 1887 and is now known as the Bangalore Woollen, Cotton and Silk Mills. Both these Mills have had a very chequered career. They were started by local capital, but owing to the concerns not having been successful from the beginning, the bulk of the shares have been sold to outside people and the Managing Agents have also come from outside. In either case, large concessions were given by Government, such as the supply of suitable sites and facilities to obtain water. Government also subscribed towards the share capital. The difficulties which such concerns have generally to face in their initial stages and the defects incidental to their management were soon remedied. After working for a number of years quite successfully, they are both now in a prosperous condition.

The Mysore
Spinning and
Manufactur-
ing Company.

The Mysore Spinning and Manufacturing Co., Ltd., was started with a nominal capital of Rs. 4,50,000. It sustained heavy losses during the first nine years and would have gone into voluntary liquidation in 1901 but for the liberal financial assistance afforded by Government. The Managing Agency was changed and after some further struggle, the mill gradually began to make good its past losses. Its present position is satisfactory. After discharging all its liabilities, it has built up a good reserve fund and has been able to secure the additional capital required for its extension.

The Banga-
lore Woollen
Cotton and
Silk Mills,
Ltd.

The Bangalore Woollen, Cotton and Silk Mills, Ltd., was started with a capital of six lakhs of ordinary shares and four lakhs of preferential shares. The concern has

also passed through several vicissitudes but is now in a flourishing state. It has invested large amounts in the construction of comfortable residential quarters for the European staff and is providing funds on an adequate scale for providing accommodation for its labour. It has also carried out large extensions, the capital having been provided out of the profits issued to the share-holders in the form of additional shares.

The two mills together have been consuming on an average 60,000 Bengal *maunds* of raw cotton per annum.

The Bangalore Mills in addition to cotton goods manufacture blankets and carpets and during the Great European War were of substantial assistance in meeting the requirements of Government for blankets for troops on active service.

The following statement gives full information regarding the total capital invested in each of these concerns, and the existing number of spindles and looms, the labour employed and the annual outturn:—

SATISTICS RELATING TO COTTON MILLS IN BANGALORE
FOR THE YEAR 1921.

	Total Number of Looms	Total Number of Spindles	Total Number of Persons employed daily (average)	
			Men	Women
1	2	3	4	5
The Mysore Spinning and Manufacturing Co., Ltd., Bangalore.	240	20,068	754	126
The Bangalore Woollen Cotton and Silk Mills, Ltd., Banga- lore.	434	23,024	2,423	644
Total ...	674	43,092	3,177	770

STATISTICS RELATING TO COTTON MILLS IN BANGALORE
FOR THE YEAR 1921—*concl'd.*

	Total Number of Persons employed daily (average)		Total amount of Capital		
	Child- ren	Total	Autho- rised	Paid up	De- ben- tures
	6	7	8	9	10
The Mysore Spinning and Manufacturing Co., Ltd., Bangalore.	212	1092	15,00,000	11,92,700	...
The Bangalore Woollen Cotton and Silk Mills, Ltd., Bangalore	240	3307	26,25,000	26,25,000	...
Total ...	452	4399	41,25,000	38,17,700	...

The Sri
Krishna-
rajendra
Mills.

The boom in cotton mills and the advantages and the prosperity which the industry enjoyed during the war stimulated the starting of new mills within the State under the auspices of His Highness the Maharaja. The Sri Krishnarajendra Mill was registered in Mysore in 1920 with a capital of 50 lakhs of rupees. Machinery was obtained from England and the mill started work early in 1924. The mill has at present 25,000 spindles. It has a complete up-to-date hosiery plant. Besides subscription of shares to the extent of five lakhs of rupees by His Highness the Maharaja, the concern has been materially assisted by Government in regard to securing a suitable site for its location and to supplying electric power at concession rates for a certain period.

The Minerva
Mills.

The Minerva Mills with a capital of 30 lakhs of rupees have been started in Bangalore. This mill is to be equipped with 20,000 spindles. Government have acquired for the mill about 70 acres of land and given it at cost price.

A weaving shed with 100 looms has been started at Yesvantpur known as the Bangalore Spinning and Weaving Mills.

The Bangalore Spinning and Weaving Mills.

The weaving of woollen blankets, *kumblis* and carpets has been an important industry in the State from time immemorial. The recent War, however, proved the possibility of developing the industry. The Bangalore Woollen, Cotton and Silk Mills Co., Ltd., Bangalore, which had a plant for the purpose, found the demand far in excess of its capacity to supply. In addition to local supplies of wool, Bangalore is an important centre for the export of skeins; large quantities of these come from other parts of India and there is no lack of supply of wool, as these skeins also contribute materially to add to the local supplies.

Woollen Mills.

The Kaiser-I-Hind Woollen Mill was started at Bangalore in 1922 as a private Company, with a capital of five lakhs of rupees and erected a plant with 600 mules—six sets of units and 12 looms. The concern was converted into a public joint-stock company with a capital of Rs. 50 lakhs in 1923.

Kaiser-I-Hind Woollen Mills, Ltd.

The Mahalakshmi Woollen Mill was started with a nominal capital of 20 lakhs of rupees and its machinery is also partially erected. In addition to the direct manufacture of woollen goods, this Mill aims at supplying yarn to the *kumbli* weavers and as a natural result of this, there is likely to be a great development of these cottage industries by the use of fly shuttle looms for weaving *kumblis*.

The Mahalakshmi Woollen Mills.

The chief difficulty in using Mysore silk in power looms is the want of uniformity in the thread and its frequent liability to break. An experimental filature

Experimental Silk Filatures at Mysore.

with 12 basins has been installed in Mysore and the quality of silk reeled is of a high standard. The success of this experiment has induced some local capitalists to take up a scheme for putting up a large filature and it is expected that at no distant date sufficient quantities of this silk will be available to allow of the weaving industry itself being developed on factory lines.

(2) Tanneries.
Factories and
their
distribution.

Like many others of its kind, tanning, once a cottage industry practised all over the State, has developed under modern conditions into a well regulated industry run on factory lines. The latest developments in the tanning of hides and skins are represented in the State by the Mysore Chrome Tannery, Ltd., situated about a mile to the west of Bangalore City.

The number of factories as returned at the Census of 1921 is 17, of which only the Mysore Chrome Tannery, Ltd., is worked by power, the rest being worked by manual labour. The total number of persons engaged in the industry is 696 males and 111 females excepting a few scattered in the Kolar and Mysore Districts. Most of the bark tanneries, which are controlled by Lubbay merchants, are to be found in the vicinity of Bangalore.

The tanners collect skins of goat and sheep and hides of bullocks, cows and buffaloes from all parts of the State and also import these from places in British India as far as Calcutta, Cawnpore, Amritsar, etc. All these tanneries excepting the Mysore Chrome Tannery and to some extent the tannery at Chintamani (Kolar District), send out the hides and skins usually in a half tanned state. The reason is that the raw and wet hides are bought at more favourable rates by foreign countries, especially America, than tanned leather. Madras is the biggest market for tanned leather and hence all the finished leather goes to that place.

The Mysore Chrome Tannery, Ltd., was formed in April 1908 with the object of organising and developing the leather industry in Mysore on modern lines. With a view to encourage the industry, the Government of His Highness the Maharaja was pleased to subscribe for shares in this concern to the value of Rs. 60,000. The average output of the factory at present is 400 hides per day. With the existing machinery, the output can be increased to nearly 1,000 hides. The factory is equipped with complete up-to-date machinery, which is worked by electric power. The Company was declaring good dividends from 1917 but in recent years the slump in the leather trade has interfered with its prosperity.

The Mysore
Tannery,
Ltd.

The concern was until recently under the management of Messrs. Chari & Co., Ltd., of Calcutta. It is now managed by Messrs. Best & Co., Ltd., Madras. The subscribed capital of the Company is Rs. 1,67,790 while the Reserve Fund amounts to Rs. 45,000. Raw materials are obtained both locally and from Madras. The finished leather is in demand all over India, and even beyond India, in the United States of America, England, the Federated Malay States, South Africa, Egypt and other foreign countries.

Since the above paragraphs were written, the Company has gone into liquidation and is now being wound up. (1928).

The manufacture of spirits is a Government monopoly. In the Government Distillery at Bangalore, the manufacturing operations are carried on by private agency under a system of contracts periodically renewed. The operations, however, are under Government supervision and control. A detailed description of the several systems of manufacturing different kinds of beer is given in the section on *Excise* in Volume III Part II *Administrative*, of this *Gazetteer*.

(2) Breweries.
Government
Distillery,
Bangalore.

Breweries in
the Civil and
Military
Station,
Bangalore.

The three breweries in the Civil and Military Station, Bangalore, supply various beer taverns at Bangalore and the Kolar Gold Fields with what is called country beer. There is also another brewery which prepares a superior beer for the soldiers' canteens in barracks.

(4) Brick and
Tile Works.
General.

The manufacture of flooring and roofing materials for buildings occupies a prominent place in the group of ceramic industries. Formerly the occupation of village potters, it has now attained to the position of a middle grade industry and moved its habitation to urban areas. The village potters at present are neither able to meet the full demand for building materials nor able to produce bricks and tiles of superior quality and designs; consequently, a number of factories have sprung up at places where the necessary material is available and turn out various kinds of building materials, including fire bricks, drain pipes, etc.

Brick and
Tile Works,
Ltd.,
Bangalore
City.

The oldest and the largest ceramic Industrial Company in the State is the City Brick and Tile Works, Ltd., Bangalore (formerly known as the Arbuthnot Industrials) now managed by the Directors of the South Indian Industrials, Ltd., whose Head Office is at Madras. It manufactures on a large scale roofing, ceiling, flooring and ridge tiles, wire cut bricks and pipes.

Number and
distribution
of Factories.

According to the latest census returns, there are 22 factories in the State, employing 905 males and 393 females. Mechanical power is used in 10 factories. The total output of these factories comes up to about 100 lakhs of tiles per annum. It may be remarked that many of these are small concerns managed with comparatively small capital and turn out largely tiles of the Mangalore pattern. They are distributed all over the State, *i.e.*, Mysore, Tumkur, Dod-Ballapur, Channapatna, Sringeri,

Saklespur, Sagar, Tirthahalli and other places. The factory at Mysore is, however, a large one. Two smaller factories have been established at Kolar and Tumkur and are flourishing. Some of the factories are not working satisfactorily mainly because the kilns have not been properly designed. In some cases, the want of working capital has been a contributory cause of their failure. A large tile factory which in addition to the manufacture of tiles will undertake the manufacture of sanitary ware is under construction at Yelahanka about 10 miles from Bangalore. Another factory for making bricks, specially fire bricks, started work on the Mysore Road, Bangalore, but went into liquidation in 1926.

About 40,000 acres of land are annually under sugar-cane cultivation in the State. The principal growing areas in it are in the East and South and the extension of the acreage under cane depends on further irrigational facilities. All the sugar-cane grown in the State is used solely for making *gur* or jaggery. The methods of cultivation of cane have reached a high state of improvement in several parts of the State and the outturn is relatively high, being in many cases, as in the Bangalore and Kolar Districts, as much as five tons of jaggery per acre. There are three chief indigenous varieties of sugar-cane grown in Mysore, 'Chein,' 'Rasatale' and 'Pattā Patti,' the last one being grown over the major portion of the area. Of the imported varieties, mention should be made of 'Red Mauritius' and 'Mysore Java.' The sugar content in cane ranges from 15 to 20 per cent and glucose about 0·5 per cent. The percentage of fibre is low and is generally between 8 and 10. The mills used for crushing the cane are mostly bullock driven and the juice is boiled over the ordinary furnaces. The quality of the jaggery produced in some places has maintained a high reputation in the market. The bulk of the sugar-cane is grown

(5) Jaggery
and Sugar
making.

under tanks, wells and channels and as a rule, the acreage under sugar-cane in any particular locality is not large. It is not, therefore, possible to start large sugar factories under existing conditions. Owing to the fluctuations in the price of *gur*, sugar refining is by itself not sufficiently profitable unless the price of sugar is itself relatively high.

Introduction
of crushing
plants and
furnaces.

Owing to the absence of facilities for starting an up-to-date sugar factory, the holdings being small and scattered, the attention of Government has been concentrated in the past in improving the present process of manufacturing *gur* which is crude and inefficient. The primitive wooden roller bullock mill has almost everywhere been replaced by the three roller iron mills which are efficient if properly adjusted. To reduce the strain on the cattle, they are often deliberately slackened. The amount of juice left in the megasse is considerable. During the process of boiling, about a fifth of the sucrose in the juice is converted or destroyed. The frequent removal of pans from the furnace involves great waste of fuel. Experiments have been made with power driven crushing plants and furnaces that could be continuously operated by burning the megasse or dried sugar-cane refuse have been introduced. The initial difficulties have thus been just overcome and there is a likelihood of power driven plants with improved furnaces being taken up on a large scale in future where the areas to be dealt with exceed 50 to 100 acres. Reference may also be made in this connection to the introduction of the improved varieties of sugar-cane and the successful efforts made to popularise the use of oil cakes as manures.

(6) The Sandal
Oil Factories,

The most valuable of the essential oils that can be got from the raw materials available in the State is

sandalwood oil. It is obtained by distilling the chips of the heart wood of the sandal tree. The oil possesses valuable medical properties and is also largely used in perfumery and in the manufacture of toilet soaps. It emits a sweet and delicate fragrance. The percentage of oil varies in different parts of the tree from 5 to 7 per cent.

In Mysore, sandalwood trees wherever they may grow belong to the State. They are found in all districts except in Kolar and Chitaldrug, where the growth is scanty on account of the unfavourable climate. The average yield per annum is 2,000 tons for the whole State. Previous to the outbreak of War in 1914, it was customary for the Forest Department to dispose of more than three-fourths of this quantity by auction sales and the rates obtained for the wood were about Rs. 500 a ton. The bulk of the wood thus disposed of found its way to Germany, where oil was extracted from it.

Disposal of
Sandalwood
prior to 1914

Towards the close of 1914, when the State was threatened with the loss of a fruitful source of revenue by a sudden fall in the demand for sandalwood, Sir Alfred Chatterton, then Director of Industries, proposed to Government the establishment of distilleries in the State for extracting the oil. The indigenous methods of manufacturing the oil were crude and wasteful; nearly 10 to 20 per cent of the available oil being left in the wood unrecovered. A number of experiments were, therefore, conducted with a view to discover the most efficient and most economical process of distillation. The result achieved was highly satisfactory. It was found that the business of sandalwood oil distillation was sure to be a commercial success by the adoption of improved scientific processes. In 1915, Government sanctioned a lakh of rupees for the establishment of a factory. At first, the outturn was about 200 lbs. of oil per month. A suitable

Bangalore
and Mysore
Sandalwood
Oil Factories.

site for the factory was found to the north of Bangalore City, not far away from the Indian Institute of Science. The factory started work in May 1916 and its capacity increased in the course of two or three years and the output rose from 2,000 to 6,000 lbs. a month. A second factory having an ultimate capacity of 20,000 lbs. of oil per month was started in Mysore in 1917.

Process of
distillation,
etc.

The process of distillation is very similar to that of rose water. The wood is converted into filings by means of a large cast iron chipper and the chips boiled in a copper pan tinned inside. Mixed vapour is received in a condenser and the oil is separated from the condensate. A big pan takes several days to distil completely. The refused wood is used for fuel. The oils obtained at both the factories are of absolute purity and of the finest quality, and satisfy the standards prescribed in England, America and Europe. The Japanese have a slightly different standard, and the oil required to satisfy this standard is manufactured separately. There is a growing demand for sandal-wood oil in the English and American markets.

Yield and
realization.

The factories started work at a time when the market was most favourable. The price of a lb. of oil which was selling at 21 shillings in 1914 rose to 50 shillings in 1917. In 1917-1918 the industry was considered to be firmly established. Between May 1916, the date of inception of the Sandalwood Oil enterprise in the State, and October 1918, 2,113 tons of wood were distilled altogether in the two factories yielding 14,12,371 lbs. of oil. The realisations of the sale of oil amounted to Rs. 7,59,489 in 1916-17 and Rs. 27,50,422 in 1917-18. The average yield from sandal-wood was about 100 lbs. of oil per ton of wood. During 1920-21, the factories distilled 1,602 tons of sandalwood.

The demand was fair up to 1920 but with the commencement of a general trade depression throughout the world, the market for the oil soon became restricted. As the stocks began to accumulate and sales dropped, arrangements were made in 1921 to close down the factory at Mysore, till the surplus stocks were disposed of. One hopeful feature worthy of mention is that in spite of the extremely unfavourable trade conditions, the combined sales of wood and oil have reached 39 lakhs during the two years. There is no doubt that when normal conditions are restored, the demand for the oil will revive as of old and the Mysore distillation will play an important part in meeting the world's market for the sandalwood oil.

Effect of trade depression.

There are two Cigarette Factories in Bowringpet. One of these is the South Indian Manufacturing Company which was started in 1911 with a capital of about Rs. 50,000. It is owned by the members of a single family. The other known as the Star Tobacco Manufacturing Company was started in 1905, with a capital of about Rs. 75,000 for plant and buildings. An oil engine of 9 H.P. is used in the first and a steam engine of 7 H.P. together with an oil engine of 4 H.P. in the second. About 100 persons are engaged in both the factories, some on monthly payments and others on daily wages. About 25,000 *maunds* of tobacco are reported to be consumed in the two factories in the manufacture of cigarettes valued at about a lakh of rupees per year. The supply of tobacco from Bettadpur and other places in the State is not suited for these factories as it is too strong. They get their supplies from Guntur, Bezwada and Salem and other places at remunerative rates.

(7) Miscellaneous industries.
Cigarette Factories.

IV. CONCLUSION.

To regulate labour in factories in the State, a Regulation was first passed in 1892, which was further

The Mysore Factories Regulation.

amended in 1914. The main provisions of the Factories Regulation of 1914 are briefly summarised below. The Regulation applies to all concerns wherein steam, water or other mechanical power or electric power is used in any process and wherein at least 50 persons are simultaneously employed. Government can by notification in the *Gazette* extend the application of the Regulation to concerns employing 20 persons. Mines, electric generating and transforming stations, indigo factories, and factories situated on coffee and tea plantations are exempted. The Regulation applies to all Government factories.

Provision is made in the Regulation for the appointment of Inspectors and certifying Surgeons. Every factory should, before it commences work, keep the Inspector informed of its name and address, work, and nature and amount of power used. Every factory should be kept clean, well ventilated and lighted. If any water is used for producing artificial humidity, the water used should be pure drinking water. There should be sufficient and suitable latrine accommodation for the employees and good drinking water should be made available to them in sufficient quantities. The doors should open outwards and there should also be sufficient means of escape in case of fire. If the Inspector is satisfied that the factory is not provided with any of these things, he is empowered to specify proper measures and to enforce their adoption before a specified date.

No one should be employed in a factory on a Sunday or in lieu of Sunday a full day holiday should be granted within three days before and after a Sunday.

At intervals not exceeding six hours, the employees should be allowed half an hour's rest. No child should be employed unless it is certified by the certifying Surgeon that it is not less than nine years old and is fit for employment in a factory. No factory should allow

women and children to begin work before 5-30 in the morning nor should they be allowed to work after 7 o'clock in the evening. Maximum number of hours of work prescribed for one day for women and children are eleven and seven hours respectively. The textile factories should not work for more than twelve hours a day and no child be allowed to work therein for more than six hours in any one day.

Factories should keep registers showing therein the names of women and children employed therein and their respective employment. They should put up notices regarding hours of work, rest, etc. To avoid accidents, the machinery should be kept well fenced. All accidents causing death or injury whereby the employees are prevented from returning to work for three days will have to be reported to the authorities appointed in this behalf. Penalty prescribed for all breaches of any provision of the Regulation is a fine extending up to Rs. 200.

At the Census of 1921, the following scheme of occupations was adopted for purposes of enumeration :—

General
statistics
relating to
occupations.

A.—Production of raw materials :—

- (i) Agriculture (exploitation of animals and vegetation).
- (ii) Exploitation of minerals.

B.—Preparation and supply of material substances (or transformation and employment of raw materials):—

- (iii) Industry.
- (iv) Transport.
- (v) Trade.

C.—Public administration and liberal arts :—

- (vi) Public force.
- (vii) Public administration.
- (viii) Professions and liberal arts.

D.—Miscellaneous :—

- (ix) Persons living on their income.
- (x) Domestic service.
- (xi) Insufficiently described occupations.
- (xii) Unproductive.

The scheme is in its essence based on that of Mr. Bertillon. As outlined above, there are in it four main classes and twelve sub-classes.

The following table shows the percentage of actual workers and dependants under each sub-class. The ratio of dependants to workers is greatest in sub-class I (Exploitation of animals and vegetation) and least in sub-class X (domestic service).

Sub-Class	Percentage	
	Workers	Dependants
I. Exploitation of animals and vegetation ...	25	75
II. Exploitation of minerals ...	39	61
III. Industry ...	33	67
IV. Transport ...	38	62
V. Trade ...	34	66
VI. Public force ...	35	65
VII. Public administration ...	28	72
VIII. Professions and liberal arts.	33	67
IX. Persons living on their income ...	31	69
X. Domestic service ...	58	42
XI. Insufficiently described occupations ...	42	58
XII. Unproductive...	49	51

The table given below sets out by sub-classes the number of female workers per 1,000 male workers. It will be seen that the number varies from thirty-one in sub-class VI (Public force) to 789 in sub-class XII (Unproductive). Female workers are found employed, it may be added, largely as field labourers, cotton-spinners, silk-spinners, basket-makers, rice pounders and huskers, bakers, butter-makers and sellers, book-

binders, sweepers, dealers in hay, grass and fodder etc., midwives, etc.

Sub-Class			Number of females per 1,000 male workers
I.	Exploitation of animals and vegetation		239
II.	Exploitation of minerals		56
III.	Industry	...	195
IV.	Transport	...	52
V.	Trade	...	366
VI.	Public force	...	31
VII.	Public administration	...	54
VIII.	Professions and liberal arts	...	118
IX.	Persons living on their income	...	323
X.	Domestic service	...	351
XI.	Insufficiently described occupations.		429
XII.	Unproductive	...	789

The occupation statistics of the sub-classes may be briefly reviewed here. The population supported by sub-class I (exploitation of animals and vegetation) has increased during the last decade by 12·4 per cent. This increase has been at the expense of the population supported by industry, which cannot be considered a good sign. The increase especially under groups four and five (farm servants and field labourers) has been nearly two-fold and cannot be viewed with satisfaction as many of them are living on the margin of subsistence. Another matter which must cause some concern is the large decrease in the population supported by "raising of farm stock." The total occupied area of the State according to the Season and Crop Report for 1919-20 is 7,861,120 acres giving about two acres per "land-holder." As under the classification adopted, the term "land-holder" includes both actual worker and dependant, the total number of land-holders, as given in the Season and Crop Report is

less than one-third of the total number of "land-holders" returned by the population Census. The average extent of cultivated area per head of the total population of the State is somewhat more than one acre, which is the approximate calculated average for all India.

The population supported by sub-class III (Industry) has declined during the last decade by 1·7 per cent, the decreases being largely under textiles, hides and skins, chemical products, food industries, industries of dress and the toilet, and the furniture industries; *per contra* there have been increases under wood, metals and building industries. This may be set down generally to the trade depression prevailing in the country as a consequence of the late Great European War (1914-1918) and its after effects.

There has been an increase of 32·3 per cent in the population supported by sub-class IV (Transport). During the decade there has been a large increase in motor vehicles of all kinds, and transport by motor buses is becoming popular both in Bangalore and Mysore Cities and in the districts as well. The population supported by sub-class V (Trade) has increased by eleven per cent during the decade. There has been a decrease of nineteen per cent in sub-class VI (Public force). Under sub-class VII (Public Administration), the decrease has been 20·6 per cent. Under sub-class VIII (Professions and Liberal Arts), there has been an increase of 19·1 per cent. Sub-class IX (Persons living on their income) shows a decrease of 7·4 per cent. Sub-class X (Domestic Service) shows an increase of 23·6 per cent on the whole of the population supported by it. There has been a decrease of 22·4 per cent in the group of private grooms, coachmen, etc., owing to a corresponding increase in the number of persons supported by the group of persons connected with motor works. Under sub-class XII (Unproductive), there is a decrease of 23·3 per cent in the population supported by it. There have been decreases

especially under the groups of inmates of jails, etc., and beggars, etc.

In connection with the census operations of 1921, a special industrial census was taken in the State. It was wider in its scope than the corresponding Census of 1911, when the minimum strength of an establishment qualifying for inclusion in the census was fixed at 20. The law relating to this Census is contained in the Mysore Census Regulation of 1920, sections 4 (l) (d), 9 and 10. This Census did not include, as in 1911, cottage or family industries, where the work was carried on by the members of a family and the profit derived shared among themselves. The total number of industrial establishments of all kinds censused was 553, the most numerous of these being coffee estates, 238 in number. Other important industries are gold mining (5) and textile and connected industries (53). The Coffee plantations are distributed mainly in the Kadur and Hassan Districts, while gold mining is confined to Kolar Gold Fields. The large cotton mills engaged in production on a large scale are situated in Bangalore City, while one is in Mysore. Cotton ginning factories are in Chitaldrug district and the silk manufacturing establishments (reeling factories and silk farms) are located in Kolar, Bangalore and Mysore Districts. Thirteen of the seventeen tanneries enumerated are in the Bangalore District, two in Kolar, and one each in Tumkur and Mysore Districts. Rice mills are found in all districts except Tumkur. Of the 553 establishments, 42 are owned by Government or local authorities, 61 by registered companies, and the rest by private individuals. Eighty establishments use electricity, 64 steam, 30 oil, 8 gas, and 4 use water for motive power. The bulk of the steam power is used in mining and textile industries as also in rice and in water works. The 553 industrial establishments employ

Industrial
Census.

57,952 persons, of whom 402 are managers, 1,043 belong to the supervising and technical staff, 1,171 are employed in clerical work, 14,140 are skilled workmen and the rest (41,136) are unskilled labourers.

Occupations
by Caste.

Among the castes which have kept up their so-called hereditary occupations are the Vokkaligas, Tigalas, Panchalas, Neygi, Kunchitigas and Komatis. More than 50 per cent of the total strength in these castes engage in their ancestral calling. Some castes, like the Bedas, Besthas, Upparas, Kurabas and Madigas, are getting on more and more dissociated from their traditional calling, the percentage of workers following the specified calling being less than 10 per cent in each case. Some castes, like the Agasas, Devangas, Ganigas, and Holeyas are still dividing their strength fairly between their hereditary occupations and others. Although the Lingayets are said to have no hereditary calling, the vast majority of them are agriculturists. It may be remarked that the number of workers in some of the castes is not insignificant when compared to male workers. The Panchamas (or depressed classes) consist of Holeyas and Madiga castes, which consist of 650,453 and 281,227 persons respectively. The total number of these castes is thus more than nine hundred thousand and forms a little less than one-sixth of the total population of the State. The total number of actual workers (both male and female) among the Holeyas is 212,685 persons, each having on the average about two to three dependants. Similarly, the number of actual workers among the Madigas is 83,332, who have each, on the average, two or three dependants. Of the actual workers among Holeyas, 34·5 per cent are village watchmen and agricultural labourers and 29·5 per cent cultivators of lands. Similarly, of the actual workers among Madigas, 37·5 per cent are cultivators of lands and 33·4 per cent are field labourers.

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CHAPTER VIII.

COMMERCE AND TRADE.

The natural
obstructions
to trade.

THE land-locked position of Mysore, the mountain barriers which separate it from the surrounding countries on three sides, and the want of navigable rivers are factors that are likely to exercise an unfavourable influence on the external trade of the State at all times. For many centuries the difficulties of transport considerably restricted the growth of trade. There were not many highways and the cart tracks were impassable during the monsoon months. The absence of any settled Government for long periods rendered it possible for bands of highway robbers to carry on their predatory practices with impunity. The great variations in the standards of currency and weights and measures even in neighbouring districts and the existence of the numerous customs stations involved undue delay in the concluding of bargains and the transport of goods.

Inland and
foreign
trade.

With the advent of settled Government in the nineteenth century, the trade of the State received great stimulus as the several factors which had impeded its progress till then were gradually remedied. At present the inland trade of the State is carried partly by road and partly by rail. The bulk of the foreign trade passes along the Railway system centring on Bangalore. All railway lines leading outside the State are now being worked by the M. & S. M. Railway Company, Ltd., and at three places the lines cross the frontiers of the State, *viz* :—

- (1) at Harihar in the north-west,
- (2) between Doddakuragod and Hindupur in the north,
and
- (3) at Bisanatam in the east.

As Mysore has no port of her own, her commodities for the overseas market are carried by rail to Madras, Bombay and Mormugoa and by road to Mangalore for being shipped abroad from those places.

The timely publication of the trade statistics of a country is of great importance as it enables the Government and the people to gauge the economic position of the country. Prior to 1913 some information regarding the exports and imports of a few important articles of trade used to be periodically published in the *Gazette* but this information was neither exhaustive nor accurate and no reliable conclusions could, therefore, be based on these statistics. After the formation of the Department of Industries and Commerce, arrangements were made with the Madras and Southern Mahratta Railway Company to obtain accurate trade statistics and to render them available to the public by the annual publication of a Review of the foreign rail-borne trade of the State. The quantities of the several commodities of trade are furnished by the Railway Company and to the Department is entrusted the assignment of their values. In the case of goods which are usually sold by weight, the value furnished in the Review may be accepted as accurate and in other cases the values are only estimates approximating to the real values. There is no agency for the collection of statistics of the road-borne trade between Mysore and the adjoining places in British India. It was only during 1918-19 that an attempt was made to register the external trade by land through the agency of *Ookads* or outposts established on the principal highways leading outside the State. These *Ookads*, numbering eight in all, were primarily interested in preventing the unauthorised export of food grains from the State. With the removal of restrictions on these exports, the registration of trade passing through the frontier roads came automatically to an end.

Trade
Statistics.

A brief
History of
the Foreign
trade of the
State.

The trade of the State before the introduction of the metalled roads and railways must have been carried by the primitive country carts. In many parts of the country, where even cart tracks did not exist, pack animals were employed for transport purposes. Owing to the difficulties of communication, trade in early times was restricted to articles of comparatively high value and small bulk, for which there was an undoubted demand from the richer classes.

(a) Under
Vijayanagar
Kings.

The Government established by the Vijayanagar Sovereigns encouraged the cultivation and manufacture of various articles of commerce by the supply of seeds and the advance of preliminary expenses. Manufacture of opium was under the control of Government. Foreign merchants used to be invited to settle in the country. They were thus importing valuable goods from distant countries and sending abroad the products of this country.

(b) Commer-
cial Regula-
tions of Tīpu
Sultān.

The Commercial Regulations of Tīpu Sultān were elaborated with the view of making the sovereign the chief merchant in his domain; with this object in view, the trade activities of the people were regulated in all directions. First, all commercial intercourse with Europeans was viewed with great suspicion and both imports and exports were prohibited because they would afford means to his enemies of getting secret information. Exports were prohibited as they resulted in a rise of local prices and imports were forbidden because they impoverished the people. A Board of nine Commissioners of Trade was set up with seventeen Foreign and thirty Home factories and minute instructions were issued regulating exports and imports. Special monopolies were created for trade in tobacco, sandalwood, pepper, etc., and a law was passed making banking the monopoly of

Government. Though special measures were adopted during this reign to foster trade, yet as they all tended to pass the control over trade into the hands of Tipu and transfer to him all the profits, commercial enterprise suffered seriously.

For a long time even after the fall of Tipu, there was no great improvement in the conditions of trade. The customs system in vogue was very oppressive. It practically stifled all trade activities of the people. There were 161 *Kattes* or tolls stations scattered all over the State and all goods passing through them were subjected to the payment of duties which fell into three classes, namely:—

(c) After the fall of Tipu Sultān.

(1) *Sthaladayam*, *i.e.*, duties on articles imported for consumption in a place,

(2) *Margadayam*, *i.e.*, duties on goods in transit, and

(3) *Mamooladayam*, *i.e.*, duties on goods exported to foreign countries.

Great was the confusion caused by the variations in the rates of duties levied from station to station. The farmers to whom the Government had rented the *Kattes* were usually unscrupulous. The grant to certain individuals of privileges of entire or partial exemption from the payment of these harassing duties added to the existing confusion. Every trader had to submit to the necessity of purchasing the good will of the sayer servants to avoid detention of his goods and the consequent loss of time and money. The foreign merchants were practically debarred from entering the country and in the absence of wholesome competition, the trade was monopolised by the customs contractors or their servants and a few traders who had influence at the Court.

On the assumption of the Government of the State in 1831, the Commission appointed by the Company recognised the supreme necessity of developing the trade

(d) Improvements after 1831.

and the resources of the country. Its chief task lay not so much in the introduction of new reforms as in the removal of the flagrant abuses of power prevailing in the old system of transit duties. Accordingly, the rules under which these duties were levied were expressed in simple terms so that every one could understand them easily and a beginning was made in the reduction of the number of articles subject to these duties. The enjoyment of concessions regarding the rates of duties payable were gradually done away with. In 1864, most of the duties levied on articles passing between Mysore and the adjacent districts in British India were removed. The trade was completely liberated from the sayer duties in 1879-80, when they were virtually abolished as State taxes and in their stead, Octroi duties were introduced for the benefit of the Municipal Towns.

The Commission also undertook to improve the means of communication. Metalled Roads were constructed connecting Bangalore with the head-quarter stations in the Districts and some of these roads were extended on all sides to the frontiers of the State, and became outlets for the road-borne traffic of the State. The duty of maintaining the branch lines of roads and of extending them was entrusted to the local Bodies. Much attention was also paid to the construction of railways. In 1864, the Bangalore branch railway was opened connecting Bangalore with Madras and in 1882 the Bangalore-Mysore line was completed. The line from Bangalore to Gubbi was opened two years later and surveys and estimates were prepared for the extension of the line to Harihar and the work was entrusted to the M. & S. M. Railway, which executed it by August 1889. The introduction of the British Indian currency also tended to facilitate the development of trade. In the year 1913, arrangements were made for the construction of new railway lines to link different parts of the State with

the main lines. A two feet light railway was constructed between Bangalore and Chick-Ballapur and the line has been connected with Bowringpet on the Broad Gauge through Srinivasapur, Chintamani and Kolar. A direct connection was effected between Mysore and Arsikere. Chitaldrug was linked with the Bangalore-Harihar line at Chickjajur. In order to provide a through connection with Erode, the line from Nanjangud to Chamrajnagar was surveyed and some preliminary work has been carried out. The Shimoga line is proposed to be extended to Arsalu with a view to connect it eventually with Bhatkal. To facilitate the working of the forests, nearly hundred miles of tramways have also been constructed. The District Boards have been empowered to raise a railway cess to enable them to construct branch lines within the Districts. The development of motor traffic has resulted in the introduction of a large number of buses for the conveyance of mails and passengers in several areas of the State not served by railways.

The neighbouring Districts in British India to which the traffic of Mysore enters on leaving the frontiers of the State are Dharwar, Bellary and Anantapur in the North, Cuddappah, North Arcot and Salem in the East, Coimbatore, Nilgiris and Malabar on the South, and Coorg, and North and South Canara in the West. It may be noted that the road-borne trade is entirely of a local character and is chiefly such as takes place between areas lying close to one another. It is only in a few places that it assumes a special importance. In the north, for example, through the frontier road crossing the Tungabhadra, large quantities of raw cotton are brought into the State for being ginned at Davangere. There is also a considerable trade in raw silk between Kollegal and the Mysore District in the South. The Western boundary of the State is crossed by a number of Ghat Roads through which, in certain seasons of the

Description
of foreign
trade.

year, food grains, coffee and cardamom are exported and salt, kerosine oil and manures are imported.

The total value of the external trade by land during 1918-19, when the Oorkads in the frontiers were employed to register the traffic passing through them, was estimated at Rs. 2,63,93,000 and the aggregate weight of the imports and exports of merchandise was registered at 50,30,390 local maunds (24·7 lbs. each). The imports weighed 18·77 lakhs of maunds and were valued at Rs. 88·74 lakhs. The chief articles were raw cotton, piece goods, hides and skins, raw silk and grains and pulses. The total weight and value of the exports by roads amounted to 3,153 lakhs of maunds and Rs. 175·22 lakhs. The exports chiefly consisted of coffee, grains, manures, silk, jaggery, piece-goods and areca-nut.

Rail-Borne
Trade.

The introduction of the railway, and the increase in the facilities for the development of trade, the spread of education, etc., have tended to concentrate along the Railway System the bulk of the foreign trade of the State. The total weight of the merchandise, excluding treasure, transported by railway in 1901-02 was 101·66 lakhs of Bengal maunds (of 82 $\frac{2}{7}$ lbs. each) and the estimated value was Rs. 670·63 lakhs. There was a steady expansion in the total volume of trade and also a rise in the total value until 1907-08 and the total weight and total value of goods transported in that year amounted to 139·03 lakhs of maunds and Rs. 865·73 lakhs. A shrinkage in trade set in from the next year onwards and the year 1911-12 saw the volume of trade reduced to 93·73 lakhs of maunds valued at Rs. 805·78 lakhs. But in about two years, there was a complete recovery as the total trade in 1913-14 was registered at 165·26 lakhs of maunds, valued at Rs. 1,220·34 lakhs. On the declaration of the great European War, the usual course of trade was greatly interfered with by the food control

operations and other measures necessary for the successful prosecution of the war. The average weight and value of the foreign trade for each of the years from 1914-15 to 1919-20 were 159·76 lakhs of maunds and Rs. 1,657·38 lakhs. The period of prosperity which had set in during the close of the long war was not destined to last long. During the past two years, the foreign trade of the State has been passing through a period of acute depression.

Table I given at the end of the chapter shows the quantities and values of both exports and imports of merchandise for each of the years from 1911-12 to 1921-22. To facilitate comparison, figures for 1901-02 and 1907-08 are also given.

Exports and
Imports.

The exports showed a steady expansion during the period 1901-08 and the three years that followed this period saw a great curtailment in the exports, the heaviest drop being in 1909-10. The total weight and value of the exports fell in that year to 33·38 lakhs of maunds and Rs. 412·31 lakhs from 62·47 lakhs of maunds valued at Rs. 439·70 lakhs in 1907-08. After the good monsoon of 1911-12, exports in the year 1913-14 rose to 58·26 lakhs of maunds valued at Rs. 547·25 lakhs. But this recovery was arrested by the outbreak of the war. It was not till 1916-17 that a complete recovery was possible as 69·00 lakhs of maunds were exported in that year valued at Rs. 172·28 lakhs. During the remaining period of the war, there was a very heavy rise in prices due to several causes considered below. Though there was a diminution in the actual quantities of goods exported, the aggregate values began to mount high as shown from the figures for 1919-20. The total weight of merchandise imported into the State in 1901-02 was recorded at 76·62 lakhs of maunds, valued at Rs. 374·67 lakhs. Owing to rise in prices of the imported goods, there was an increase in the total value of the imports in 1908-09 to Rs. 482·21 lakhs, though the

total weight was only 79·65 lakhs of maunds. The imports suffered a slight set back for a few years afterwards and recovered by 1913-14 both in volume and in value as merchandise of 107·03 lakhs of maunds by weight were imported in that year valued at Rs. 673·09 lakhs. Due to a phenomenal rise in prices of foreign goods, the value of the imported goods rose very high during the war period from Rs. 658·27 lakhs in 1914-15 to nearly Rs. 1,298·00 lakhs in the year 1919-20. The average weight and value of imports for each year from 1914-15 to 1919-20 were 105·66 lakhs of maunds valued at Rs. 930·11 lakhs.

The salient features of trade.

As agriculture is the main occupation of the people and as the success of agriculture depends on the seasonal rainfall, the volume of foreign trade in any particular year is governed by the seasonal condition prevailing in the previous year. The growth of trade in the last decade has tended towards particular localities specialising in the production of the more paying commercial crops, chiefly in oil-seeds, cotton, tobacco, sugar-cane, fruits and vegetables. Consequently, the area under food grains has shown a tendency to contract from 53 lakhs of acres in 1914-15 to 51·55 lakhs of acres in 1921-22. The chief articles that figure prominently in the export trade are raw cotton, oil-seeds (including copra and cocoa-nuts) hides and skins (raw as well as lightly tanned), raw silk, areca-nut, jaggery, oil cakes and timber. As most of these are raw materials, fetching comparatively low prices, the people sustain a great economic loss which might have been avoided if the raw materials had been used within the State. As shown by the figures of the recent Census, the population supported by agriculture in 1921 came up to 47·46 lakhs of persons as against 42·05 lakhs in 1911. This unfortunate tendency of the people depending more and more on agriculture has been checked to some extent by the fresh impetus offered to the development of

industries in recent years. With the increase in facilities offered to the unrestricted flow of imports, the volume of foreign goods received into the State has been steadily expanding from year to year and the number and variety of imported goods have also been very large. An analysis of the several articles of import trade has shown that the chief articles received by the State are cotton piece-goods, machinery and mill work, manufactured goods, rice, salt, sugar, coal and kerosine oil. Tools and implements of iron are in great demand all over the country. Petty articles of domestic use or personal adornment as soaps, scents, foreign medicines, bicycles, watches, sewing machines, enamelled ware and sugar are being received in large quantities and the demand for them has been steadily increasing. The imports of finer varieties of foreign piece-goods have injuriously affected the indigenous hand-loom weavers of cotton and woollen goods, who have more and more taken to the using of mill-spun yarn. The use of the kerosine oil for purposes of domestic illumination has taken the place of the vegetable oils and thus contributed to the exports in large quantities of oil-seeds till now consumed locally.

With the outbreak of the European War, the usual channels of trade were rudely disturbed. The necessity of steadily pursuing a policy of industrialisation of the country was recognised by the Government and the Department of Industries and Commerce organised in 1913 was entrusted with the arrangements to be made to fulfil that object. (See Volume III, Part II, Chapter IV, *infra*). The hand-loom weaving industry which was languishing till then received the special attention of the Department. By the introduction of improved methods and more efficient appliances, the position of the hand-loom weavers has been considerably strengthened. The use of the mill-made yarn and the application of power for

Industrial
changes in
the State.

purposes of weaving and the use of power looms in small factories, as at Bangalore, will enable the industry to withstand the competition from the mills. The exports of hand-woven goods to places outside the State have been steadily increasing of late. The erection of oil mills in important centres, as Bangalore, Davangere, etc., and the consequent increase in the export of oils and oil-cakes also deserves mention. In the case of sandalwood, a Government monopoly, large quantities of wood used to be exported before the war to foreign countries, especially to Germany. The erection of the Government Sandalwood Oil Factory in 1916 has dispensed with the necessity for this exportation and in its place oil extracted therefrom is being sent out. In 1921-22, 79,420 lbs. of oil were exported and the price obtained locally was Rs. 18.40 per pound. The successful working of the Cauvery Power Scheme has enabled the State to do without large imports of coal. The power generated at Sivasamudram is chiefly supplied to the Gold Mining Companies and the Cities of Bangalore and Mysore for lighting and industrial purposes. The sericultural industry in the State is also receiving the special attention of Government. A silk filature with 12 basins was installed last year at Mysore with a daily output of about 8 lbs. of silk. As an indication of the development of the sericultural industry in the State, it may be stated that the area under mulberry has shown a steady increase and the exports of the woven silk fabric are also of considerable value. The establishment of an additional cotton mill at Mysore and of an Woollen Mill at Bangalore indicate that private capital and enterprise are readily forthcoming for industrial purposes. Among other industrial improvements effected in recent years, mention may be made of the use of machinery for agricultural purposes such as Irrigation, Jaggery boiling, manufacture of bricks and tiles, rice milling, oil seeds

crushing, etc. The imports of cheap iron and machinery and mill work have contributed to the progress made by the several industries in recent years. The erection of the VI Installation at Sivasamudram, the construction of a large reservoir at Krishnarajasagara, the opening of a new Railway Line between Mysore and Arsikere and the erection of Distillation and Iron Works at Bhadravati are the chief works financed by Government. These are all calculated to enhance considerably the productive capacity of the people in several directions.

The chief features of the Foreign Trade of the State in treasure are that the exports chiefly consist of gold bullion—the output of the Kolar Gold Mines—and the import trade is mainly in silver bullion and Government rupees. Table II given at the end of the chapter furnishes the particulars of the exports of gold bullion and the net imports of silver and rupees for each of the years since 1913-14. To facilitate comparison, the average figures for each year from 1901-02 to 1910-11 are also given.

Treasure,
Exports and
Imports.

It will be noted that there have been no imports of gold as shown by the rail returns excepting in recent years. It has also not been possible to ascertain the quantities of gold bullion brought into the State as passengers' personal luggage or through the frontier roads. Government rupees are imported by rail by the Gold Mining Companies and by the Bangalore Branch of the Imperial Bank. The import of silver bullion into the State depends on the price of silver. The heavy imports of silver in 1914-15 and 1915-16 synchronised with the fall in the price of silver and when there was a rise in price as a result of scarcity of silver, the imports declined considerably. During 1921-22, there was a phenomenal increase in the imports of silver as the total value was estimated at 40·63 lakhs of rupees.

Fluctuations
in prices.

The changes in the level of prices can be studied by recourse to the method of index numbers. There do not exist reliable statistics to illustrate the variations in the general level of prices for any period prior to 1913-14. In 1914, arrangements were made to collect regularly the wholesale prices, obtaining in Bangalore, of 54 articles of general consumption. The prices of these commodities in July 1914 are taken as representing 100 and are compared with the prices ruling in July of every subsequent year. The commodities included are a large variety of articles, and are arranged under five main groups such as food grains, oils and oil seeds, other food articles, textiles and others. Table III at the end of the chapter gives the total index numbers of each of these five main groups of articles for the month of July in each year after 1914. The index numbers are unweighed, that is, each commodity is considered to be of equal importance in the general average.

From the table, it will be seen that prices began to rise high during 1916-17 and the rate of rise was accelerated during the succeeding three years by the combined action of several factors, as scarcity of goods, shortage of waggons and steamers, controlling operations necessitated by war, failure of monsoon, the influenza epidemic, the inflation of currency, etc. It was only in 1920-21 that prices began to show signs of a climb down. The general average level in July 1922 recorded a fall by about 24 points from the level of 1919, but it still represented an increase by about 80 points over that of July 1924.

Internal
trade of the
State.

Before the advent of Railways and metalled roads and the introduction of a uniform system of currency and weights and measures, trade in rural parts was of a local character and was confined to a few articles in the production of which the State had natural facilities, such as

sandalwood, food grains, coffee, areca-nut, cotton and its fabrics, etc. The trade was carried on by small journey-men who used to frequent the neighbouring weekly markets and the annual *jātres* in the adjacent districts. The goods were carried in the country carts and on pack animals or by head-loads as is being done even now in the hilly tracts. The prevailing medium of exchange in early days was grain. The labourers and the village artisans used to be paid in kind and even in large weekly markets one kind of grain used to be exchanged for another. The people in the country as a whole estimated their wealth not so much in cash or jewels as in grain and cattle. When there was a famine or a dearth of food-stuffs, the surplus grain, especially ragi, stored in the previous good years, was made use of and the pernicious effects of a temporary scarcity of corn were easily averted.

The season of *jātres* and festivals coincided with the time of rest when there was no work to be done on the fields. Rural people would seize these opportunities to bring those things which could not be had in ordinary weekly fairs. Business combined with pilgrimage to holy shrines or annual festivities resulted in the promotion of considerable trade on such occasions. Some of the places which have been famous on account of a large volume of trade effected during *jātres* are Chunchan-katte, Ghati-Subramanyam, Sravana-Belgola, Melkote, Sulekere, Naikanahatti, Sibi, Nandi, etc. At Chunchan-katte, a cattle fair is annually held and the total number of cattle exhibited range from 5,000 to 10,000, most of which are sold. Sravana-Belgola, a Jain centre, specialised itself in the manufacture of brass and copper vessels of good quality. The weekly fairs held at the Taluk head-quarter stations and other large important villages also afforded facilities for small traders and travelling pedlars hawking cheap imported goods to do business with the rural population. Some of these weekly fairs, *e.g.*, at

Tiptur, Arsikere, etc., still attract a large number of people for purposes of trade.

The major portion of the trade as described above was handled by one or the other of the chief commercial castes. Lingāyats, Banajigas, Nagarthas, Vaisyas, etc., are a few of the chief castes whose main profession is trade and trade was often combined with agriculture or industries. The farmers in rural areas were often traders in grain on a small scale. As caste distinctions are no longer rigid and trade has ceased to be local in character, it is not necessary to mention all the castes and sub-castes to which individual traders of the present day belong. Mention may, however, be made of the foreign merchants who have been coming into the State in large numbers during recent years as the Mārwaris, Multānis, Labbes, Nāttukottai-Chetties, Mudaliars, etc.

Financial
facilities for
trade.

The trade in the interior parts of the State even now suffers under a large number of middlemen who take away the major portion of the profits that should legitimately go to the producers. In early days, they were the chief money lenders and dealers in grain, salt, clothes, etc. They used to purchase grain from the raiyats in small quantities during the harvest season and store it for some time and sell the same when prices had gone up. It was not worth the while of the small farmer to take his produce to large markets at a distance.

For want of adequate banking facilities, the chief agricultural crops of the State are being moved with the aid of funds obtained from Bombay and Madras. A certain quantity of local capital is also employed but its volume is limited. Of the two leading money markets in the south of India, Bombay and Madras, the major portion of the funds is obtained from Bombay owing to the fact that money can be had there at cheaper rates. To finance trade properly what is required is money at

low rates of interest and discount which would enable the borrowers to engage in every kind of trade, wholesale and retail, and to sell at prices which the public could afford to pay. Financial facilities of this nature are not yet available, but the establishment of the Bank of Mysore, Ltd., nearly ten years ago, has effected some improvement in this direction.

The Bank of Mysore, Ltd., was opened for business at Bangalore on the 2nd October 1913. Its authorised capital is Rs. 20,00,000 consisting of 20,000 shares of Rs. 100 each, fully paid up. According to Balance Sheet showing the affairs of the Bank as on the 31st December 1922, private deposits have risen to the extent of Rs. 89·14 lakhs, besides the Government deposit of ten lakhs. In the shape of loans and discounts, the Bank has financed the trade and commerce of the State to the extent of Rs. 106 lakhs. The Bank has opened branches at most of the important business centres in the State. The demand for banking facilities has been steadily increasing, but without additional resources at the disposal of the Bank, such demand cannot be met easily.

The Bank of
Mysore, Ltd.

There has been a steady increase in the number of Joint-Stock Companies in the State. At the close of the year 1894-95, the total number of Companies in the State excluding those incorporated in British India and foreign countries amounted to 92 and their aggregate nominal and paid-up capital amounted to Rs. 43,40,292 and Rs. 25,66,742 respectively. Of those 92 Companies, 80 were engaged in Banking business and the rest in Trade and Industries. At the close of the year 1921-22, there were in all 101 Companies limited by shares and 16 Companies limited by guarantee besides 23 Companies incorporated outside the Mysore State. The total authorised, subscribed and paid-up capital of all these Companies

Joint-Stock
Companies
in the State.

amounted to Rs. 772,55,214,11, and 126.55 lakhs respectively.

The following table furnishes the total number of Companies engaged in several kinds of business and the total paid-up capital distributed between them :—

Description	Number of Companies	Total paid-up capital in lakhs
I. Banking, Loan and Insurance.	42	41.61
II. Transit and Transport ...	2	7.02
III. Trade and Manufacture ...	35	12.84
IV. Mills and Presses ...	8	53.24
V. Mines and Quarries ...	8	11.65
VI. Others as Estates, Hotels, etc.	6	0.19
Total ...	101	126.55

All the 16 Companies limited by guarantee are Agricultural Banks registered between 1895 and 1898 and the total number of members on their rolls amounted to 393. Of the 23 foreign Companies working here, 9 have been incorporated in British India and the rest outside India. To 24 persons in the State, the Government have granted certificates to audit the accounts of the Joint-Stock concerns in the State.

The new Companies Regulation (VIII of 1917) came into force from the 1st July 1918. The chief features of the new Regulation are the legal recognition accorded to private Companies and the grant to the Registrar of Joint-Stock Companies of vast executive powers with a view to safeguard the interests of the share-holders and to foster the growth of Joint-Stock enterprise in the State. It will take some time before the Directors and Managers of the various Companies thoroughly understand all the provisions of, and the duties they have to perform under, this new Regulation.

TABLE I.—IMPORTS AND EXPORTS.

Article	1901-02 Mds. in lakhs	Rs. in lakhs	1907-08 Mds. in lakhs	Rs. in lakhs	1910-11 Mds. in lakhs	Rs. in lakhs
1	2	3	4	5	6	7
IMPORTS.						
1. Cement ...	...	...	...	...	...	...
2. Coal and Coke ...	27.75	18.13	21.98	14.23	1.88	1.03
3. Cotton ...	.25	4.56	.19	4.09	.29	6.88
4. Piece-goods ...	.32	20.78	.45	30.63	.46	30.37
(European)						
5. Do (Indian)	.46	22.07	.58	32.88	.48	28.64
6. Drugs ...	.003	.15	.02	2.08	.02	1.85
7. Rice ...	7.00	28.66	5.00	23.97	7.84	33.24
8. Manufactures ...	1.29	18.91	.67	6.15	.59	5.02
9. Wrought Iron & Steel.	...	...	...	...	...	...
10. Machinery ...	...	...	...	...	...	...
11. Kerosine Oil ...	...	...	2.63	12.04	3.10	15.48
12. Salt ...	5.48	19.57	6.41	12.11	6.71	12.81
13. Refined Sugar ...	.47	5.35	.98	7.89	.98	8.95
14. Timber ...	9.41	9.29	10.75	35.93	8.92	34.74
15. Wool, raw ...	.07	1.48	.02	.31	.08	1.28
16. Matches ...	...	...	...	...	...	...
Total ...	52.503	148.95	49.68	182.31	31.35	180.29
EXPORTS.						
1. Raw Cotton ...	.09	1.59	1.52	31.49	.72	17.05
2. Twist and Yarn ...	.083	3.09	.16	6.26	.12	4.98
(Indian)						
3. Piece-goods ...	.024	1.13	.04	1.97	.05	2.83
(Indian)						
4. Tanning barks ...	.77	1.47	1.44	3.61	1.61	4.33
5. Oil-cakes ...	...	...	...	...	...	...
6. Fresh Fruits ...	2.12	10.98	3.52	16.59	2.62	13.97
7. Coffee ...	...	...	...	...	...	...
8. Copra ...	...	...	...	...	...	...
9. Grains and pulses.	8.66	24.59	16.53	50.44	10.49	29.49
10. Skins, raw ...	.76	29.07	.84	34.24	.86	31.30
11. Unmanufactured leather.	.33	43.66	.36	53.72	.50	31.79
12. Oil seeds ...	3.70	19.69	5.10	31.49	5.73	34.90
13. Ores, Metallic ...	.002	.05	19.76	15.46	8.31	6.61
14. Silk, raw ...	.05	34.56	.06	48.17	.04	22.70
15. Silk Waste ...	...	...	...	...	...	...
16. Jaggery and refined sugar.	1.68	11.29	3.67	24.77	1.65	12.99
17. Tobacco ...	.04	.53	.10	1.18	.12	1.64
Total ...	18.309	181.70	53.10	319.39	32.82	214.48

TABLE I.—IMPORTS AND EXPORTS—(concl'd.)

Article	1913-14 Mds. in lakhs	Rs. in lakhs	1918-19 Mds. in lakhs	Rs. in lakhs	1920-21 Mds. in lakhs	Rs. in lakhs	1921-22 Mds. in lakhs	Rs. in lakhs
	8	9	10	11	12	13	14	15
IMPORTS.								
1. Cement ...	17	1.14	44	2.89	1.41	5.72	76	33.82
2. Coal and Coke ...	34.26	23.63	33.58	35.62	36.51	42.49	29.88	39.28
3. Cotton ...	41	10.08	48	33.25	62	24.77	67	23.23
4. Piece goods ... (European)	59	43.89	25	65.67	08	22.27	07	18.83
5. Do (Indian).	74	40.78	81	212.18	96	245.99	1.17	304.23
6. Drugs ...	10	12.30	15	6.52	07	54.97	11	97.99
7. Rice ...	7.30	39.24	9.49	76.96	8.59	72.83	11.37	93.20
8. Manufactures ...	1.01	24.08	1.17	40.75	1.06	44.13	84	31.55
9. Wrought Iron & Steel.	18	1.00	58	7.54	4.66	58.08	5.09	77.37
10. Machinery ...	02	68	18	10.10	1.00	57.46	1.31	96.69
11. Kerosine Oil ...	3.64	20.41	2.86	27.39	3.92	37.44	4.30	40.91
12. Salt ...	6.83	11.53	7.16	25.91	8.98	23.87	6.88	19.75
13. Refined Sugar ...	99	8.25	98	13.58	56	16.68	88	16.49
14. Timber ...	5.86	21.97	5.77	36.87	6.55	46.79	4.83	35.27
15. Wool, raw ...	23	3.97	20	5.11	22	4.41	19	3.50
16. Matches ...	10	2.09	13	4.68	18	6.94	20	9.59
Total ...	62.53	264.04	64.63	664.02	75.37	764.84	68.55	637.70
EXPORTS.								
1. Raw Cotton ...	1.37	33.93	1.39	99.00	1.79	71.86	98	33.00
2. Twist and Yarn .. (Indian).	18	7.87	20	22.44	13	16.91	09	12.22
3. Piece-goods ... (Indian).	09	4.95	32	85.61	30	78.40	35	92.69
4. Tanning barks ...	1.68	6.72	2.10	12.62	62	2.68	88	2.69
5. Oil-cakes ...	25	62	29	87	61	2.27	58	2.07
6. Fresh Fruits ...	4.46	31.24	3.21	35.53	4.28	44.75	4.60	53.25
7. Coffee ...	52	31.85	57	16.06	44	15.37	10	17.75
8. Copra ...	...	...	1.67	29.54	2.03	51.67	2.17	53.90
9. Grains and pulses.	18.11	79.82	10.99	55.48	0.95	7.94	15.76	87.02
10. Skins, raw ...	72	23.15	83	24.20	40	15.78	52	21.20
11. Unmanufactured leather.	45	27.30	75	70.69	28	29.55	31.00	24.83
12. Oil seeds ...	8.43	40.82	5.26	28.24	5.89	45.43	5.84	36.83
13. Ores, Metallic ...	3.67	68	6.08	3.00	11.00	5.60	4.00	3.25
14. Silk, raw ...	05	31.73	07	50.90	03	37.19	08	77.04
15. Silk, Waste ...	...	...	03	2.55	06	6.95	14	5.92
16. Jaggery and refined sugar.	5.68	29.82	4.44	37.21	2.97	62.00	3.00	42.76
17. Tobacco ...	14	2.38	0.34	11.65	36	15.20	34	14.24
Total ...	45.80	352.88	38.54	585.59	32.14	514.55	70.73	580.66

TABLE II—EXPORTS AND IMPORTS IN TREASURE.

Year	Ozs. in lakhs.	Rupees in lakhs
EXPORTS.		
<i>Gold Bullion.</i>		
1 1901-02 to 1910-11 (average).	4'94	304'40
2 1913-14 ... ..	...	356'40
3 1914-15 ... ..	...	360'11
4 1915-16 ... ..	...	323'74
5 1916-17 ... ..	...	319'39
6 1917-18	5'30	304'67
7 1918-19	4'95	266'17
8 1919-20	4'87	266'92
9 1920-21	4'58	278'44
10 1921-22	4'20	294'97
IMPORTS.		
<i>Silver Coin (Government Rupees).</i>		
1 1901-02 to 1910-11 (average).	14'09	37'87
2 1913-14 ... ..	...	63'33
3 1914-15 ... ..	...	53'06
4 1915-16 ... ..	...	66'40
5 1916-17 ... ..	...	78'02
6 1917-18	21'94	58'35
7 1918-19	22'03	58'59
8 1919-20	14'96	39'78
9 1920-21	9'97	26'53
10 1921-22	12'28	32'65
IMPORTS.		
<i>Silver Bullion.</i>		
1 1901-02 to 1910-11 (average).	3'07	5'82
2 1913-14 ... ..	...	5'52
3 1914-15 ... ..	...	9'08
4 1915-16 ... ..	...	8'37
5 1916-17 ... ..	...	5'66
6 1917-18	1'26	3'29
7 1918-19	'88	2'72
8 1919-20 ... ..	...	...
9 1920-21	'40	'99
10 1921-22	3'00	7'98

TABLE III—FLUCTUATIONS IN THE
LEVEL OF PRICES.

Main Head	Item in each main head	Standard index Nos. July 1914	Total index Nos. July 1915	Average	Total index Nos. July 1916	Average
1	2	3	4	5	6	7
1. Food grains and pulses	8	800	803	100	823	103
2. Oils and Oil-seeds ...	10	1000	998	100	1052	105
3. Other Food articles ...	15	1500	1486	99	1547	103
4. Textiles ...	6	600	532	89	641	107
5. Others ...	15	1500	1719	115	1900	127
General Average ...	54	5400	5538	103	5963	110

Main Head	Total index Nos. July 1917	Average	Total index Nos. July 1918	Average	Total index Nos. July 1919	Average
	8	9	10	11	12	13
1. Food grains and pulses	865	108	1223	153	1944	243
2. Oils and Oil-seeds ...	1138	114	1401	140	2341	234
3. Other Food articles ...	1745	116	1858	124	2712	181
4. Textiles ...	912	152	1430	238	1323	220
5. Others ...	2134	142	2345	156	2712	181
General Average ...	6794	126	8257	153	11032	204

Main Head	Total index Nos. July 1920	Average	Total index Nos. July 1921	Average	Total index Nos. July 1922	Average
	14	15	16	17	18	19
1. Food grains and pulses	1698	212	1713	214	1451	181
2. Oils and Oil-seeds ...	2064	206	1608	151	1887	189
3. Other Food articles ...	2455	164	2358	157	2548	170
4. Textiles ...	1393	232	1233	206	1340	223
5. Others ...	2470	165	2497	166	2495	166
General Average ...	10080	187	9409	174	9721	180

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CHAPTER IX.

CO-OPERATIVE SOCIETIES.

Regulation
No. III of
1905 and its
object.

SOON after the scheme of Agricultural Banks was abandoned in 1905, Regulation No. III of 1905 was passed in June of that year for providing for the constitution and control of Co-operative Societies in Mysore having for their object :—

(a) the promotion of thrift and providence among the members,

(b) the attraction of capital and grant of credit to the members,

(c) the supply of raw material, seed or manure,

(d) the sale on behalf of the members of agricultural produce or of manufactured goods,

(e) the manufacture of goods or growth of produce by the members co-operatively,

(f) the purchase of food-stuffs, clothing or other articles of consumption or of animals, implements or other stock required in agriculture or industries and their retail sale to members,

(g) the purchase of machinery and its use in common by members,

(i) the carrying out or development by joint action of agricultural or industrial improvements.

This Regulation was based on the Co-operative Credit Societies Act X of 1904 of British India, but went much farther as it admitted of the formation of Co-operative Societies other than Credit Societies and of the Federation of Co-operative Societies into Central Societies.

These societies promised better results than the Agricultural Banks both as an educative agency and as promoting the material well-being of the raiyats and of the industrial classes.

The members of societies formed under this Regulation unitedly derive benefits which individually they cannot. There is no distinction between the rich and the poor in a society and the criterion for membership is a man's character and not his property qualifications.

The above Regulation was amended by Regulation VII of 1918 in order to remedy certain defects brought to light by the experience of the past twelve years.

Amendment
of the
Regulation.

The area of operation of each society generally extends to one or two villages, but where proper men are not available for purposes of management, 3 to 5 villages are brought under the control of only one society.

Area of
operation.

The affairs of co-operative societies are managed by a Board of Directors elected at a general meeting. The daily transactions are noted then and there and the affairs are made public leaving little or no room for fraud or any underhand dealings. They are constantly supervised and inspected by the Inspectors and higher officers attached to the Co-operative Department.

Management.

From its inception, the history of the co-operative movement in Mysore has been one of steady progress as will be noticed from the following statement:—

General
Progress.

Year	Number of Societies	Number of Members	Working Capital	Total Tran- sactions	Reserve Fund
1905-06 ...	5	362	14,243	4,85,506	132
1906-07 ...	111	9,043	3,71,194	20,72,413	9,549
1915-16 ...	800	64,857	44,21,688	165,24,561	1,59,626
1923-24 ...	1,487	92,203	87,44,945	272,40,951	11,84,902

The Bangalore Central Co-operative Bank and the Mysore Provincial Co-operative Bank are the two principal

Co-operative
Central
Financing
Institutions.

central institutions for the financing of the co-operative movement in the State.

(1) The
Bangalore
Central
Co-operative
Bank.

The Bangalore Central Co-operative Bank which admits both individuals and co-operative societies as members was started in December 1908, its object being not only to finance the outlying co-operative societies but also offering them a safe and profitable investment for their reserve and surplus funds. It has an authorised share capital of Rs. 4,00,000 made up of 1,600 shares of the value of Rs. 250 each. The position of the Bank as it stood at the end of June 1924 is given below :—

Membership		Share Capital	Deposits	Loans granted and outstanding against		Reserve Fund
Indivi- duals	Societies			Indivi- dual members	Societies	
633	161	3,00,771	8,42,206	6,59,152	3,39,889	1,07,500

(2) The
Mysore
Provincial
Co-operative
Bank.

The Provincial Co-operative Bank was started in November 1915—

(i) for the purpose of financing, supervising and controlling the co-operative societies in the State and to take steps for the extension and consolidation of the co-operative movement in Mysore,

(ii) for arranging co-operative lectures and conferences,

(iii) for maintaining co-operative libraries,

(iv) for publishing co-operative literature,

(v) for organising a co-operative service for the benefit of persons who are working as office-bearers in societies, and

(vi) for doing all such other acts as are incidental or conducive to the promotion of co-operation in Mysore.

This institution also admits both individuals and co-operative societies as members but has made provision

for the elimination of individual membership in course of time. Unlike the Central Bank referred to above, this Bank does not grant loans to individuals.

The Bank has an authorized share capital of Rs. 5,00,000 made up of 5,000 shares of the value of Rs. 100 each. Of these, 3,500 are confined to co-operative societies in the State and the remaining 1,500 open to individuals.

The position of the Bank as it stood at the end of 1923-24 is given below :—

Membership		Share Capital	Deposits	Loans granted and outstanding against		Reserve Fund
Individuals	Societies			Individual Members	Societies	
428	509	1,45,478	3,90,038	...	4,78,815	35,957

With a view to enable each of the above Banks to have its own separate and distinct sphere of operation and to devote itself to develop fully the field of investment and co-operative organization therein, the Government ordered in May 1916—

(1) that a cash credit of Rs. 50,000 be allowed to each Bank with interest at 3 per cent repayable in five years subject to certain conditions, and

(2) that the Central Bank should deal with all applications for loans proceeding from the Bangalore, Kolar and Chitaldrug Districts and the Provincial Bank with applications from the other five districts.

Neither of the banks has availed itself of the cash credit sanctioned by Government. In 1912-13, smaller Central Institutions known as Federal Banking Unions were started with jurisdiction over one or two taluks each with the object of supervising and financing co-operative societies in their jurisdiction. But as several of

District
Central
Banks and
Federal
Banking
Unions.

these did not progress well with their limited area of operations, they were substituted by District Central Banks having operations over each District. There were five District Banks in all working in the Mysore, Hassan, Kadur, Shimoga and Chitaldrug Districts at the end of 1920-21. These were intended to serve as a link between the chief central institutions referred to above and the primary co-operative societies but it is now considered that they have not satisfactorily fulfilled their functions.

How the
Societies are
financed.

The societies collect their own capital to a great extent by means of shares and deposits and wherever they cannot do this on an adequate scale, they obtain loans from District Banks and the two Central Banks referred to above.

Results
achieved.

A great majority of the societies are banking and credit institutions; but a beginning has been made in the development of agricultural and industrial co-operation with the co-ordination of the Departments of Agriculture and Industries and Commerce. The following are the varieties of societies as they stood at the end of the year 1923-24 :—

Primary Agricultural Credit societies	...	1,185
Primary Non-agricultural Credit societies	...	285
Central Banks, Unions, etc.	...	18
Societies for the supply of seed, agricultural implements and manure	...	43
Societies for the sale of agricultural produce ..		3
Societies for lift-irrigation	...	1
Societies for dairy-farming	...	1
Societies for weavers	...	42
Societies for sericulturists	...	4
Societies for jaggery-boiling and rice-hulling		2
Societies for the benefit of lacquer ware artisans	...	1

Societies for Gudigars	...	...	2
Societies for jewellers	...	...	1
Societies for brass-makers	...	...	2
Societies for shoe-makers	...	...	1
Societies for oil-mongers	...	...	1
Societies for mat-weavers	...	...	1
Societies for rattan-weavers	...	...	1
Societies for basket-makers	...	...	1
Societies for home industries	...	...	1

As a result of the new policy initiated by Government, that, wherever conditions are favourable, Agricultural Credit Societies should be made to undertake the work of supplying seed, manure, agricultural implements, etc., that are recommended by the Agricultural Department as useful to the raiyats, a good beginning has been made for the development of Agricultural co-operation. The societies are permitted to set apart and use a portion of their Reserve Fund for developing this work. About 110 societies are doing the work of supplying the members with good seed, manure, implements, etc., and are popularising the usefulness of these articles among the agriculturists. Actively supported as it is by the Director of Agriculture, this branch of co-operative activity promises well for the future.

The weavers' societies are the chief among the Industrial Co-operative Societies in the State. There are 42 societies with a working capital of Rs. 1,56,000 and a membership of 1,278. They are all doing business, chiefly on the credit side at present. Proposals are under consideration to start a Central Co-operative Store in order to purchase and supply the raw materials to all the weaver societies and also to find a sale for their finished articles.

The stores movement has made fairly good progress in the State. There are 82 stores societies working now and they are chiefly to be found in towns and cities.

These societies together sold goods to the extent of 10 $\frac{3}{4}$ lakhs of rupees and made a profit of nearly 40,000 rupees during the year 1923-24.

Other
activities.

Apart from the purely co-operative part of their work, several societies showed a praiseworthy interest in developing the general well-being of the villages in which they are situated. The formation and management of schools, opening of reading rooms and works of village improvement received strong support and encouragement from several co-operative societies. In times of epidemics and bad seasonal conditions like those through which the State passed in 1918-19, the societies actively engaged themselves in distributing medicines, food-stuffs, etc. To the flood relief fund many societies have contributed large sums for the help of the sufferers.

Concessions
granted by
Government.

The following privileges have been granted by the Government to the societies :—

(a) The share or interest of a member in the capital of the society is not liable to attachment for the money decree of a Civil Court.

(b) A society has priority over other creditors to enforce its claim :

(i) upon the crops or other agricultural produce of present or past members at any time within a year from the date when seed or manure was advanced, or money for their purchase was lent.

(ii) upon any cattle, agricultural or industrial implements or raw material for manufactures, supplied by the society or purchased in whole or in part with money lent by the society.

(c) The societies are exempted from the payment of stamp duty and registration fees on their documents, and the settlement of disputes is done by arbitration.

(d) Suits between societies and their members are decreed by the Registrar and the decrees are executed by the Deputy Commissioner. Until recently, no Court Fee was being levied but now the small fee of 25 per cent of the Court Fees levied by Civil Courts is levied on these suits.

(e) A sum of Rs. 35,000 from State funds for advances to weaver societies and another sum of Rs. 15,000 for financing some of the backward societies in their infant stages have been placed at the disposal of the Registrar.

In addition to these sums, His Highness the Maharaja was graciously pleased at the time of the inauguration of the movement, in 1905, to place at the disposal of the Registrar, a sum of Rs. 2,000 for advances, free of interest, to backward societies.

With a view to educate the members of co-operative Conferences. societies in sound principles and methods of co-operation and to afford to the Secretaries and other office-bearers an opportunity to exchange ideas with one another and to compare notes, Provincial, District, Taluk and Hobli Conferences are being held and suitable resolutions passed for the guidance of the societies.

With a view to serve as an incentive to good work in the co-operative field, His Highness the Yuvaraja of Mysore was graciously pleased to institute in 1918-19 a system of awarding prizes to co-operative societies. There are ten prizes, one for the best industrial society, one for the best agricultural society in the State, and the remaining eight, for the best credit co-operative society in each of the eight Districts. The prize for the best industrial society is in the name of His Highness the Maharaja and the rest in that of His Highness the Yuvaraja. The prizes are in the form of shields and a society owns a shield if it wins it in three consecutive years. System of giving prizes.

A Co-operative Committee was appointed in 1920 with the Hon'ble Mr. Lalubhai Samaldas Mehta, C.I.E., of Bombay, as Chairman to consider the progress of the movement in the State in all its stages, the Committee on co-operation.

organization, constitution, management, inspection and audit of societies and the development of non-credit forms of co-operation and suggest suitable measures for the future progress of the movement on sound lines. The Committee have, after a fairly detailed tour in all the Districts and examining a large number of witnesses, submitted a report which is now under the consideration of Government.

Work of the
Department.

The following questions are actively engaging the attention of the Department :—

- (1) The formation and development of an Apex Bank to finance the societies.
- (2) Development of a co-operative Propaganda Institute.
- (3) Development of Agricultural and Industrial Co-operation.
- (4) Development of Sericultural Co-operation.
- (5) Formation of a Central Co-operative Depôt for the supply of yarn and raw materials to weavers and for the sale of their manufactured articles.
- (6) Formation of sale societies for the sale of agricultural produce.
- (7) Formation of House-building Societies in the areas affected by the floods.

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CHAPTER X.

MEANS OF COMMUNICATION.

I. ROADS AND BRIDGES.

Prior to 1800.

Brief history
of roads and
bridges in
Mysore.

THERE are a few bridges of singular construction which belong to the period prior to 1800, such as those over the two arms of the Cauvery river as divided by the island of Sivasamudram and those over the minor branches of the Cauvery at Seringapatam, the bridge over the Kabbani river at Nanjangud, that at Betamangala on the old Kolar road, and five other small works of the same class within the fortifications of the ancient city of Nagar or Bednur. But these, though doubtless of local value, formed no portion of a system of provincial communications.

Prior to 1831.

From Col. Green's report it appears that there existed in 1831 only three roads in any way entitled to the appellation, *viz.*, the road from Naikneri to Mysore *via* Bangalore; the road from Seringapatam to Sira and Bellary; and the road from Bangalore to Harihar; and all these were in a very indifferent state, having portions running through swamps, the passage of which would detain the baggage of a regiment an entire day; other places bore the appearance of water-courses with beds of river sand, the soil having been washed away far below the level of the surrounding country. The better order in which some few portions were preserved was in a great measure neutralized by the almost total absence of bridges, which, in a country

like Mysore, situated between the two monsoons, was a most serious inconvenience, and throughout the year kept the progress of the merchant or the traveller perpetually liable to interruption. It was no uncommon thing for a regiment, or even the postal runners to be detained for several days at a channel not 16 miles from Bangalore, and there were several other such impediments in different places on the three roads, where lives were annually lost to a considerable extent.

There was not, at the time of the assumption of the country by the British in 1831, a single pass through the Western Ghats practicable for cattle with loads. At the Agumbi Pass, in the Nagar country, which was the most frequented, it was usual to carry everything of value on coolies, the hire for which was half a rupee per bullock load. Thus, when the bales exceeded the number of porters, who were a peculiar caste of men of a limited number, or when the latter were away at festivals, it was not an extraordinary thing for a merchant to be detained at the ghat ten days or a fortnight before his turn came or there were means available by which his goods might pass the ghat. The approach to the head of the pass was marked by lame cattle, bleeding and bruised, with horns broken off in scrambling about the stones on the pass, while the atmosphere was tainted with the effluvia of the carcasses of bullocks which, taxed beyond their strength, had perished by the way.

During 1831-56, a sum of 28 $\frac{3}{4}$ lakhs was spent on roads. The roads constructed at this period not only connected all head-quarter stations with Bangalore, but also some of them were through lines extending on all sides to the frontiers of the State. Altogether 1,597 miles of road, with 309 bridges and 1,998 drains,

During the
Commission :
(From 1831 to
1856).

were constructed in the State after the transfer of Government and before a regular Department of Public Works was organized.

Under the
Public Works
Department.

The expenditure under communications was incurred mainly either in the construction of new roads or in rectifying and improving old ones as well as in the construction of large bridges. In 1875-76, there were 1,552 miles of road maintained by the department at an expenditure of about three lakhs, and at the rate on an average of Rs. 193 per mile, including the travellers' bungalows and inspection lodges. The two new ghats, *viz.*, the Bund and Haidarghar, were most important additions to the provincial communications, and completed six outlets for cart traffic between Mysore and the Western Coast. These six were the following :—

- | | |
|---------------------------|---------------------------|
| (1) Kallur ghat road, | (2) Agumbi ghat road, |
| (3) Manjarābād ghat road, | (4) Bisleghat road, |
| (5) Bundghat road, and | (6) Haidarghar ghat road. |

The last was laid out at easier gradients than any other. It stands in direct connection with a network of roads designed to open out the whole of the Nagar Malnād. This tract of country, so rich and fertile in its *supāri* gardens, was most difficult of access, and presented a serious barrier to all communications with the coast. Opened by these lines, the whole State to its remotest corner is in communication with the Western Coast.

The construction of numerous bridges also devolved on the Public Works Department, in connection with both the old and the new lines. These are so numerous that only the very largest need here be mentioned, from among those which have been constructed since 1856.

Subjoined are particulars concerning four such works :—

Sl. No.	Name of work	Over what river	On what road	Materials of construction	Number and dimensions of spans	Date of completion	Cost
1	Harihar bridge.	Thunga-bhadra.	Bangalore to Dharwar.	Stone and brick.	14 elliptical spans, 60 feet each.	1,868	Rs. 3,48,096
2	Saklēspur bridge.	Hemāvati	Bangalore to Mangalore	Iron ...	4 spans, lattice girders, 120 each on cylinders.	1,870	1,94,620
3	Shimoga bridge.	Tunga ...	Bangalore to Honnawar.	Brick ...	16 arches of 50 feet span each.	1,859	1,07,538
4	Benkipur (now Bhadravati) bridge,	Bhadra ...	do ...	Brick ...	13 arches of 50 feet span each.	1 860	74,997

The most important of the roads newly opened after the Rendition were the Sagar-Malnād road in the Shimoga District and the Bābābudan Hill road in the Kadur District to a length of 61 and 45 miles at a cost of Rs. 2,32,000 and Rs. 1,17,000 respectively. Extensive improvements were carried out to the Mysore-Manantoddy road in the Mysore District and the Bisleghat road in the Hassan District at an aggregate cost of Rs. 2,96,000. For the accommodation and convenience of the travelling public, over 125 new buildings, such as travellers' bungalows, inspection lodges, *musafir khanas*, *chattrams* and *chāvadies* were constructed.

With the introduction and extension of the railway system, it has become more and more necessary to build roads in a direction which will enable them to feed rather than compete with the newer means of communication ; and the demand for metalled roads and bridges which would give access to the railway line at all times

After the Rendition.

Influence of railways on road construction.

of the year is also increasing. On the whole, the influence of railways has been in the direction of stimulating progress in road construction and developing traffic.

Influence of
Local Self-
Government.

Another great factor in stimulating construction and up-keep of roads has been the extension of Local Self-Government. Each district is provided with District and Taluk Boards and Municipalities whose primary duty it is to apply the funds at their disposal to the maintenance and improvement of local communications.

The increasing revenue derived since 1862 from District Local Funds enabled the transfer to that head of the maintenance of subordinate lines of road (maintained by the Public Works Department) besides providing the means of extending cross roads; including the transferred lines of road, there were, at the end of 1875-76, an aggregate of 2,243 miles for which maintenance allowances were provided out of District Funds. During the first few years, while there existed inadequate means for laying out roads of this class, framing the estimates and subsequently executing the work, the results were in many respects unsatisfactory; but arrangements were made for entrusting the designs and setting out of the work to executive officers, while the work was carried into execution by local agency, under the Revenue Officers. The Public Works Department, moreover, construct all bridges over 20 feet span on District Fund roads.

Present
condition of
roads.

Mysore has a system of magnificent roads, State as well as Local, intersecting the country in all directions and forming its centres of commerce and communications. Trunk roads run through all the district head-quarters to the frontiers of the State connecting the east coast and adjoining British Districts by way of the tableland

with the west coast. Besides the construction of new roads, improvements in the alignment of old ones, provision of bridges across rivers, and other measures to ensure free transit have been continuously carried out. A good system of local roads radiates from each district head-quarters to all parts of the districts. Much attention has also been paid to improving the Ghat roads through the passes in the mountains to the west. As railways have extended, feeder roads have been made in those parts where none existed.

Roads are at present classified as State Fund roads and District Fund roads according as the funds for construction or maintenance are allotted from the State or District Board revenues. These are further classified as metalled and gravelled according as the surface is treated with metal or gravel.

Classification
of roads.

In 1891, there were 1,730 miles of State Fund roads and 3,113 miles of District Fund roads. In 1904, the figures were 1,927 miles of State Fund roads and 3,502 miles of the District Fund roads; in 1919, the figures were 2,003 miles of State Fund roads costing for up-keep an average of Rs. 249 per mile; and 3,505 miles of District Fund roads, maintained at an average cost of Rs. 84 per mile. In 1923-24, the total length of 2,061 miles of State roads was maintained, of which 1,613 miles were metalled. The average cost of maintaining the roads worked to Rs. 263½ per mile. For the maintenance of State Fund roads, allotments ranging from Rs. 100 to Rs. 600 per mile have been allowed according to the importance and nature of traffic on the road. Similarly for District Fund roads, the grants vary from Rs. 30 to Rs. 250 per mile. Whenever special repairs are needed urgently, special allotments are made from time to time and the improvements carried out. The

Maintenance,
cost, etc.

maintenance of all important roads in the State is systematically attended to by the subordinate establishment of the Public Works Department under the guidance and periodical inspections of Sub-Divisional and Engineer Officers.

The total cost incurred towards the maintenance of State Fund roads during 1923-24 was over Rs. 6 lakhs and towards District Fund roads, over Rs. 3 lakhs every year as may be seen from the statement given at the end of the chapter. Owing to the rise in wages and in the prices of materials, to scarcity of labour in some parts and the damage done to bridges by the motor buses, the question of the adequate maintenance of roads has become a difficult one. Proposals for effecting improvements in road maintenance have been recently sanctioned by Government.

Laws
regarding
Public
Conveyances.

The Mysore
Public
Conveyances
Regulation.

To provide for the regulation and control of public conveyances, Government in 1911 passed a Regulation called "The Mysore Public Conveyances Regulation" (No VII of 1911). Power to apply this Regulation to any municipality and to make rules for areas outside municipalities is vested in Government under Sections 4 and 5 of the Regulation. Any breach of rule under this Regulation is punishable with fine which may extend to fifty rupees. In June 1914, Government framed rules under Section 5 of this Regulation for the control and inspection of public conveyances in Mysore. The rules have already been extended to certain roads and to the towns and villages adjacent to these roads in all the districts.

Motor
Vehicles
Regulation.

To regulate the use of motor vehicles in Mysore, Government in 1913 passed a Regulation called "The Mysore Motor Vehicles Regulation" (No. IV of 1913). Under this Regulation, no person is allowed to drive

a motor vehicle on a public road or thoroughfare unless it has been registered and without a license obtained from the authority authorised to issue the same. Power to make rules under this Regulation is vested in Government under section 9 of the Regulation. Any person committing a breach under this Regulation or of any rule made under Section 9 is liable, on conviction, to a fine which may extend to fifty rupees or in the case of a second or subsequent conviction, to a fine of one hundred rupees.

The following is a statement showing the number of miles, cost of maintenance, etc., of the several roads in the State :—

Statistical tables :
(a) Statement of the several roads in the State.

District	State Fund roads			District Fund roads		
	No. of miles	Cost of maintenance	Average cost per mile	No. of miles	Cost of maintenance	Average cost per mile
1	2	3	4	5	6	7
		Rs.	Rs.		Rs.	Rs.
Bangalore ...	215	84,000	...	454½	51,812	...
Kolar ...	211½	44,000	...	392½	36,872	...
Tumkur ...	189	30,000	...	511½	31,426	...
Chitaldrug ...	220	35,000	...	273½	11,475	...
Mysore ...	386	1,46,100	...	651½	68,913	...
Hassan ...	191½	40,000	...	439 ⁷ / ₁₀	39,690	...
Shimoga ...	283½	55,000	...	427	35,440	...
Kadur ...	326½	70,000	...	310 ⁵ / ₂₄	23,345	...
	2,023½	5,04,100	Rs. 250 per mile	3,505	3,04,973	Rs. 84 per mile

(b) Statement
of bridges.

Of the numerous bridges constructed after the Rendition, the following are the important ones :—

Name of bridge	Where constructed	Cost
		Rs.
1 Belur bridge ...	Across the Yagachi ...	1,87,000
2 Balehonnur bridge ...	do Bhadra ...	1,71,000
3 Hariharpur bridge ...	do Thunga ...	1,52,000
4 Yedatore bridge ...	do Cauvery ...	1,06,000
5 Hole-Narsipur bridge	do Hemāvati.	1,18,000
6 Anjur bridge ...	do do ...	88,000
7 Honnali bridge ...	do Tungabhadra	3,28,408
8 Lakshmantīrtha bridge.	do Lakshman- tīrtha.	98,839

II. RAILWAYS INCLUDING TRAMWAYS AND WATERWAYS.

Brief History
of Railway
activities in
the State.

In Sir Mark Cubbon's *Administration Report* of 1854-55 to 1855-56, under the heading 'Rail-roads,' the following passage occurs :—

Prior to the
Rendition.

"Colonel Green observes, 'nothing of this sort has yet been commenced in Mysore. A branch to connect Mysore with the Madras and Calicut line had been conditionally sanctioned to be undertaken after the completion of the latter. But in the meantime, the Madras Railroad Company have been invited to undertake the Madras and Bellary line, so that the Bangalore Branch to the Eastern Coast has been indefinitely postponed.' The Commissioner concurs with the Chief Engineer in regretting that this course has been taken, for the opening of the short line from Madras to Arcot has been already attended with an enlivening effect on the trade of Mysore. Bangalore too with its 162,000 inhabitants, its considerable European population, its importance as a military station, its fine climate, the yearly increasing value of its productions, and its situation as the centre of a high tableland exactly half way between two coasts of the peninsula, seems in every way to claim attention as a point of railway communication. It is believed that these sentiments are fully concurred in by the Madras Government."

The first railway to be constructed in this State was the broad gauge section of the Madras-Bangalore line lying in the Mysore territory and this was opened for public traffic in August 1864 during the administration of Mr. L. B. Bowring, C.S.I. This line was constructed by the late Madras Railway Company, under the old guarantee terms of the Government of India. The Mysore State provided the land required for the line, but had no financial interest in it. But fifty-five miles extending from Bangalore to Bisanattam are within the limits of the State, Kamasandra being the last Railway Station. It joins the Madras main south-west line at Jalarpet.

In the year 1863-64, the survey of a line between Bangalore and Tumkur was made. But Railway construction by State Agency was first thought of about the year 1871 and the construction of the Bangalore-Mysore line was actually taken up in 1877-78. The earthwork between Bangalore and Channapatna was, more or less, commenced as a measure of famine relief in 1877-78. The first section of three miles, between the Bangalore Cantonment and Petta, was for the broad gauge, while the metre gauge was adopted for the line between Bangalore Petta and Mysore, a distance of about 86 miles. In June 1879, the complete project was sanctioned by the Government of India at an estimated cost of 38·82 lakhs. In October 1880, the Petta extension was by agreement transferred to the Madras Railway Company who took it over up to formation level, free of cost, to complete and work it as a portion of their system. The section from Bangalore to Channapatna, 35 miles, was opened to traffic on 1st February 1881 and by the date of the Rendition, the 25th March, a further length of 23 miles was opened, as far as Mandya.

The work progressed and the Bangalore-Mysore line of metre gauge was completed and opened in February

After the
Rendition.

1882. The whole line was constructed almost entirely out of current revenues.

In October 1882, the construction of the Bangalore-Harihar line, also of metre gauge, was taken up and the section from Bangalore to Tumkur, a distance of 43 miles, was completed and opened for traffic in August 1884, a loan of Rs. 20 lakhs at 5 per cent interest having been raised for the purpose. The line was shortly after extended to Gubbi, 11 miles distant from Tumkur, and opened in 1884. Surveys and estimates for extending the line to the frontier at Harihar were also prepared, but the construction work was interrupted for a time owing to financial pressure, chiefly brought on by the famine debt of Rs. 80 lakhs. On the advice of the British Government, it was decided to hand over the construction to the Southern Mahratta Railway Company, to whom the open line of 140 miles was hypothecated for the amount of its cost to be worked by them on terms similar to those in force with regard to the Deccan Railways. The transfer was effected on the 1st July 1886. The contract concluded by the Secretary of State, acting on behalf of Mysore, was to be in force for forty-six years. The Company, under his guarantee of interest at 4 per cent, payable by Mysore, raised a loan of £ 1,200,000 which at a premium of 2 per cent realized £ 1,224,000. Out of Rs. 16,382,801, the equivalent in Indian currency, the sum of Rs. 6,860,508 was paid to Mysore for the actual outlay on the Mysore-Gubbi line, and the balance, or such portion as was necessary, not to exceed 80 lakhs, was to be devoted to the extension of the line to Harihar, 156 miles. The whole line from Mysore to Harihar, 296 miles, was to be worked by the Company as a separate system, distinct from their railways in British India, the cost of management being apportioned according to their respective gross earnings. Out of the net earnings of the Mysore line, the Company were to retain one-fourth, and pay three-fourths

to Mysore. From the balance of net earnings, the State had to meet the interest on the sterling loan of £1,200,000 amounting to nearly Rs. 7,20,000 per annum. The other metre gauge branch lines were worked by the Company for actual working expenses, based on proportionate gross earnings, without claiming any share of the net earnings. The Kolar Gold Fields Railway was worked by the Madras Railway Company under the same terms. Up to the year 1907-08, the net result of the working of these lines was a loss of Rs. 65 lakhs to the State.

Meanwhile, the advantage of Railway connection to other important places had not been lost sight of. Between the years 1890 and 1899, the metre gauge line from Yesvantpur to Dod Kurugod, the broad gauge section known as the Kolar Gold Fields Railways, extending from Bowringpet to Marikuppam, and the metre gauge line from Birur to Shimoga were all constructed by the State. The details of mileage, cost, etc., relating to them are as follows:—

No.	Name of Line	Miles	Cost	Year of opening
			Rs.	
1	Yesvantpur-Mysore frontier.	51·35	22,23,968	1892-93
2	Kolar Gold Fields Railways.	9·88	6,37,204	1894
3	Birur-Shimoga Railway.	37·92	22,94,457	1899

A short length of 15 miles to Nanjangud was constructed by the Southern Mahratta Railway Company and opened for traffic in 1891. The cost of the line, Rs. 6,18,552, was met from the current revenues of the State.

In order to liquidate the Southern Mahratta Railway Company's loan, an arrangement was come to with the Government of India in the year 1900, by which a sum of Rs. 50,81,500 was paid to that Government. This sum,

with the interest accruing on it, will amount to more than the loan of Rs. 1,63,82,801, by the year 1936, when it is redeemable on the reformation of the Southern Mahratta Railway Company. The original contract with it was revised and a supplementary one entered into with the Madras and Southern Mahratta Railway Company under date 26th June 1908. The modifications made in the original agreement were:—

(1) Currency of the contract to be for a period of 30 years from December 1907 ;

(2) The Company to get working expenses plus one-twentieth share of net earnings, besides interest at 4 per cent on the original loan of £ 1,200,000 and the State to receive interest on the further capital found by them subsequent to 31st December 1907 for expenditure on open lines ; and

(3) The terms for working the branch lines to be the same as for the main line. This portion of the contract is terminable at six months' notice on either side.

Minor extensions, 1899.

The line from Nanjangud was extended to Nanjangud Town (a distance of 0·76 miles) and opened for traffic on 12th July 1899. In the same year, the Metre Gauge line from Birur to Shimoga (37·12 miles) was constructed by the State and opened for traffic on 1st December 1899.

Resumption of activity.

There was, however, a lull in Railway activity in the decennium, 1900-1910. From 1911 the question was again taken up, a vigorous railway programme definitely adopted and a new State Railway Construction Department also organised in June 1912. Bowringpet was connected with Kolar in 1913 by means of a Railway line 2' —6" in gauge, which was financed by the Kolar District Board. The Bangalore-Chickballapur Light Railway, for constructing which a private Company had been floated previously but which could not proceed to construction, despite Government guaranteeing an interest of 4 per cent on the capital cost, was next taken up by the State under agreement with

the Company. Surveys for this line had been carried out and the sanction of the Government of India to the project had been received in 1909. The section from Chickballapur to Yelahanka was opened in 1915 and through running to Bangalore City by means of a third rail between Yelahanka and Yesvantapur was established in 1918. The question of linking up these two sections by a line running from Kolar to Chickballapur, a distance of 55 miles, had in the meantime been discussed with the Kolar District Board and the line was completed in November 1916. Side by side with this activity on aided Railways, work on the principal State line from Mysore to Arsikere, which had long been in contemplation, was taken on hand, and in 1918 the metre gauge line running from Mysore to Arsikere, a distance of 103 miles, and crossing the three large rivers, *viz.*, the Lakshmantīrtha, the Cauvery and the Hemāvati, was completed at a total cost of Rs. 82,39,944.

In October 1919, the working and maintenance of the Bangalore-Mysore-Nanjangud and the Birur-Shimoga sections, which had till then vested in the Madras and Southern Mahratta Railway Company, was resumed by the State Railway Department. In 1921, the Chickjajur-Chitaldrug metre gauge line (21 miles), partly financed by the District Board, was also completed.

Besides these railways, there are tramways, 2'—0" in Tramways. gauge, which comprise 36 miles, owned and worked by the State, known as the Tarikere-Narasimharajpur Tramway and its branch the Tadasa-Hebbe Tramway chiefly for transport of forest produce and also for general traffic on Tarikere-Narasimharajpur Tramway and of another 30 miles between Shimoga and Kumsi owned and worked by the Workington Iron Steel Co., Ltd., for carrying the manganese ore in addition to 44·3 miles of Tramway connected with Bhadravati Iron Works completed at a

cost of Rs. 43,10,153 to facilitate the supply of fuel and Iron ore. The tramway between Shimoga and Kumsi, though a private line, is subject to the control of Government in the matter of types of rolling stock used and the tools charged.

Suspension of activities owing to financial stringency.

Construction work was begun on the Shimoga-Arasalu and Nanjangud-Chamarajnagar sections and earthwork was also nearing completion on the former line, but further work on both of these lines had to be stopped for the time being in 1921 on account of financial stringency, with a view to develop the lines already opened for traffic. During the year 1923-24, the scheme for the construction of the Nanjangud-Chamarajnagar section progressed favourably. The District Board of Mysore was permitted to raise a debenture loan of Rs. 8 lakhs at 7 per cent during the year and as it has already accumulated by means of the Railway Cess Rs. 4 lakhs, and the estimated cost of the line is only Rs. 12 lakhs, there is good prospect of the construction of this remunerative and important addition to the State Railways being recommenced during the current year (1924-25).

Progress up to 30th June 1923.

Thus, on the 30th June 1923, the State owned, in its own right, 9·88 miles of railway (Broad Gauge), 525·2 miles (Metre Gauge) and 36·2 miles of Tramways and had part ownership and powers of management over 102·2 miles of 2'—6" gauge railway. There was also a private owned tramway of 30 miles in the Shimoga District. Out of the State-owned lines, the 9·88 miles of Broad Gauge and 261·6 miles of Metre Gauge are worked by the Madras and Southern Mahratta Railway on behalf of the State. The total capital outlay on all the lines except the private Tramway was Rs. 4,74,22,733 lakhs including the sum of Rs. 1,63,82,801 being the proceeds of the sterling loan raised by the late Southern Mahratta Railway Company

on behalf of the Secretary of State for extension of the Metre Gauge line up to Harihar. The amount spent on lines under construction and the Iron Works Tramways to end of 30th June 1923 amounted to Rs. 51,05,516.

In view of further extensions, surveys for several lines have been undertaken and projects are ready for the following :—

Surveys and
Projects for
further
extensions.

- (1) Shimoga-Tirthahalli-Sagar Railway.
- (2) Shimoga-Bhatkal Railway.
- (3) Bhatkal-Harbour Investigation.
- (4) Tumkur-Sira Railway.
- (5) Kadur-Chickmagalur Railway.
- (6) Sira-Chitaldrug Railway.
- (7) Mysore-Coorg Railway.
- (8) Mysore-Coorg Branch Railway.
- (9) Arasalu-Tirthahalli Railway.
- (10) Chickmagalur-Mudgere-Koppa Railway.
- (11) Bangalore-Hosur Railway.
- (12) Nanjangud-Kakankote Railway.

The project estimate for Nanjangud-Kakankote Railway is being prepared. There is no likelihood of these lines being taken up for construction in the near future for want of funds.

Owing to the importance of pilgrimages to the numerous sacred shrines and rivers, marriages and festivals, litigation, trade and commerce, the passenger traffic has always been on the increase, especially among third class passengers. The development of traffic has been so rapid and the supply of stock so insufficient that in times of fairs great difficulty has been experienced in connection with the conveyance of third class passengers. Some idea of the increase in passenger traffic in the State-worked section of the Railway may be had from the following figures :—

Passenger
and Goods
Traffic.

1922-23	...	...	...	3,309,159
1923-24	...	...	...	3,740,568

In a country which is almost agricultural, the principal traffic of railways must necessarily be in goods. The development in goods traffic has been very marked and the improvement in communications has equalized prices in the case of agricultural produce within reasonable distance from a railway. The opening up of the country has led to a greater demand for manufactured goods from foreign countries and a marked increase in the important trade accompanies the extension of the railway system.

Economic
and moral
effects of
Railways.

Before railways were open, pilgrimages occupied months and absorbed the savings of a life-time. A trip to any popular shrine is no longer a formidable undertaking. The cost is comparatively trifling and the journey involves an absence from home of only a few days. Another factor is that cheap, easy and quick communications enable the surplus population in congested areas to move to the more sparsely populated parts of the country, where labour alone is needed to make the soil yield bountiful harvests.

It is not easy to gauge the moral influence which railways have exercised on the habits and customs of the people. It is often alleged that railways are helping to break down caste; but it is doubted by many whose opinions are entitled to respect whether there has been any weakening of caste prejudices among the orthodox. There can, however, be little doubt that increased travel and the mixing up of all castes of people in carriages, which railway travel necessitates, must produce greater tolerance, if it does no more.

Financial
results.

On 1st July 1922, the total capital outlay on all the lines, except the private tramway, was, as stated above, about Rs. 474·4 lakhs. The gross earnings for 1921-22 amounted to Rs. 69·4 lakhs and the working expenses

Rs. 54.4 lakhs. On the Company-worked railways, after deducting the Company's share of the net earnings and the interest due on the capital outlay, the net profit to the State was Rs. 2.6 lakhs. On the lines managed by the State Railway Department, the net earnings amounted to Rs. 3.16 lakhs, yielding only 1.36 per cent on the capital outlay. Deducting interest on the capital expenditure, the result of the working of the lines by the State Railway Department was a loss of about Rs. 7,58,000. The disparity in results between Company and Department worked lines is due in a large measure to the fact that the lines worked by the Company are old lines forming part of trunk systems in which traffic has fully developed and established itself while those worked by the State Railway Department are either new and undeveloped or branch lines feeding the trunk system. The relative position of the several State-worked lines is summarised below :—

Sections	Mileage	Total capital outlay in thousands of rupees	Gross earnings in thousands of rupees	Net earnings in thousands of rupees	Percentage of net earnings to total outlay	Earnings per mile per week	Proportion of expenses to earnings
1. Bangalore-Harihar-Bangalore-Hindupur Kolar Gold Fields Railways (broad gauge),	261	17,676	3,942	1,139	...	Rs. ...	...
2. Bangalore Mysore ...	86	5,548	1,505	187	3.2	337	81.6
3. Mysore-Nanjangud ...	16	660	102	12	1.8	131	89
4. Birur-Shimoga ...	38	2,461	328	41	1.7	166	88
5. Mysore-Arsikere ...	103	12,531	585	66	0.5	103	89
6. Chikjajur-Chitaldrug ...	21	...	47	...	...	41	...
7. Bangalore-Chikballapur	39	1,288	187	24	1.8	93	87
8. Bowringpet-Chikballapur.	64	2,186	208	24	1.1	68	89
9. Tarikere-Narasimharajpur.	27	702	41	26	3.7	30	89
10. Thadasa-Hebbe ...	10	...	...	...	New	...	89

It will be seen that working expenses are heavier on all the sections worked by the State Department than on those worked by the Company. While this is inevitable to some extent in respect of new lines and of an administration managing a relatively small system, with all its incidental overhead expenses, etc., it has to be conceded that there is considerable scope for economy in administration. The Bangalore-Mysore section is an old established line and the traffic on it has been well developed. The proportion of working expenses on this section accordingly is being reduced to the level obtaining on the Madras and Southern Mahratta Railway system. Attempts are also being made to increase earnings with the same train mileage by utilising waggons and trains to greater advantage and for effecting economies in running and station expenses and retrenchments in establishment, etc., wherever possible. In 1922-23, the percentage of return on capital worked out to 1·96 against 1·36 in 1921-22, the ratio of working expenses to gross receipts being 84·94 in 1922-23 as compared with 87·87 in 1921-22. Though in 1923-24 the percentage of ordinary working expenditure worked out to 73·70, the percentage is still considerably high and its further reduction is receiving attention. What has actually contributed towards a high percentage of working expenditure has been thus authoritatively set down :—

“The ratio of working expenses to gross earnings on the Mysore Railways is high compared with the results obtained on larger Railways systems as, within reasonable limits of six or seven thousand miles, overhead charges per ten-mile and per passenger-mile decrease as the size of the system increases. This cognised maxim in railway working has led to the grouping of the numerous railways in Great Britain into only four railways and also to proposals to group the railways in India so as to reduce the cost of management. Further, the Mysore Railways consist of detached feeder lines on three different

gauges bringing valuable additional traffic to the Madras and Southern Mahratta Railway at comparatively little benefit to this Railway owing to the relatively short lead. As an example, the manganese traffic from Shimoga to Mormugao which is the heaviest traffic on the Mysore Railways is carried only 37.92 miles on the Mysore Railways as compared with 80 miles (Birur to Harihar) on the Madras and Southern Mahratta Railway and traffic to and from the Madras and Southern Mahratta Railway for the Iron Works at Bhadravati is carried only 28 miles on the Mysore Railways. The small receipts on the Birur-Shimoga section due to the short lead are still further reduced by the hire that has to be paid for the foreign waggons in which most of the material is carried. Owing to the severe gradients on the Metre gauge sections, 1 in 70 between Bangalore and Mysore and 1 in 80 between Birur and Shimoga, working expenses are necessarily higher than on lines with gradients not steeper than 1 in 100 where the state of the Permanent Way and bridges allows engines of equal or greater power to be used."

With the growth in the mileage, Railways are receiving increasing attention in recent years. A sound policy of economy in administration has not stood in the way of meeting urgent requirements or developing even necessary conveniences. During 1922-23, the renewal of the old $41\frac{1}{2}$ lbs. rails with 60 lbs. rails between Bangalore and Mysore was commenced and 12 miles from Bangalore were replaced. During 1923-24, a further length of 35 miles, bringing the renewals up to Maddur, was completed. In addition to arrears of renewal of permanent way, the state of the locomotives and rolling stock transferred to the State Railway Department by the Madras and Southern Mahratta Company, at the time it handed back the section, required urgent attention involving special charges of replacement of worn out parts. These special charges to meet depreciation, as there was no reserve or depreciation fund out of which to meet the same, amounted

Recent
Railway
improve-
ments.

during 1923-24 to about Rs. 8½ lakhs. The details of capital cost by gauges, so far incurred (1st July 1925), are as follows:—

Lines worked by the Madras and Southern Mahratta Railway Company.

— —	Mileage	Capital outlay	Percentage of net return on capital outlay
		Rs.	
Broad gauge ...	9'88	12,25,732	...
Metre gauge ...	261'60	1,77,88,866	...
Total ...	271'48	1,90,14,598	9'5

Lines worked by the State Railway Department.

Metre gauge ...	263'60	2,40,15,068	...
Narrow gauge (2'-6")	102'20	39,91,644	...
2 Feet gauge ...	36'20	10,59,355	...
Total ...	402'00	2,90,66,067	...

Among other improvements effected have been the following:—

The repairing of old bridges and construction of new ones; opening of new stations, providing of additional waiting rooms at various stations for 3rd Class passengers; extensions of goods sheds at different places to meet trade requirements; running of additional trains between certain stations to meet public needs; opening of out-agencies for facilitating transport of goods from outgoing centres, like Hunsur, Mulbagal and Chamrajnagar; providing for the training of apprentices as skilled workmen in the workshops and for training students as Drivers and Firemen, etc.

Labour
employed.

The State Railway Department maintained, in 1923-24, 1,150 hands against 2,862 in 1922-23. Of these 1,150

hands, 1,098 were Indians, 47 Anglo-Indians and 5 Europeans. The Madras and Southern Mahratta Railway during the same year employed under it 3,991 hands against 3,996 in the previous year. Of these 3,991 hands, 3,822 were Indians, 145 Anglo-Indians and 24 Europeans. The cost of the Police Force maintained by the Railway, on the State-worked sections, was Rs. 44,015 and on the Company-worked section, Rs. 24,139. The cost per train mile for the State-worked section was pies 11·6 and for the Company-worked part, pies 4·39.

A history of Railways in Mysore constructed and in progress will be found in the annual Report of the State Railway Department issued from year to year. The following statement gives in one conspectus the progress in the opening of the different sections forming the State-worked part of Mysore Railways :—

History of
Railways in
the State.

1. COMPANY AND DISTRICT BOARD RAILWAYS CONSTRUCTED AND WORKED BY THE STATE.

(a) Kolar District Railway (2'—6" Gauge).

The first section of this Railway from Bowringpet to Kolar (formerly called the Bowringpet-Kolar Railway) was constructed by Government agency under sanction conveyed in Government of India Foreign Department Letter No. 2161—I. B., dated 15th October 1912. It was financed entirely by the District Board of Kolar from the proceeds of a debenture loan. Later on, it became evident that if the District Board had to obtain the full benefit of its Railway policy, it would be desirable to extend the line to Chikballapur and link it with the Bangalore-Chikballapur Light Railways. Accordingly, the construction of the Section from Kolar to Chikballapur was undertaken in August 1914 under the sanction of the Secretary of State for India conveyed in First Assistant to the Hon'ble the Resident's letter No. 5420, dated 5th August 1914. The section between Bowringpet and Chikballapur is financed both from the State Funds and from the District Board Debenture

Loans. The whole length of the line from Bowringpet to Chikballapur is now called the "Kolar District Board Railway."

Section of Railway	Date of opening		Miles
	Goods	Passenger	
Bowringpet to Kolar	15th Dec. 1913	15th Dec. 1913	10·51
Kolar to Chintamani	6th Mar. 1916	6th Mar. 1916	29·79
Chintamani to Chikballapur ...	8th Nov. 1916	8th Nov. 1916	23·27
Total ...			63·57

(b) *Bangalore-Chikballapur Light Railway (2'—6' Gauge).*

This is the first Railway in the State started by private enterprise under a guarantee from the Government of 4 per cent per annum on the capital subscribed by the Company. The Government of India sanctioned its construction on 10th September 1909.

Section of Railway	Date of opening		Miles
	Goods	Passenger	
Yelahanka to Devanhalli ...	15th Sept. 1914	6th April 1915	14·70
Devanhalli to Chikballapur ...	1st Aug. 1915	1st Aug. 1915	13·75
Yelahanka to Yesvantapur ...	1st Feb. 1917	1st Feb. 1917	6·85
Yesvantapur to Bangalore ...	...	7th Jan. 1918	3·33
Total ...			38·63

2. STATE LINES CONSTRUCTED AND WORKED BY THE STATE.

(a) *Bangalore-Mysore-Nanjangud Section (Metre Gauge).*

This section, which was being worked and maintained by the Madras and Southern Mahratta Railway Company on

behalf of the State, was taken back by Government in October 1919.

Section of Railway	Date of opening for Passenger Traffic	Miles
Bangalore to Channapatna ...	1st Feb. 1881	34·75
Channapatna to Mandya ...	20th March 1881	23·31
Mandya to Mysore ...	25th Feb. 1882	27·97
Mysore to Nanjangud ...	1st Dec. 1891	15·04
Nanjangud to Nanjangud Town	12th July 1899	0·76
Total ...		101·83

(b) *Birur-Shimoga Section (Metre Gauge).*

The working and maintenance of this branch was resumed in October 1919, from the Madras and Southern Mahratta Railway Company.

Section of Railway	Date of opening for Passenger Traffic	Miles
Birur to Shimoga ...	1st Dec. 1889	37·92

(c) *Mysore-Arsikere Railway (Metre Gauge).*

The construction of this important section was sanctioned by the Government of India on 2nd October 1913, but actual work was started some months later as certain ghat sections had to be entirely re-aligned. The line crosses three large rivers, *viz.*, the Lakshmantirtha, the Cauvery and the Hemāvati.

Section of Railway	Date of opening for Traffic		Miles
	Goods	Passenger	
Mysore to Arsikere ...	1st Sept. 1917	3rd Jan. 1918	102·95

(d) Chikjajur-Chitaldrug Railway (Metre Gauge).

The construction of this line was sanctioned by the Government of India on 28th January 1914, but actual construction work was started in October 1917. The requisite funds for construction were provided by the State and by the District Board of Chitaldrug. As only a small portion of the capital was contributed by the District Board, the Railway was ordered to be as a Government and not a District Board line (G. O. dated 12th August 1921). It connects Chikjajur, a station on the Bangalore-Harihar main line, worked by the Madras and Southern Mahratta Railway Company, with Chitaldrug, the head-quarters of the District of the same name.

Section of Railway	Date of opening for Traffic		Miles
	Goods	Passenger	
Chikjajur to Chitaldrug ...	5th Jan. 1921	6th May 1921	20·90

(e) Tarikere-Narasimharajpur Tramway (2'—0" Gauge).

The original object of undertaking this project was to have a cheap tramway to carry forest products, but it has subsequently changed into a scheme for a tramway to carry all class of traffic including passengers. Its construction under the Mysore Tramways Regulation No. II of 1906 was sanctioned by the Government of India on 25th September 1913. It is financed and worked by the State.

Section of Tramway	Date of opening for Traffic		Miles
	Goods	Passenger	
Tarikere to Lakkavalli ...	15th Jan. 1915	22nd May 1915	11·88
Lakkavalli to Narasimharajpur	15th May 1917	15th May 1917	14·72
Total ...			26·60

(f) Tadasa-Hebbe Tramway (2'—0" Gauge).

This is a branch of the Tarikere-Narasimharajpur Tramway, taking off from Tadasa station on that Tramway.

Length, 9'6 miles. This branch forms the first section of the Forest Tramway on the Jagar valley and is constructed to develop the resources of the Malnād Forest and to open up the country. It is financed entirely by the State. Its construction was sanctioned by the Government of India on 27th August 1917; construction was started in November 1917; and it was opened for traffic on 5th February 1921.

3. LINES CONSTRUCTED BY COMPANIES AND WORKED BY THEM.

Shimoga-Kumsi Tramway (2'—0" Gauge).

This is the first Tramway constructed in the State under the Mysore Tramways Regulation II of 1906 from Shimoga, the terminus of the Birur-Shimoga branch, to Kumsi and from Sheregere, an intermediate station of the Tramway at Shankargudda, in all about 35 miles in length, to serve the Manganese Mines near Kumsi and Shankargudda. The construction and working of the line from Shimoga to Kumsi by the agency of the Mysore Manganese Company, Ltd., who afterwards transferred their undertaking to the Workington Steel and Iron Co., Ltd., was sanctioned on 12th April 1907. Sanction for the expansion from Sheregere to Shankargudda was given on 26th February 1915. The construction of both the sections was ratified by the Government of India on 17th March and 5th May 1914, respectively. Among the conditions to which the Company is subject, one relates to payment of tools and taxes. The governing clause is as follows :—The Company to pay a total duty of one anna per ton on the Manganese or other ore carried by the Tramway and afford facilities for the Municipality to collect octroi or other Municipal taxes. Also to pay to Government a tax of two annas per ton of ore for the first 10,000 tons in a year and for every ton above that quantity within the said year at one anna.

The following statement gives the gross receipts, working expenses, etc., of the railway lines owned by the State, showing the position in its main aspects at the

Statistical
statement.

end of each decade commencing from 1881, when the Railway line was opened:—

Year	Length of line open (miles)	Number of passengers conveyed	Gross Receipts	Working Expenditure	Net earnings	Per centage of net earnings on capital outlay
1881 ...	58	163,073	131,525	77,772	53,753	1.50
1891 Jan. to June.	296	624,969	626,599	399,172	227,427	1.52
1901-02 ...	411	26,41,258	1,998,817	1,337,517	661,300	2.90
1911-12 ...	411	40,46,859	3,252,749	1,848,104	1,403,935	5.61
1923-24 ...	571	57,87,157	7,173,109	*5,964,159	1,208,950	2.74

*Includes the following items :—

- (1) Surplus profits 1,21,724
- (2) Guaranteed interest on Mysore Railway Sterling debentures 6,92,455.

Alternative lines to the West Coast with Mysore.

Mr. G. Richards, Engineer-in-Chief with the Railway Board, investigated several alternative lines intended to give a more direct connection than exists at present between the railways in the State and the West Coast. The final decision on the best alignment is to be arrived at only after the question of the proposed harbour at Bhatkal is settled. This scheme involves the construction of a harbour open to shipping throughout the year at Bhatkal, a point on the West Coast, about 10 miles from the Mysore frontier, and connecting the harbour with Shimoga. Investigations hitherto made have shown that the project is feasible from an engineering point of view and expert opinion is being obtained on the question.

Legislation regarding Railways and Tramways. Railway Regulation

Act IV, 1879 (The Indian Railways Act, 1879) was in force till April 1894. On the 13th April of 1894, "The Mysore Railway Regulation" (No. IV of 1894) was passed repealing Act IV of 1879. Provision is made in this Regulation for--

- (1) Inspection of Railways,
- (2) Opening and working of railways,
- (3) Responsibility of Railway Administrations as carriers,
- (4) Report of Railway accidents to Government, and
- (5) Penalties for offences by Railway servants, passengers and others.

To facilitate the construction and to regulate the working of tramways in Mysore, the Mysore Tramways Regulation (No. II of 1906) was passed on the 7th day of July 1906. Provision is made in this Regulation for—

- (1) Making an order authorising the construction of a tramway in a circle on application made by the local authority of the circle or by any person with the consent of the local authority,
- (2) Construction and maintenance of tramways,
- (3) Traffic on tramways, and
- (4) Working of tramways owned by local authorities.

Power to make rules under this Regulation is vested in Government under Section 24. Failure of promoter, lessee or licensee to comply with the Regulation or order is made punishable with fine which may extend to Rs. 200. Wilful interference with tramway is punishable with fine which may extend to Rs. 100.

In 1914, Government promulgated a set of rules defining the concession that would be granted to District Boards and Companies to promote the financing of new railway lines by these bodies. These are given below.

The following are terms on which the Government of His Highness the Maharaja of Mysore are prepared to consider offers for the construction of Branch lines of Railways within the State:—

- (1) The concessions to be given to promoters of Light Railways in the State will be decided in each case by

Government and embodied in detail in separate agreements. Such concessions will be generally on the lines adopted in the British India (*vide* the rules published in the *Gazette of India*, Part I, dated 29th November 1913, pages 1304 to 1311) with the modification that the rate guaranteed in the Mysore State will be 4 per cent instead of $3\frac{3}{4}$ per cent and with some minor changes indicated by the rules below or other special orders of Government. Extracts from the Government of India Rules adapted to local conditions are appended hereto (*Annexure A*). The present rules relate only to arrangements for financing local railway projects.

(2) Whenever a District Board, a private company or any other body offers to raise capital for constructing a feeder railway, the Government may, after such enquiry as they may deem fit, guarantee the payment of interest on such capital at 4 per cent per annum for a period not exceeding 30 years.

(3) In the matter of affording guarantee and granting other concessions, Government will give preference to lines according to their importance and also according to the proportion of capital raised locally by the financing body. Government reserve to themselves the power of rejecting applications without assigning any reason.

(4) If any line guaranteed under Rule 2 works at a loss, that is, pays less than 4 per cent per annum on the paid up capital, an amount sufficient to raise the return to 4 per cent on the whole capital will be paid from State Funds.

(5) If the line works at a profit of over 4 per cent, half the profit in excess of 4 per cent will go to the State.

(6) As an alternative arrangement to that contained in paragraph 4, the amounts drawn from the State Funds during a period of loss may be treated as an advance to the particular railway to be repaid with interest at 4 per cent. In that case, in modification of the arrangement in Rule 5, the whole of the profits during a period of profit will be available to the owner or owners of the railway, no part of the profits going to the State Funds.

(7) Whenever a railway is constructed in a district which has accumulated fund of railway cess imposed under clause 1 (a) of Section 20 of the Local Boards Regulation, all payments required to be made under Rule 4 will be made out of such railway cess fund as far as available and the balance from

State Funds. In such a case, any profits derived under Rule 3 will be divided between the District Funds and the State Funds in proportion to the contribution made by each.

(8) The foregoing rules will apply *mutatis mutandis* to cases where capital is furnished by more than one financing body.

ANNEXURE—A.

(EXTRACT REFERRED TO IN RULE 1 ABOVE).

(i) The prospectus for the purpose of inviting subscriptions for providing capital for the line must be submitted to, and approved by, the Government before issue.

(ii) The railway shall be built according to plans and estimates approved by Government and must conform to the fixed and moving dimensions for the time being prescribed. The gauge of the lines, the route followed, the situation of stations, and details of a similar character shall be subject to the approval of the Government.

(iii) All land which is, in the opinion of Government, required for the construction of the line, will be provided free of charge, including land, permanently or temporarily required for quarrying ballast for brickfields, and similar purposes.

(iv) The results of existing surveys will be made available to persons applying for concessions under these rules. In cases in which this is considered advisable by Government, fresh surveys will be made at the request of promoters inquiring into the probable prospects of any projected line on the understanding that no preferential claim to a concession for the construction of the line is thereby established. If permission be eventually given for the construction of any line, the cost of all surveys, whether special surveys or surveys previously made at the cost of or with the approval of Government, shall, at the discretion of Government, be included in the capital cost of the railway. The Government expressly disclaim all responsibility for the accuracy of any survey plan, estimate or other information supplied by them.

(v) Arrangements will be made with the Government of India for the supply of electric telegraphs and telegraphic appliances and for their maintenance by them at the charges and on the conditions in force for the time being for similar services on State Railways in British India.

(vi) The Government will grant assistance to financing bodies in the shape of guarantee of interest (4 per cent in Mysore).

(vii) All agreements for lines constructed under these terms shall include a special purchase clause permitting Government to purchase the lines at any time, after giving one year's notice, in the following cases :—

(1) When the Government consider it desirable that the gauge of the branch lines should be altered.

(2) When it is desired to convert the branch line into a line of through communication.

(3) When the Government desire to extend the branch line (without altering the gauge or making the line part of a through route) and the branch line company is unable or unwilling to supply the necessary capital for such extension.

In the event of a line being purchased under this clause, the price payable shall be 25 times the average net earnings (excluding payments on account of guarantee) during the three years preceding the purchase or 115 per cent of the capital expenditure on the line, whichever may be the greater.

(viii) The agreements shall also include an ordinary purchase clause permitting the Government to purchase the line at the expiry of 30 years. The price payable on purchase under this clause shall be 25 times the average net annual earnings (excluding payments on account of guarantee) during the three years preceding the purchase, subject to a maximum of 120 per cent and the minimum of 100 per cent of the capital expenditure on the line at the time of purchase,

Waterways.

Owing to either rocky or shallow beds, none of the Mysore rivers is navigable, nor are there other waterways for such use.

III POSTS AND TELEGRAPHS.

Brief history of Posts and Telegraphs in the State. Before the Rendition.

The *Anche*, as the local Post was called, was an old institution dating from the time of Chikka-Dēva-Rāja in the seventeenth century. For many years, the *Anche* appears to have been almost wholly devoted to the conveyance of official despatches. This institution did

its work very well in times past. It continued to meet the wants of the public and many improvements in working were introduced from time to time by the *Anche Bakshi*, the head of the Department.

This institution was peculiar to Mysore and was distinguished from the local posts in the districts of the Madras Presidency by its more perfect organization. The department was controlled by a Bakshi who was in direct subordination to the Commissioner, and its offices were located at every taluk head-quarter station, as well as at every town of any size or importance. The establishments of both office clerks and runners, though for the most part underpaid, were organized on a complete scale, and the service was on the whole conducted with much regularity and efficiency.

The local post carried letters (ordinary and registered), book-packets, news-papers and ordinary parcels. Postage stamps were not in use and prepayment of postage in cash was compulsory. Articles could not be insured, and there was no postal money order system or value payable post. The system of granting receipts for the postage received in cash and keeping detailed registers of letters received and delivered was in vogue.

Among the miscellaneous works executed during the days of the British Commission was the commencement in 1853, and in great part completion, of flying and permanent electric telegraph lines, one from Attebele near Osoor to Rampur on the Bellary frontier, being a length of 191 miles; the other from Bangalore to Kankanhalli on the Nilgiri road, length 143 miles, at a cost of Rs. 1,03,639 for the lines, and Rs. 8,253 for offices at Bangalore and Mysore.

No extra postage was levied by Mysore on letters received for transmission to British territories through British Post Offices, or on those received for delivery in

the State. As the collection of postage on bearing letters so received was attended with great inconvenience and complication of accounts, it was decided, in communication with the Post-Master-General of Madras, that paid letters only should be received for delivery by the Mysore *Anche*.

Certain measures to improve the efficiency of the service were also adopted. The practice of sending money parcels by *Anche* which retarded the progress of the mail and was in other respects objectionable, was abolished, the charges for express *tappals* regulated, and attention was given to various other matters of detail which would add to the efficiency of the department. In 1863-64, the Imperial Post Offices at Seringapatam, Hunsur and Tumkur were abolished and the service undertaken by the *Anche* Department. Consequent on the conveyance of the mail by rail, *via* Coimbatore, the Imperial Post line between Mysore and Ootacamund was abolished, and the line was temporarily re-opened at the expense of the Mysore Government. The main lines radiating from Bangalore were 7 in number in 1866-67, and comprised nearly 800 miles of road. There were 54 branch lines aggregating 1,506 miles. The rates of *Anche* were assimilated to those laid down in the Post Office Act XIV of 1867.

There were at the time two Imperial Post lines traversing the State, one from Bangalore through Chitaldrug to Harihar (*en-route* to Bombay) and the other from Bangalore, *via* Mysore to Mangalore. There were Imperial Post Offices at Bangalore and Mysore, as well as at the military stations of Harihar and French Rocks.

In connection with the *Anche* Department, the following establishment at head-quarters was maintained during 1867-68 at a total cost of Rs. 1,08,854:—

One *Bakshi*; 17 Sheristedars, Peshkars, Gumastas, etc.; 30

Shroffs, Duffedars and Peons in Districts; 8 Inspectors; 184 Mutsaddis; and 1,511 Duffedars, Peons and Runners.

All letters, etc., despatched by public officers in the State through the British Post Office were chargeable with postage from 1868-69, the amount of which was either transferred to the imperial exchequer by a cash payment or levied in the form of Indian Government stamps.

In 1869-70, the salary of the *Bakshi* and the pay of the *Junardars* and *Gumastas* of the establishment were increased and additional establishments were entertained for the additional post offices, receiving houses as well as for the postal lines extended. There were only two telegraph offices in the State in 1870-71, one at Bangalore and the other at Mysore. In 1871-72, an arrangement was entered into with the Madras and Bombay Postal Departments for the distribution by the *Anche* of all unpaid letters addressed to Mysore that might be made over to it for that purpose by the local Imperial Post Offices, the *Anche* Department being responsible to the British Post Office for the full amount of postage due on all overland letters, and for a moiety of that leviable on all other letters so made over to it, any further realizations on the latter account being retained by it. It also levied additional postage at half the Imperial rates on (*bhangi*) parcels weighing more than 40 tolas, transmitted to or received from British Post Offices and conveyed and delivered by the local *Anche*. The revised postal tariff published in Government of India Notification No. 1445, dated 28th February 1873, was extended to the *Anche* Department with effect from 1st April 1873.

The growth of postal receipts was slow, but steady. During 1833 to 1843, they rose from Rs. 2,000 to Rs. 6,000, in 1853 to Rs. 12,000, in 1863 to Rs. 30,000. In 1872-73, notwithstanding a reduction of postal rates in accordance with the British India scale, the revenue

was Rs. 44,000. The cost of the department which had always exceeded its receipts—public despatches being carried free of postage in any shape—was enhanced from year to year. The establishment cost Rs. 33,000 in the year 1833, Rs. 44,000 in 1843, Rs. 49,000 in 1853, Rs. 95,000 in 1863 and Rs. 1,51,000 in 1873. In 1875-76, the runners of the *Anche* Department were admitted to the privileges of gratuity rules. Till 1875-76, all judicial processes issuing from Civil and Revenue Courts were charged with postage. Such correspondence was, during that year, exempted, with certain exceptions, from postage. In 1878-79, the rates charged were changed in accordance with an alteration made in the Imperial postage rates to which *Anche* rates were assimilated. Early in the year 1879-80, an economy in expenditure on establishment was effected by doing away with the *Anche* offices attached to the Division and District Office establishments, by recasting the pay of the *Bakshi* and abolishing one or two places in the head-quarter offices. An attempt was made for the first time in 1879-80, to extend the postal system so as to take in many small places, at a cost so low that the little revenue likely to accrue would still prove sufficient. To this end, *hobli* school masters were appointed *Anche Mutsaddis* and given a small addition of Rs. 3 per mensem for doing the extra work. Other changes introduced which should be noticed were, the introduction of post cards and reduction of *bhāngi* rates. The latter change came into force on the 1st April 1880; by it *bhāngis* posted for carriage in the interior of Mysore were charged with rates just equal to one-half of Imperial rates; the same charge was levied on *bhāngis* intended for or received from outside the State, for forwarding them to or from the frontier Post Office, but light parcels of one pound and under were forwarded free of *Anche* charge like letters.

The Postal arrangements remained the same as before the Rendition, but much was done from 1881-82 to 1885-86 towards improving the efficiency of the department and affording the rural population better facilities for communication. The department was reorganized in November 1882. The establishments of clerks and runners which had been maintained on an extravagant scale, quite out of proportion to the receipts of the department and the requirements of work, were reduced and *Anche* lines, kept up on roads which had ceased to be of importance, were closed and new lines established in more suitable localities. The total length of *Anche* lines in 1885-86 remained nearly the same as in 1880-81 (2,477 miles), but the gradual extension of the State Railway from Mysore to Gubbi and the changes effected in 1882 tended to reduce the number of runners' miles from 2,442 to 2,293. The number of *Anche* officers, however, was largely increased from 1880-81 to 1885-86, as will be seen from the following table:—

After the
Rendition.

Years				No. of offices
1880-81	...	...	...	180
1881-82	...	...	...	182
1882-83	...	...	...	186
1883-84	...	...	...	369
1884-85	...	...	..	390
1885-86	...	...	...	412

The increase was due to the gradual extension of the system by which *hobli* school masters in important villages were appointed *Anche Mutsaddis*. These cheap offices tended to bring the benefits of the department within reach of the rural population and became very popular. Their number which in 1880-81 was only 30 reached 231 in 1886-87.

Owing to the large increase in the number of *Anche* offices and to the introduction into the State of British quarter-anna post cards by means of an arrangement

under which the State was paid one pie by the Imperial Post Office on each British post card used purely within the limits of the State, private correspondence increased considerably within the 5 years from 1881-82 to 1885-86 as will be seen from the following table:—

Years			Letters	Packets and news- papers	Parcels	Total
1881-82	...	...	1,566,621	69,624	8,721	1,334,966
1882-83	..	...	1,329,495	79,309	8,809	1,417,613
1883-84	..	..	1,348,310	65,465	9,679	1,423,454
1884-85	...	...	1,439,900	64,447	10,052	1,514,399
1885-86	...	...	1,519,469	76,676	10,146	1,606,291

The fee for the registration of letters at the Post office having been reduced from 4 to 2 annas in British India, the same reduction was made in Mysore with effect from 1st August 1881. This concession which was greatly appreciated by the people led to an increase in the number of registered letters from 14,278 in 1880-81 to 30,387 in 1885-86.

Correspondence was exchanged and accounts were adjusted between the Imperial and the *Anche* Offices at Bangalore; but the process of exchange and restriction in routes, owing to mail matter having to pass through Bangalore, necessarily caused much delay in many cases. Ordinary paid letters and packets, post cards and registered letters posted in British India for Mysore were delivered free of charge by the *Anche*, and so also were parcels not exceeding 40 tolas in weight, while for parcels exceeding 40 tolas in weight, the *Anche* levied additional postage at half the ordinary rate. On articles of the kind named above which were posted in *Anche* offices for delivery in British India, no charge was made by the Mysore Post Offices, except postage at half rates on parcels over 40 tolas in weight. On all articles exchanged between the Imperial and Mysore Post Offices, full postage was charged by the Imperial Post Office. It

was only, therefore, on parcels over 40 tolas in weight exchanged between India and Mysore in either direction that the rates of postage were in excess of those on the Imperial Post Office. Money orders were issued and paid by Mysore Treasuries, and there was an exchange of orders with British India through the Bangalore Post Office. The amount of money order business done by the State treasuries was insignificant, the reasons no doubt being that treasuries cannot afford the public the same facilities as post offices for the transaction of business of this kind and that delays were necessarily caused by orders for places beyond Mysore having to pass through the office of exchange. Value payable and insured articles posted in British India for any place in Mysore, except the very few stations where there were Imperial Post Offices, were detained in the Bangalore Post Office until the addressees could make their own arrangements to take delivery.

In 1885, two alternative proposals were made to the State authorities through the British Resident by the Director-General of Post Offices in India. The first was that the complete control of postal arrangements in Mysore should be surrendered by the State to the Imperial Postal Department; that the Department should take over the whole of the Mysore Postal establishments, pay them from Imperial revenue and treat Mysore in all postal matters exactly as if it were a British Province, the service correspondence of the State being carried at the cheap official postage rates prepaid by service stamps. The other alternative proposal was that Mysore should adopt all British rules and rates of postage, using British postage stamps overprinted "Mysore" which would be supplied to it for the mere cost of manufacture; that all paid inland correspondence, official or non-official, transferred from Mysore to British Post Offices or *vice versa*,

Amalgamation agreement with the British Government in 1889.

should be delivered free, each post office keeping whatever it collects in stamps or bearing letters; and that Mysore should introduce the money order, insurance, value payable parcel, postal note and other systems peculiar to the British Indian Post Office, retaining any fees it earns on account of them.

On a careful consideration of the subject, the Government of His Highness the Maharaja informed the Resident that it was inexpedient to transfer the local post to the Imperial System, but that it was ready to accept the other alternative proposal and to introduce into Mysore all the rules of the Imperial Postal system and ensure complete reciprocity between the two departments.

To this communication, a reply was received to the effect that the alternative proposal in question had led to some practical inconvenience in the States to which it had been applied, and that until further experience of the system had been obtained, it would not be introduced elsewhere. The question was therefore dropped for the time being.

However, in 1889, the transfer was sanctioned on the following terms:—

(1) That the Imperial Post Office should take over all the postal arrangements of Mysore without any charge to the State and administer the Post Office on the Imperial system, giving the public all the facilities for both internal and external communication afforded by Post Offices in British India;

(2) That the whole of the official correspondence of the State be carried within the limits of Mysore free of any cost to the State; and

(3) That the official correspondence of the State which has to travel through British territory should be charged for at the reduced rates of postage allowed to the official correspondence of the Imperial Government, certain specified officers of the State being authorised to use service postage stamps for the purpose.

The transfer, from a financial point of view, was a

success, the result being a saving annually of Rs. 60,000 to the State.

In agreeing to the transfer, the State was swayed by considerations higher than those of mere financial gain. Surrounded on every side by British territory and its highly developed postal system, the insolation of the local post could not long continue without causing marked inconvenience to trade and without impeding general progress. With the railways and roads, which were then so rapidly opening out every part of the country, and with the growth of commercial relations with other parts of India, Mysore was expected to keep pace with the requirements of the times. Requisitions had, indeed, been made from various quarters for the insurance of parcels, money orders, telegraph offices and other new wants, such as are elsewhere met by the Postal Department. But it was apparent that such an elaborate system could not usefully be attempted by a purely local post, for, the essential condition of success in every postal system is centralized control and absolute uniformity of rules and organization. There were some difficulties in improving the *Anche* so as to give the public all these advantages and to fit it into the Imperial system. Those considerations influenced the Government in deciding to amalgamate the Local with Imperial Post.

The Imperial Post undertook to employ such of the post-masters and clerical staff and delivery and carrying establishments of the *Anche* as were found qualified for the work of the Imperial system, and in accordance with this undertaking, the *Anche Bakshi* or State Post-Master-General was provided with an appointment as Superintendent of the Bangalore Division and more than 25 per cent of the Post Masters and clerical staff and more than 50 per cent of the delivery staff of the Mysore Post were transferred to the Imperial service. It was also arranged

Subsidiary
terms of
Amalgama-
tion.

that the remaining and future staff of the post offices in Mysore should, as far as possible, be recruited from natives of the State, and that the pensions of men in the service of the Mysore State before the amalgamation should be divided between the Imperial and Mysore Governments according to the rule of proportions. On the other hand, the State transferred free of charge to the Imperial Post Office in Mysore all its own postal buildings and runners' huts that were required. Also, although it was no part of the original agreement that the Mysore treasuries should cease to perform money order business, the State voluntarily closed the treasuries to this business from the 1st July 1891 and referred all applicants to the Post Office.

Immediate
results of
amalgama-
tion.

From the introduction, on the 1st April 1889, of the Imperial Postal system within the Mysore State, the public were at once relieved of the postal disadvantages mentioned already. Every postal facility given by the Indian Post Office was extended to the whole of the State, and the general adoption of Imperial postage stamps at once made every post office in the State a direct means of communication with the whole civilized world. On 28th November 1887, the Government of His Highness the Maharaja expressed their conviction that the numerous public advantages likely to result from an amalgamation of the local with the British post must outweigh all minor considerations. The most important of those considerations, and the one specially dwelt upon on that occasion, was the sentiment attaching to the Mysore *Anche* as an ancient local institution, and it was at one time feared that owing to this sentiment the public benefits from the change might not at once be fully recognised. From the time of the transfer, however, not a single remonstrance was made to the Director-General against the measure, and on the other hand, the

Post-Master-General received assurances from all quarters in Mysore that both the State officials and the general public fully appreciated the advantages derived from the introduction of the Imperial Postal system.

From the statistical tables included in this Chapter, it will be seen that the increase of 80 per cent in two years in ordinary correspondence and ordinary parcels is specially noteworthy, for, as has been stated already, correspondence exchanged between Mysore and British India was not, as in the case of most Native states, charged with double postage during the time of the *Anche*. In British India, the increase in articles of the same classes during the same period was 30 per cent and the more rapid expansion of ordinary correspondence in Mysore (80 per cent against 30 per cent) must be attributed to the greater facilities afforded by the Imperial system and to the acceleration of the service when correspondence was enabled to enter and leave the State by every available route.

Results of the
amalgamation
as shown by
statistics.

The number of post offices in the Mysore State having been practically stationary for a number of years, the State requested the British postal authorities in the year 1917 for a substantial extension of postal facilities in the State and furnished a programme including the opening of about 92 new post offices and improvements in a number of existing ones. The British Postal Department undertook to comply with the scheme of improvements suggested by the State in three years and new offices in places most urgently required began to be opened from January 1918.

Extension of
postal
facilities.

The total number of post offices at end of the year 1923-24 was 489, of which 4 were Head Offices, 109 Sub-offices and 376 Branch offices. Of these, 67 were Combined offices. The Postal Department is now

affording facilities for carrying mails by the motor buses which have been started in different parts of the State. In addition to a through line from Shimoga to Mangalore, arrangements are, it is reported, in contemplation to have a similar line from Hassan. In the year 1921-22, the Director of Industries and Commerce was appointed *Liaison* Officer between the State and the British Postal and Telegraphic Department. In this capacity, he keeps himself in touch with the activities of the Department in the State and also represents the interests of the public in regard to the extension of postal facilities. According to the policy now being pursued by the Postal Department, no new office is opened unless it is self-supporting and exception is made only in the case of offices whose existence is found necessary on administrative grounds.

Extension of
telegraphic
communica-
tion.

For years before the amalgamation of the *Anche* with the Imperial Post Office, the public and the State had been pressing for the extension of the telegraph to a number of places in the State. Imperial Post Offices having been opened at these places, it became possible also to open and work telegraph offices at a small cost under the combined office system; and there are now telegraph offices at the head-quarters of all districts, at all the more important centres, in the planting districts, and at most of the principal places of trade. Excluding the cities of Bangalore and Mysore at each of which there are several telegraph offices, there are now telegraph offices open at 42 other stations.

Extension of
telegraph
facilities.

The extension of telegraph facilities has not kept pace with the demand owing to the shortage of telegraph materials during the war. The restrictions in the opening of new combined offices having been removed, arrangements have been made with the Government of India

for opening telegraph offices in all taluk head-quarter stations of the State. The total number of Combined offices, as stated above, stands at 67.

The following figures show the total number of Post Offices that existed in the State during the years 1916-17 to 1926-27 :—

Number of
Post Offices
between
1916-17 to
1926-27.

Year.	No. of Post Offices.	Year	No. of Post Offices.
1916-17	... 400	1922-23	... 502
1917-18	... 411	1923-24	... 489
1918-19	... 453	1924-25	... 483
1919-20	... 493	1925-26	... 488
1920-21	... 494	1926-27	... 510
1921-22	... 503		

The monopoly of the Post Office in Mysore has been secured and its administration safeguarded and assisted by the following measures of the Mysore Government :—

Legislation
regarding
Posts and
Telegraphs.

Under Section 3 of Regulation I of 1893, all postal servants in Mysore are deemed public accountants and the amounts defalcated by them are recoverable from them and their securities as if they were arrears of land revenue, under Section 4 of the Regulation.

Regulation I
of 1893.

By Regulation VIII of 1894, the Mysore State relaxed the rule requiring the Post-Master-General to appear in person or by agent in any proceeding connected with the registration of any instrument executed by him in his official capacity.

Regulation
VIII of 1894.

Rules similar to those issued by the Madras Government requiring village officials to render aid to the post office by checking the clearance of letter boxes, assisting runners during floods, selecting postmen and runners, identifying payees of money orders and attesting payments, etc., have been issued.

Rules
requiring
village
officials to
render help.

Concessions
to postal
officers.

Further, the Government have exempted postal officers of certain classes from the operation of the Mysore Arms Regulation and have extended free medical aid to officials of Imperial Post Office serving in Mysore.

Regulation
No. I of 1899.

To make better provision for the efficient working of the Postal Department in the territories of Mysore, Regulation No. I of 1899 was passed assimilating the law relating to post offices in Mysore to that from time to time in force in British India and repealing, at the same time, Regulation II of 1895. Under Section 3 of this Regulation, offenders in Mysore against the postal law are liable to punishment provided by the Indian Post Office Act and rules and orders thereunder, and to be tried and punished in Mysore as in British India, under Section 4.

Government and its servants are protected in Mysore as in British India and the law of British India for the regulation of post offices as well as rules and orders having the force of law in British India are made applicable under Section 5 of the Regulation to the territories of Mysore so far as they may be suitable.

Regulation
No. IV of
1899.

With a view to apply the provisions of the Indian Telegraph Act of 1885 to all telegraph lines in Mysore, Regulation No. IV of 1899 was passed in October 1899. Under Section 2 of this Regulation, privileges, powers and duties of Government and the telegraph authority as regards telegraph lines worked by the British Government, are vested in the British Government and its officers.

The Government have prohibited the employment of Imperial Postal officials in the Mysore State Service except with the previous permission of their departmental superiors.

Statistical
Statements.

Tables I to IV are appended.

TABLE I.

THE FOLLOWING FIGURES SHOW THE INCREASE IN LETTERS, POST CARDS, NEWSPAPERS, PACKETS AND PARCELS DELIVERED IN MYSORE DURING THE FIRST FEW YEARS AFTER THE AMALGAMATION.

Year		Number of letters, etc.
1887-88	... (Latest year for which statistics of the <i>anche</i> are available.)	3,951,851
1889-90	... (First year after amalgamation)	5,619,666
1892-93	...	7,113,886
1902-03	...	10,742,264

TABLE II.

THE FOLLOWING TABULAR STATEMENT SHOWS FOR THE SAME PERIOD THE INCREASE IN INSURED PARCELS, VALUE PAYABLE ARTICLES AND MONEY ORDERS.

MONEY ORDERS.							
Year	Insured article	Value payable articles	Money orders				
			Issued		Paid		
			Number	Amount	Number	Amount	
1887-88	...	2,886	9,308	47,809	Rs. 8,61,000	61,498	Rs. 10,72,000
1889-90	...	7,826	21,502	96,443	17,91,000	87,180	18,40,000
1892-93	...	10,426	41,548	1,50,516	26,62,000	1,18,257	24,31,000
1902-03	...	12,142	92,768	3,12,056	50,84,970	2,01,487	34,39,368
Percentage of increase in five years (from 1887-88 to 1892-93).	261	346	214	209	129	126	

TABLE III.

THE FOLLOWING FIGURES SHOW THE GROWTH OF BUSINESS IN THE POST OFFICE SAVINGS BANKS.

Year	Number of accounts open on 31st March of the year	Amount at credit of the Depositor
1888-89	...	Rs. 3,07,927
1892-93	...	5,69,187
1902-03	...	8,15,671

TABLE IV.

STATEMENT OF RAILWAY BILLS ACCEPTED BY THE DEPUTY POST-MASTER-GENERAL, RAILWAY MAIL SERVICE AND SORTING, WESTERN CIRCLE, FOR ACCOMMODATION ON THE MYSORE RAILWAYS.

Name of Railway	Nature of charge	Haulage of vans	Weighment system	Interest
1	2	3	4	5
Mysore Railways.		Rs. a. p.	Rs. a. p.	Rs. a. p.
	(i) Haulage of mail vans as per details given.	3,524 8 6	.....	.....
	(ii) Interest on the capital cost of post office vans for one year.	.....	.....	413 14 8
	(iii) Charges for conveyance of mails on Tarikere-Narasimharājapura line for one year.	.....	50 0 0	.....
	Total ...	3,524 8 6	50 0 0	431 14 8

Stations		Distance in miles	Rate per mile in pies	No. of trains daily	Haulage charge for year
From	To				
6	7	8	9	10	11
Bangalore City	Bowringpet ...	102	4½	1	Rs. a. p. 872 9 3
Bowringpet ...	Bangalore City	102	4½	1	872 9 3
Mysore ...	Arsikere ...	104	4½	1	889 11 0
Arsikere ...	Mysore ...	104	4½	1	889 11 0
	Total	3,524 8 6

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CHAPTER XI.

RENTS, PRICES AND WAGES.

I. RENTS.

Land
Tenures.

THE sum payable by the occupant of unalienated land to Government is revenue rather than rent and is determined mainly by the class of soil and the kind of cultivation carried on. The principles of assessment will be found described in the section on Revenue Survey and Settlement (Vol. III, Part II, Chapter II).

The principal measure intended to improve the position of the occupants and to relieve them from indebtedness is the collection of revenue in instalments at such intervals as would enable them to sell their crop first.

The general system of land tenure is *raiyatwāri* under which small separate holdings are held direct from Government. The total number of holdings according to the Season and Crop Report for 1923-24 is 1,027,596 covering an extent of 7,803,612 acres. Of this total, 109,755 holdings covering an extent of 101,365 acres are each less than one acre, and 473,941 covering an extent of 1,241,014 acres are each between one and five acres. There is also a certain number of Inam tenures which are wholly or partially revenue free. Land tenures in the State are described in the sections on Survey and Settlement and Inam Settlement in Vol. III, Part II, Chapter II.

The following are the tenures prevalent in the Inam villages :—

(i) *Vāram*.—Under this tenure, an equal division of produce is made between the land-lord and the tenant. The land-lord pays the assessment ;

(ii) *Mukkuppe*.—Under this tenure, two-thirds of the produce go to the cultivator and one-third to the land-lord who pays the assessment ;

(iii) *Arakandāya*.—The land-lord gets one-fourth of the produce and pays half the Government assessment and the tenant gets three-fourths of the produce and pays the other half of the assessment ;

(iv) *Volakandāya*.—The tenant pays a fixed money rent to the land-lord for a specified period ;

(v) *Guttige*.—The rent is paid in kind.

An hereditary right of occupation is attached to all *kandāyam* lands. As long as the registered occupant pays Government dues, he has no fear of displacement, and virtually possesses an absolute tenant right as distinct from that of proprietorship. When the Government finds it necessary to assume the land occupied by him for public purposes, he is always paid compensation, fixed by mutual consent or under the Land Acquisition Regulation. Sections 63, 64 and 65 of the Land Revenue Code lay down the conditions and limitations under which an occupant may use his land for purposes other than agriculture. The Land Revenue Code (Regulation No. IV of 1888 as amended by subsequent Regulations) and the rules framed thereunder deal *in extenso* with the various conditions to be fulfilled for holding the land and the rights and privileges attached thereto.

Relations
between
Government
and registered
occupants in
unalienated
villages.

Chapter VII of the Land Revenue Code deals with the rights and obligations of inamdars and their tenants. Such tenants as pay a rent assessed at the authorised rates of Government land revenue are declared to have the rights of occupants of Government land. Tenants are protected from the capricious enhancement of rent by inamdars and the grounds upon which and the mode in which rent is enhanceable are definitely laid down. Provision is made for inamdars granting written leases

Relations
between the
holders of
alienated
villages and
their tenants.

and obtaining counterparts of them from their tenants. Where written leases have been executed, the inamdars are enabled to recover their rent through the revenue authorities as if it were a demand for Government land revenue.

The Land Revenue Code authorises Government to issue a commission to any holder of alienated lands conferring upon him special powers with regard to the recovery of land revenue.

A commission
of inquiry.

Questions regarding the relationship of inamdars and their tenants and the administration of Inam villages generally have formed the subject of discussion for a long time. In July 1918, Government appointed a Commission with the Revenue Commissioner as President for investigating how far the existing rules and standing orders furnish a satisfactory solution of all outstanding questions, in what respects they are defective and what specific amendments are necessary. In their order constituting the Commission, the Government referred the following matters for its consideration :—

I. Should the introduction of Survey and Settlement be made compulsory in all inam villages? Or, subject to what conditions may it be made compulsory on the motion of (a) Inamdars, (b) Tenants, and (c) Government?

II. In what manner are the provisions of Sections 63 to 78 of the Land Revenue Code relating to rights of occupants, etc., to be applied in the case of tenants of inam villages into which Survey and Settlement has been introduced?

III. In what respects may Section 236 of the Land Revenue Code be amended and the provisions of Chapter VII on the rights and responsibilities of the inamdars and their tenants made more definite?

IV. Should Rule 99 (c) of the Land Revenue Rules regarding the recovery of arrears of quit-rent due in inam villages be amended, and if so, in what respects?

V. How should the responsibilities of an inamdar and the raiyats of an inam village in regard to the restoration and

maintenance of irrigation works, situated wholly within an inam village, be fixed?

VI. Who should be held responsible for contribution and water-rate payable to Government on lands newly converted into wet in an inam village from a Government source of irrigation, and what compensation, if any, may be given to Inamdars if they offer to collect on behalf of Government? Can the Block System of irrigation be introduced without the inamdars' consent?

VII. Do the existing rules in the matter of the assumption of the management of inam villages by Government require any modification, and if so, what?

VIII. Subject to what conditions may inam villages be placed in the same position as Sircar villages in the matter of their securing the benefits of the various measures inaugurated for rural improvement, *e.g.*, the Village Improvement Scheme, the Tank Panchayet Scheme, the Village Forest Scheme, etc., and the application of the Land Acquisition Regulation for the extension of village sites, etc.?

IX. In what other directions are changes in the existing rules or the enactment of new rules necessary to effect an improvement in the relations subsisting between Inamdars and tenants, and to better the condition of inam villages generally?

X. Is it necessary to have a separate regulation consolidating all the laws in force and now proposed to be enacted, making the relationship between:—

- (1) Government and Inamdars,
- (2) Inamdars and Tenants,
- (3) Tenants and Government,

More clear and definite?

If so, the rough lines on which such legislation may be undertaken may be indicated.

The Commission, which was presided over by Mr. K. Chandy—added two other matters to the above questions referred by Government, *viz.*

- (1) relationship between the Inamdars and the village officials, and
- (2) appointment of agents for *vritti* villages.

Suitable and exhaustive interrogatories were framed by the Commission and sent to representative gentlemen

all over the State. Twenty-eight witnesses were examined. Altogether, the Commission met on 15 days for the examination of the witnesses and for the deliberation of the subjects referred to it. In February 1920, the Commission submitted their report to Government, and in July 1925, Government issued their orders on it, after a careful consideration of all the representations received on it.

In regard to the question whether introduction of Survey and Settlement should be made compulsory in all Inam villages, Government have directed that when re-survey operations are in progress in any taluk, survey shall be introduced compulsorily into all Inam and Kayamgutta villages situated in it, the entire cost of the Survey Establishment being borne by Government. The incidental charges on account of flag-holders, etc., is to be met by Inamdars and tenants as hitherto. Government may also order the introduction of survey in an alienated or Kayamgutta village independently of the re-survey operations of the taluk on an application to that effect made in writing by the holder of the village or where there are more holders than one, on the application of so many of them as hold in the aggregate not less than two-thirds of the shares in such village. In such cases, the Inamdar or Inamdars should pay the cost of the Survey Establishment. As regards settlement, Government have ruled that the existing facilities for introducing settlement should be considerably improved. They have therefore directed that settlement may be introduced on the application of the majority of Inamdars if they also hold not less than two-thirds of the *vrittis*, or on the application of not less than half the number of the Kadim tenants in the village. In the latter case, the Inamdar will be called upon to show cause why settlement should not be introduced and after hearing his objections, the

Revenue Commissioner may pass orders, an appeal against his order lying to Government, whose decision will be final. As regards the cost of settlement, it will be waived if the settlement is made at the instance of the Inamdars, whether it synchronizes with the revision settlement of the taluk or not. If the settlement is introduced on the motion of the Kadim tenants, those who ask for it should bear the entire cost of the settlement.

In regard to the second point referred to the Commission, Government have ruled that in settled Inam villages whose owners do not hold a Commission under Section 99 to exercise powers under Sections 63 and 64 of the Land Revenue Code, these powers may be exercised by the Deputy Commissioner on the application of the Inamdar or tenant, after due enquiry of both parties. One half of any penalty or fine that may be imposed and recovered by the Deputy Commissioner in such case will be paid to the Inamdar and the other half credited to Government.

Next, as to the third point referred to the Commission, rendering more definite the provisions of Chapter VII (of the Land Revenue Code) on the rights and responsibilities of the Inamdars and tenants, the Commission recommended that the provisions of that Chapter, except Section 79, be left unaltered. They proposed that the following classes of raiyats should be considered as permanent tenants :—

(i) Those who have been recognized as such, by the landlords, or by Courts in cases to which the land-lords were parties ;

(ii) holders of lands in respect of which any alienation has been recognized by the Inamdars, or by Courts in cases to which the Inamdars were parties or which have not been contested by Inamdars for 12 years ; and

(iii) where the tenants have effected permanent improvements, such as the construction of wells, tanks, or other works

for the storage of water for purposes of agriculture, the preparation of land for irrigation, reclamation, drainage, etc., of land for garden cultivation, and are left in undisturbed possession for 12 years thereafter, provided that the Inamdars have made no contributions for such improvements nor recovered enhanced rent.

These recommendations of the Commission were unanimous, but a majority of four against two further added that permanent tenancy should be presumed when the Inamdar is unable to prove the origin of the tenancy and where the tenant establishes the fact of possession on payment of a fixed rent for 12 years or more. The Commission's recommendations have been accepted by the Government with the modification that the period of 12 years suggested by them to establish permanency of tenure may be raised to 30 years. They have ordered the amendment of Section 79 of the Land Revenue Code in the light of these orders.

In regard to the fourth point, whether the rule in regard to the recovery of arrears of quit-rent due in Inam villages be amended, the Commission recommended, to obviate the difficulties created by the joint responsibility of *vriddars* and the consequent impossibility of putting purchasers in possession of the shares bought by them, that *vriddis* should be compulsorily allocated on the land, the officer appointed for the purpose being vested with plenary powers to allocate the lands among the *vriddars* in proportion to the income received and *jodi* payable by them in cases where they do not come to any agreement among themselves and that the rules regarding the registry of Inam lands laid down by Government in February 1893 should be strictly enforced. Government have expressed the opinion that it is not practicable to undertake the compulsory allocation of *vriddis*, as suggested by the Commission, where they are enjoyed in common by all the *vriddars* together and that the

existing rules should therefore continue to operate. In view of the recommendation of the Commission that, in the case of alienated holdings, permanent tenants and Kadim tenants are entitled to protection at the hands of Government, Government have ordered that necessary action be taken to amend the Land Revenue Code (Section 54) so that the position of these particular classes of tenants may in no way be affected by the forfeiture and sale of alienated holdings.

Then as to the fifth point, the fixing up of responsibilities of Inamdars and their raiyats in regard to the restoration and maintenance of irrigation works situated wholly in an Inam village, the Commission recommended that the raiyats in Inam villages should be treated in the same manner as raiyats in Government villages. As regards maintenance, the *Hanchige patti* (the allocation statement) prepared by village officials should be prepared by the Amildar, and it should be incumbent on the Inamdar to get work carried out according to it. As regards restoration, raiyats in Inam villages should be held responsible for the same portion of the cost of restoration as raiyats in Government villages and the balance of the estimate should be borne by the Government and Inamdars in the proportion of the *Jodi* and the *gari*. In all cases of restoration, the plans and estimates should be sent to the Deputy Commissioner for approval, and the Government quota of cost should be paid only after the work is inspected and approved by the Deputy Commissioner or the officer deputed by him. They also recommended that the restoration of serial tanks and tanks above Railway lines should be made compulsory and that in other cases restoration should be insisted upon, where the Inamdar or a majority of *vriddidars* or a majority of tenants ask for it and when the cost of restoration does not exceed 20 times the income under the tank. Government have accepted all these recommendations but have

ordered that the work of restoration should be always done by the Public Works Department, the contributions due from the Inamdars and the tenants being collected in the same manner as contributions in respect of tanks in Government villages. Steps are being taken to amend the Minor Tank Restoration Regulation accordingly.

As regards the sixth point, the fixing of liability for contribution and water-rate payable to Government on lands newly converted into wet in an Inam village, from a Government source of irrigation, and what commission should be paid to Inamdars for collecting the same, Government have ordered that all applications for water from tenants in Inam villages, in cases of this kind, should be made through the Inamdars and that the compensation to the Inamdars should be fixed at $12\frac{1}{2}$ per cent. On the question of the introduction of the Block System of irrigation into Inam villages, the Commission declared that they did not favour the proposal. Government have accepted this view of the Commission.

On the seventh point, whether any modifications in regard to the assumption of the management of Inam villages by Government are called for and if so, on what lines, Government have ordered that while Inam villages should not be taken up under Government management ordinarily, Government should have power to interfere and take up the management in cases of gross mismanagement or unsoundness of mind. They have ordered the amendment of Section 120 of the Land Revenue Code so as to make it applicable to cases of management that may arise under this newly added provision.

As to the eighth point, on what conditions may Inam villages be placed in the same position as Government villages to secure the benefits arising from the various measures inaugurated from time to time by Government, such as the Village Improvement scheme, the Village

Forest scheme, etc., Government have directed attention to the fact that Inam villages can have the benefit of the Village Improvement scheme under their orders dated 9th May 1914 and that there is no legal objection to the contribution of Village Forest, Village Courts and Tank Panchayets in Inam villages. As regards the acquisition of land, the Commission recommended that the Land Acquisition Regulation should be suitably amended so as to make it possible to apply it to cases where lands have to be acquired for village extension or other improvement for the benefit of Inam villages, even though payment is not made from the public Treasury. Under Government order dated 19th August 1922, the duty of providing village sites in the rural areas, whether in Government or in alienated villages, devolves on the District Board. Proposals for extension of village sites should, it is pointed out, be formulated by the District Board on whose behalf acquisition of lands under the Land Acquisition Regulation is permissible at present. Consequential changes in the Land Revenue Code (Sections 40, 59 and 194) and the rules framed under it and in the Land Improvement Loans Regulation (Section 4) are, in the light of these observations of Government, being separately provided for.

On the ninth point, in what other directions changes in the existing rules or the enactment of new rules are necessary to effect an improvement in the relations subsisting between Inamdars and their tenants and to better the condition of Inam villages generally, the Commission recommended among other things the following :—

(a) Raiyats should be protected against Inamdars in the appropriation of *gomal* and communal lands ;

(b) Raiyats in villages should be given the benefit of *Takavi* Loans and Forest privileges, as in Government villages ;

(c) As in Government villages, Revenue Officers should make necessary enquiries as regards channel offences on complaints made by Inamdars ; and

(d) In cases of widespread famine, where Government grant remission of revenue, the Inamdars, on proof forthcoming of their having granted similar remission, may be allowed appropriate remission of *jōdi* payable by them to Government.

Government have approved of these recommendations and in regard to *gomal* and communal lands, have ordered that Inamdars should not be allowed to dispose of them without the approval of the Deputy Commissioner. They have also directed the necessary amendments to the Regulations bearing on the recommendations.

Finally, in regard to point ten, whether any separate Regulation consolidating all the laws in force, making the relationship between the Government and the Inamdars, Inamdars and tenants, and tenants and Government, more clear and definite, the Commission were of opinion that there is no need for any special enactment of the kind mentioned and that the Land Revenue Code and the rules thereunder, with suitable amendments, would be sufficient. Government have expressed their agreement with this opinion.

Besides the ten points referred to the Inam Commission for investigation, the Commission included two more points in their Report :—

- (1) The relation between Inamdars and Village officials ; and
- (2) The appointment of Agents for *Vritti* villages.

As regards the former, they stated that under Government Order dated 23rd March 1876, Inamdars can appoint village officials, subject to confirmation by the Deputy Commissioner. As regards punishment, they recommended that Inamdars of settled villages should be given the powers of an Amildar and competent Inamdars should be given the powers of an Assistant Commissioner. They proposed that the present rule

regarding the payment of *potgi* in Inam villages may stand and as regards accounts, etc., to be maintained by the village officials, they suggested that they might be left to the decision of Inamdars. Government accepted these recommendations with the modification that, in the case of settled villages, the *potgi* payable to the village officers, Patels and Shanbhogs may, in the absence of custom or agreement to the contrary, be fixed at half of that for Government villages, as they have less work than village officers in Government villages. They have also ruled that the exercise of punitive powers by the Inamdars should, in every case, be duly authorized by Government by a commission under Section 7 (3) of the Village Officers Regulation. They have also provided for appeals against the orders passed by Inamdars holding commissions under Section 99 of the Land Revenue Code, by the addition of a specific provision in it. Appeals against the orders of an Inamdar exercising an Amildar's powers will lie to the Assistant Commissioner in charge of the Division and appeals in the case of an Inamdar exercising the powers of an Assistant Commissioner will lie to the Deputy Commissioner of the District.

Regarding the appointment of Agents for *Vritti* villages, the Commission was of opinion that the rules laid down by Government in their order dated 28th September 1871 in the matter of the recognition of Agents for *Vritti* villages are sufficient and should be strictly enforced. They, however, added that, where there is no agreement among the *Vrittidars* as regards the person who is to be appointed as Agent, one of the *Vrittidars* may be selected, failing which the Patel or the Shanbhog may be made Agent and that five per cent of the gross collection should be paid as remuneration to him. Government have approved of these recommendations of the Commission.

Relations
between the
registered
occupants
and their
tenants.

Certain phases in the relations between registered occupants and tenants are dealt with in Sections 64 and 77, Land Revenue Code and Rule 40 of the Land Revenue Rules.

An occupant of land appropriated for purposes of agriculture is entitled by himself, his tenants or legal representatives to erect farm buildings and dwelling houses for agriculturists and their labourers, construct wells or tanks, or make any other improvement thereon for the better cultivation of the land or its more convenient occupation for the purposes aforesaid. But, if the holding or any part thereof is to be appropriated for any other purpose, the registered occupant should invariably apply to the Deputy Commissioner for permission to so appropriate the holding and, unless the Deputy Commissioner shall in particular instances otherwise direct, no such application shall be recognized except it be made by the registered occupant. Any tenant or any occupant or any other person holding under or through an occupant who shall, without the registered occupant's consent, appropriate any land appropriated for purposes of agriculture to any purpose unconnected with agriculture and thereby render the registered occupant liable to the penalties prescribed in the Land Revenue Code shall be responsible to the registered occupant in damages, provided that the Deputy Commissioner may, instead of fining the registered occupant as prescribed in the Code, fine any tenant or any other person holding under or through the occupant, who may have without the registered occupant's consent appropriated any such land to any purpose unconnected with agriculture.

In order to prevent the forfeiture of an occupancy under the provisions of the Land Revenue Code or of any other law for the time being in force, through non-payment, by the registered occupant, of the land revenue due on account of the occupancy, it is lawful under Section 77

of the Code for the tenant interested in the continuance of the occupancy to pay, on behalf of such registered occupant, all sums due on account of land revenue and for the Deputy Commissioner to receive the same. And in any such case, the Deputy Commissioner may give to the tenant who has paid the land revenue such aid for the recovery of the proportional amounts which he may consider to be properly payable by other persons in occupation or enjoyment of parts of a field or survey number as he might legally have given, had the tenant so paying been the registered occupant. But, the privileges conferred on the tenant by Section 77 of the Code as aforesaid do not affect the rights of the tenant and the registered occupant as the same may be established in any suit between them in a Court of competent jurisdiction.

The tenant of a registered occupant is entitled, under Rule 40 of the Land Revenue Rules, to notice before the occupancy is declared forfeited for non-payment of the land revenue due on it, provided he registers his name and his interest in the occupancy in a Register kept in the Taluk Cutcherry for the purpose and pays on every application for such registry a fee of one Rupee in the shape of Court Fee Stamps of that value to be affixed to the application. The registry thus made does not give a right to the tenant so registering to receive notices under this rule for more than five official years beginning with the year of registry unless a fresh application is made before the expiry of the period and the entry in the register is renewed. No fee will, however, be charged on application for such renewal.

The following extract from the *Imperial Gazetteer of India* may be said to hold good generally in Mysore also :—

Influence of
custom on
rents.

“The incidence of rents may be said generally to depend

on the interaction of three forces, custom, competition and legislation. In the early days of British rule, custom was everywhere paramount and even now, the influence of competition is comparatively restricted. A rise of prices, for instance, even in unfettered tenancies, does not necessarily entail a concurrent rise in rents. The rent legislation of India starts from a basis of custom and while accepting the legitimate influence of competition, seeks to confine that influence within reasonable limits. It aims not so much at the curtailment of advantages naturally accruing to landlords as at the maintenance of rights already conferred on tenants by custom. Custom is, therefore, still to a large extent the foundation of Indian rents."

II. PRICES.

Retail
prices.

Since the year 1866, the prices of some of the articles have been published in the *Mysore Gazette* under the head "Nirakpatti" or "Prices current." The prices have also been reported in fortnightly returns from the Districts. An abstract of each year's prices has been made and embodied in an official publication entitled "Retail prices of some principal articles of food in Mysore," first issued in March 1901.

Standard
food grains.

The statement given below, of retail prices from 1886, is confined only to four principal food grains, viz., Rice, Ragi, Jolam (*Sorghum-vulgare*) and Bengalgram (*Cicer Arietinum*), for which a complete record exists.

Method of
expressing
prices.

Prices are expressed, according to the usual Indian method, in terms of the number of seers sold for a rupee.

Statistics
of retail
prices.

The averages for each quinquennium between 1886 and 1915 and the years 1916 to 1923 are given. The average is for all the eight Districts in the State.

AVERAGE QUANTITY OF GRAIN IN SEERS PER RUPEE.

Years	Rice	Ragi	Jolam (Sorghum- vulgare)	Bengal-gram (Cicer Arietinum)	Years	Rice	Ragi	Jolam (Sorghum- vulgare)	Bengal-gram (Cicer Arietinum)
1	2	3	4	5	6	7	8	9	10
1886-90 ...	13.51	39.96	28.90	12.72	1918 ...	6.32	14.86	12.20	6.75
1891-95 ...	11.42	28.11	23.64	10.59	1918-19 ...	4.65	8.88	6.89	4.12
1896-00 ...	9.54	22.28	19.05	9.19	1919-20 ...	4.21	7.55	8.33	3.54
1901-05 ...	10.35	24.40	18.60	9.99	1920-21 ...	4.17	7.55	8.16	3.54
1906-10 ...	7.83	14.73	14.90	8.15	1921-22 ...	4.54	10.26	8.51	3.77
1911-15 ...	7.43	16.07	15.53	8.16	1922-23 ...	4.88	9.52	9.52	4.88
1916 ...	7.22	17.08	15.35	7.09	1923-24 ...	4.70	8.51	8.33	5.88
1917 ..	7.34	17.68	15.42	7.36					

Good crops were harvested throughout the country and towards the close of 1889, owing to the apprehended scarcity in some of the neighbouring Districts of Madras, there was a large export of grains.

Prices of
1886-1890:

The year 1891-1892 was one of serious famines in most parts of Southern India, and in Mysore, it was happily a year of only moderate agricultural disturbance. The rains everywhere were below the average. The year 1892-1893 was one of agricultural prosperity. Towards the close of 1893-1894, the retail prices of the principal food grains, which during 1892-1893 remained high owing to the drought of the previous year, became more favourable and in 1894-1895 they remained almost stationary.

Prices of
1891-1895.

There was a falling off in prices during 1895-1896, but in subsequent years there was a rise and in 1899-1900, there was a general rise in the price of ragi and jola and also in that of rice in some Districts.

Prices of
1896-1900.

Prices of
1901-1905.

The prices went down gradually from 1901-1902 till the early part of the year 1904-1905, when they began to rise on account of deficiency of supply in the markets due to the withholding of a portion of the stock by the producers and merchants in view of the uncertainty of the seasons. The harvests were poor owing to deficient rainfall.

Prices of
1906-1910.

Throughout the year 1905-1906, the retail prices were higher than in the previous year. From the beginning they showed a tendency to rise and in the last fortnight of the year, they were nearly from 20 to 40 per cent higher. This was due to a general failure of the harvest owing to want of rain. The Shimoga District suffered most, the prices there being nearly 50 per cent higher than the average prices of the District, and rice had to be imported into the District from the Madras Presidency. In 1906-1907, the prices showed a tendency to rise in spite of increase in the outturn. During 1907-1908 and 1908-1909, there was a rise in the prices of rice, ragi, cholam and Bengal-gram and significantly in the case of ragi, the staple food grain of the State, which rose by 25 per cent. The higher prices are ascribed to a perceptible falling off in the total outturn of paddy and ragi in the State and the large exports of ragi from the Districts to parts of British India. The year 1908-1909 was a year of distress and relief measures were adopted. Though there was a decided improvement in the outturn of crops during 1909-1910, the fall in prices was but slight and the prices continued much above the normal average of previous years.

Prices of
1911-1915.

During 1910-1911, there was a fall in price due in a large measure to the favourable seasonal conditions and to the good harvests of the year. During the next three years, there was a general rise in the prices owing to the

failure of the *mungar* rains and also to the exportation of food grains to affected parts outside the State. There was generally no large variation during 1914-1915 in the average prices of rice and ragi though the price of Bengal-gram increased in all the Districts owing to the poor yield of the crop. The price of ragi was somewhat higher in the Hassan, Shimoga and Kadur Districts while in other Districts, there was a fall.

During the year 1916-1917, the price of rice rose slightly, due to the decrease in the outturn under paddy, in the districts of Mysore, Hassan and Shimoga. The prices of ragi and Bengal-gram, however, remained stationary in the Hassan and Chitaldrug Districts and the price of cholam rose appreciably in the Shimoga District. During 1917-18 there was an abnormal rise in the prices of all staple grains owing to exports and the conditions brought about by the Great European War.

Prices of 1916,
1917, 1918 and
1919.

During 1919-20, there was a slight rise in the prices of rice, ragi and Bengal-gram and an appreciable fall in the price of jolam. The prices were stationary during 1920-21. A general fall in the prices of these important food crops was noticeable during 1921-22 and especially that of ragi was appreciable. In 1922-23, there was a further slight fall in the prices of rice, cholam and Bengal-gram while there was a slight rise in the prices of ragi. During the last year of the quinquennium, there was a slight rise in the price of rice and an appreciable rise in the prices of ragi and cholam owing to unfavourable seasonal conditions in some parts of the State.

The General Administration Reports of the State till 1895 contain statements of wholesale prices, and the fortnightly statements of wholesale prices of food grains, etc., at the head-quarters of the eight Districts of the

Wholesale
prices.

State are being regularly published in the *Mysore Gazette* since 1899.

Variation in prices.

The following tabular statement shows the average wholesale prices of the principal food grains in the State during each year from 1881-82 to 1923-24 :—

Years	Rice	Ragi	Cholam (Sorghum-vulgare)	Bengal-gram (Cicer Arietinum)	Years	Rice	Ragi	Cholam (Sorghum-vulgare)	Bengal-gram (Cicer Arietinum)
1881-82 ...	12·86	27·23	26·50	14·06	1903-04 ...	10·18	36·81	31·62	10·00
1882-83 ...	15·23	33·68	26·50	14·11	1904-05 ...	8·43	20·60	22·18	11·50
1883-84 ...	16·00	36·57	31·00	15·14	1905-06 ...	6·68	14·50	14·00	9·18
1884-85 ...	14·19	25·85	27·50	15·23	1906-07 ...	7·25	17·50	17·87	87·5
1885-86 ...	12·77	26·66	22·00	13·21	1907-08 ...	6·18	15·18	15·25	7·94
1886-87 ...	14·32	54·85	30·00	14·94	1908-09 ...	5·43	11·43	11·31	6·74
1887-88 ...	14·38	43·6	37·50	14·57	1909-10 ...	6·43	14·93	14·18	7·99
1888-89 ...	12·69	40·85	35·50	13·91	1910-11 ...	7·56	10·25	20·12	9·21
1889-90 ...	11·65	39·38	32·00	11·19	1911-12 ...	5·87	14·50	14·56	8·96
1890-91 ...	9·68	28·97	29·00	12·01	1912-13 ...	5·56	16·18	15·37	8·33
1891-92 ...	8·35	20·58	17·33	11·43	1913-14 ...	5·50	14·12	12·81	7·89
1892-93 ...	10·77	27·82	25·26	9·00	1914-15 ...	6·86	15·30	14·89	6·40
1893-94 ...	10·26	30·23	26·03	9·25	1915-16 ...	7·22	17·08	15·35	7·09
1894-95 ...	9·87	31·47	24·77	12·25	1916-17 ...	7·34	17·68	15·42	7·36
1895-96 ...	10·44	34·28	30·21	10·93	1917-18 ...	6·32	14·86	12·20	6·75
1896-97 ...	9·41	23·91	19·55	8·95	1918-19 ...	4·65	8·88	6·89	4·12
1897-98 ...	8·90	21·31	17·42	7·95	1919-20 ...	4·21	7·55	8·33	3·54
1898-99 ...	10·59	23·80	23·50	10·85	1920-21 ...	4·17	7·55	8·16	3·54
1899-00 ...	9·35	17·34	15·39	9·55	1921-22 ...	4·54	10·26	8·51	3·77
1900-01 ...	8·11	14·64	13·32	7·30	1922-23 ...	4·88	9·52	9·52	4·88
1901-02 ...	10·03	17·88	21·65	9·94	1923-24 ...	4·70	8·51	8·33	5·88
1902-03 ...	10·82	25·71	25·71	10·00					

It will be observed from the above statement that, notwithstanding occasional variations, the prices all round have been showing a more or less steady tendency to rise, so that, during the 37 years from 1886 to 1923, the prices of all food grains have risen appreciably.

General conditions affecting prices.

The question remains whether any conclusions can be drawn as to the operation of general causes which have

Variations of wages.

In 1876, the average rates of wages for skilled labour were 4 annas to 1 rupee a day, unskilled about 2 annas to 8 annas a day.

In 1893, the following were the rates of daily wages :—

No.	District	Unskilled labour	Skilled labour
1	Bangalore ...	2 Annas to 6 As.	8 As. to 12 As.
2	Kolar ...	4 „ 6 As.	10 „ 1 Re.
3	Tumkur ...	4 „ 6 As.	8 „ 12 As.
4	Mysore ...	2 „ 4 As.	8 „ 12 As.
5	Hassan ...	2 „ 4 As.	8 „ 1½ Rs.
6	Shimoga ...	2 „ 4 As.	8 „ 1 Re.
7	Kadur ..	3 „ 6 As.	8 „ 1 Re.
8	Chitaldrug ...	4 „ 8 As.	8 „ 1 Re.

The minimum daily wages for skilled labour had thus doubled in 17 years in all districts and that for unskilled labour had doubled in three districts and increased by a half in another.

From 1893 to 1916, during a period of 23 years, the minimum rate for skilled labour rose by 50 per cent in two districts (Tumkur and Mysore) while it remained stationary in the districts of Hassan, Kadur and Chitaldrug and it slightly fell in the Bangalore and Shimoga Districts. It increased by 20 per cent in the Kolar District. There was no perceptible change in the minimum rate of wages for unskilled labour during the same period. The wages for skilled labour have steadily risen from 6 Annas to Rs. 2½ in 1917-18 to 8 Annas to Rs. 3 in 1923-24 and those for unskilled labour have varied between 2 Annas, 8 pies to Re. 1 in 1917-18 and 4 annas to Rs. 2 during 1918-19.

General conditions affecting wages.

Agriculture being the main industry of the State, there is comparatively less demand for skilled labour. The

wages of skilled labour are not altogether regulated by the operation of the ordinary law of supply and demand and are generally more or less on a par with those paid in the adjacent parts of India. The wages of unskilled labour, however, depend mostly on custom and are not easily influenced by competition except very temporarily. In big towns and other places where there is a steady demand for skilled labour, irrespective of the conditions of the season, the tendency of wages is to increase with the rise in prices of food stuffs. Numerous coffee plantations in the west of Mysore, railway construction, large expenditure on Public Works and greater activity in house-building and the plague account for the rise in wages. The establishment of mills and factories in the State and the development of mining and other industries have exercised a great degree of influence, illustrating the economic theory that wages depend mainly on the demand and supply of labour. The failure of crops destroys a large portion of the fund used in paying wages and the numbers seeking employment are greatly enhanced, so that those, who find it, often obtain in return the barest subsistence. When, however, a rise in the price of agricultural produce is due to a larger demand, and extra profits are thus obtained by the cultivator or land-owner, wages may and do rise.

The rise or fall in the prices of food grains does not affect the wages of labour in the *malnad* tracts, as in addition to the money wages which are on a par with those prevailing in the *maidan* parts, they receive their rations. It must, however, be observed that any fluctuation in prices of food grains may not necessarily produce any immediate corresponding change in cash wages of labour on account of the deep conservative instincts of the masses and the fact that wages are generally controlled more by custom than by competition unless the demand for skilled labour increases rapidly in any specified locality.

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CHAPTER XII.

FAMINE.

I. HISTORY OF PAST FAMINES AND OF FAMINE RELIEF.

THE information about famines due to drought, previous to the year 1876-77, is very scanty, but dreadful famines followed the devastations of the Mahratta armies and the wars with Mysore at the end of the eighteenth century. During the invasion of Lord Cornwallis, when the country was attacked on all sides and penetrated in every direction by hostile armies, or by defending armies little less destructive, one-half at least of the inhabitants are said to have perished of starvation. In the last century, periods of scarcity occurred in 1824, 1831 and 1833. The ten years following 1851 were a time of great trial when year after year the scanty and unseasonable rainfall kept the agricultural classes in constant dread of actual want. Two or three seasons ensued which were prosperous, but in 1866, famine was again prevalent in Chitaldrug and the north-eastern parts of the State.

Famines prior
to 1876-77.

The failure of rain in the years 1875-76 and 1876-77, brought about a famine such as was never known before. The beginning of the calamity was the partial failure of the rains in 1875, the fall being from one-third to two-thirds of the average. Much of the food crop was lost; but owing to the usual large stocks in the State, only temporary or occasional distress was caused, the price of grain being within double the ordinary rates. In 1876, the rainfall was again very short and barely a third of

Famine of
1876-78.

the ordinary harvest was reaped. Matters were aggravated by the fact that crops had failed in the adjacent Districts of Madras and Bombay, and by the middle of December, famine had begun. From then till March 1877 matters grew worse. The only railway from Madras to Bangalore brought in daily 500 tons of food enough to support 9,00,000 people; yet the prices of the food stuffs ranged during those months at four to five times the ordinary rates. In April and May 1877, the usual spring showers fell, and hope revived. But as the month of June wore on and July came, it was apparent that the early rains were going to fail again, for the third year in succession. Panic and mortality spread among the people, famine increased and became sore in the land. In May 1877, 100,000 starving paupers were being fed in relief kitchens, but by August the numbers rose to 227,000 besides 60,000 employed on the railway to Mysore. The Viceroy, Lord Lytton, visited Mysore and appointed Mr. (afterwards Sir Charles) Elliot as Famine Commissioner, with a large staff of European Assistants. Relief works were now concentrated, and gratuitous relief was confined to those whose condition was too low to expect any work from them at all. Bountiful rains in September and October caused the cloud to lift and the pressure of famine began to abate. During the eight months of extreme famine, no crops were reaped; the price of grains ranged from three to six times the ordinary rates; and for the common people, there were no means of earning wages outside the relief works. Even in 1877-78, the yield of harvest was less than half the crop of an ordinary year. From November 1877 to December 1878, prices ranged at nearly three times the rate of ordinary years. In 1878-79, the season was exceptionally favourable, and though there were not wanting causes for serious anxiety, the crops, particularly the rice and ragi crops, on which the agricultural prosperity of the country

mainly depends, were most bountiful. Although the rainfall in 1878 was slightly less than that gauged in 1877, it was more seasonably distributed, and did not, as in the end of 1877, cause damage by copious but untimely fall. A plentiful harvest soon effected a most welcome fall in prices, especially in the prices of food grains consumed by the people, which were sold at rates within the reach of the poor. The mortality in this famine has been estimated at 11 millions in a population of 51 millions. The mean annual birth rate of 36 per 1,000 was reduced to one-half.

The financial effects of the famine were indeed very disastrous. The invested surplus of 63 lakhs had disappeared and a debt of 80 lakhs had been incurred.

Financial effects.

According to the Report of the Indian Irrigation Commission, the average annual rainfall for Mysore is 34 inches and the number of dry years and years of drought that may be expected in a cycle of 50 years are 9 and 3 respectively. The Revenue Commissioner, in his report on the Administration of relief measures during 1908-09, has classified the 28 years from 1881-82 to 1908-09 into—

Bad and good years.

(a) "Good years" (numbering 11) in which the rainfall was timely, sufficient and generally seasonable throughout the State;

(b) "tolerable years" (numbering 9) in which either of the two monsoons proved scanty or gave rise to apprehensions of scarcity but subsequent rains materially improved the situation; and

(c) "bad years" (numbering 8) in which the rainfall was, on the whole, defective and unseasonable or ill-distributed.

Under the last class are included the years 1883-84, 1884-85, 1891-92, 1899-1900, 1904-05, 1905-06, 1907-08 and 1908-09. Taking the years under class (c), we find

Distress of 1883-84 and 1884-85.

that the years 1883-84 and 1884-85 caused grave anxiety to the Government. In the former year, the dry crops in the north-eastern and eastern districts yielded from one-fourth to half of the normal average. In 1884-85 the unfavourable conditions of the first half of 1883-84 appeared in an aggravated form. This state of things was, however, changed by the fall of heavy rains about the end of September; and subsequently the season assumed a favourable aspect.

Distress of
1891-92.

The five years preceding 1891-92 were years of normal prosperity. In 1891-92 the rains of October proved a sad disappointment. In the *maidan* parts of Mysore and Hassan District, the south-west monsoon was scanty and precarious. The northern and eastern districts did not get any of the early rains. A few showers which came later on permitted of the sowing of nearly the usual extent of land with ordinary dry crops in the northern taluks. These began to fade from insufficient moisture.

Besides the regular relief works, but under the same agency and serving the same objects as those works, were the drinking water-wells for which a total grant of Rs. 1,38,000 (chiefly from Local Fund) was sanctioned. There were in hand 850 such wells, principally new wells undertaken wherever most needed, besides a number of old wells which required deepening. They were all works of permanent utility but were of special immediate value owing to the scarcity of drinking water which existed in most places.

In 1891, the Government resolved to make advances for the sinking of irrigation wells at a normal rate of interest, repayable by easy instalments in a long series of years; no further security was demanded than the well and the land it irrigated, exemption to the raiyat from enhanced assessment on the ground of the well being guaranteed. Accordingly the working of the scheme in

the year 1892, in each of the districts of Kolar, Tumkur, Chitaldrug and Bangalore, was entrusted to a special officer under the Deputy Commissioner. The loans sanctioned aggregated Rs. 2,80,000 for 917 *Kapile* and 530 *Yātam* wells calculated to irrigate 5,252 acres.

Another important class of works for which Government loans were given was the construction and repair of *Sāguvali Kattes*. During the distress of 1891-92, loans to the extent of Rs. 21,175 were sanctioned for 251 such works calculated to benefit 5,069 acres.

The total outlay on the several measures adopted by Government (excluding remission of revenue) was Rs. 14,05,000.

The rainfall in July and August 1899 was below the normal and the north-east monsoon was also deficient and unequally distributed. In the case of dry crops, the late sowings proved more or less a failure; and as regards irrigated crops, the serious deficiency in tank-filling rains affected the outturn of the *Kārtik* harvest and prevented cultivation of the *Vaisakh*. There was a general rise in the prices of food grains, especially ragi. Towards the close of the official year, the outlook in the *maidan* parts was again gloomy. A few test works to give relief to villagers were opened in the Bagepally Taluk of the Kolar District and Mandya Taluk of the Mysore District. The rains of September and October 1899 considerably improved the prospects in almost all parts of the State.

Distress of
1899-1900.

The heavy rains of 1903-04 had been productive of serious injury to the tanks of the Kolar District. In 1904-05, the north-east monsoon was a failure and in the next year, all the Districts, except Bangalore and Hassan were similarly affected. In 1907-08, the *maidan* districts except Mysore fared badly, the early rains being neither seasonable nor evenly distributed. The north-east

Distress of
1908-09.

monsoon proved most disappointing in all the districts and the rainfall in November was scarcely above the average with the result that there was insufficient supply of water in the tanks for the *Vaisakh* crops. The year 1908-09 was thus preceded by three bad years.

The distress was severe in intensity both on account of the antecedent bad years as well as of the very deficient and unseasonable rainfall, combined with insufficient stock of food grains and abnormally high prices. By December 1908, the effects of the severe drought began to be felt by the people. Even before this, the raiyats in the arid tracts of Tumkur and Hassan Districts became solicitous about fodder for cattle and went in large numbers to the jungles in the *malnad* parts of Mysore, Shimoga and Kadur. In the Districts of Mysore, Tumkur and Chitaldrug, the distribution of gratuitous relief on a small scale became indispensable. By January 1909, the campaign of relief operations was systematically taken on hand. By the end of January and the commencement of February, the raiyats of small holdings and the labourers began to feel the pinch. The hottest part of the year having set in, the difficulty for water and fodder began to greatly aggravate the hardships of the people who could only reap a very scanty harvest and who were therefore forced to buy food grains at high prices. Thus a number of causes combined to make the distress acute in February and March. In April, May and June, the relief operations were in full swing in the *maidan* districts but the rains of April and May mitigated the distress to a large extent. In June and July, the break in the rain caused apprehensions, but in August, the copious rainfall materially improved the situation and by the end of September all the special relief establishments were practically abolished.

The affected tracts comprised about 5,600 villages, spread over all the districts, with a total area of about

7,800 square miles and a population of about one million and four hundred thousand.

The total cost to Government under direct and indirect measures of relief amounted to Rs. 19 lakhs.

The south-west monsoon of 1923 was very feeble in the eastern districts of the State and the north-east monsoon that followed was a complete failure. The result was that a major portion of the Kolar and Tumkur Districts and a small portion of the Bangalore and Mysore Districts suffered from drought, want of cattle fodder and want of employment for the labouring classes.

Distress of
1923-24.

As soon as the first signs of distress was apparent, suitable measures of relief were taken. The sinking of temporary wells was largely resorted to. The import of fodder was encouraged by Railway freight facilities, and Government depôts, for selling straw and hay procured from elsewhere, were opened. Forests were thrown open for free grazing and the driving of valuable cattle to *malnad* forests was organised. Tank maintenance, tank restoration and village improvement works were started as locally required, to provide labour within easy reach. Land improvement, *Takavi* and Irrigation well loans are being freely given. Relief to weavers, mainly through Co-operative Societies, has been arranged for. In extreme cases, gratuitous relief is being afforded to helpless persons. Certain relaxations have been ordered about the levy and collection of revenue on wet lands in the affected tracts. The growth of fodder crops has been encouraged under the Krishnaraja Sagara and Vani Vilas Sagara.

Instructions issued up to 10th April 1924 have been summarised in a hand-book which has been issued recently.

Since the operations connected with relief are still going on, the total cost has not been given.

II. THE CAUSES OF FAMINE.

The causes of
Famine.

The following extract from the *Imperial Gazetteer of India* describing the causes of famine holds good in Mysore also :—“Famine is a disease of all agricultural countries. India is and has always been mainly agricultural under conditions peculiarly exposed to famine. The soil is parcelled out in minute farms. The farmers have no capital and depend on unorganised local credit which shrinks when harvests fail. Off the land, but dependent on it, are millions of agricultural labourers, the vast majority of whom have only casual employment and are thrown out of work when the harvests fail. Thus the masses of the Indian people depend upon harvests, and these depend upon a periodic, by no means regular rainfall.” When both the monsoons fail, distress becomes inevitable and its intensity is often governed by the quantity of rainfall in the years immediately preceding. Not only human beings but cattle also suffer from failure of rainfall owing to lack of water-supply and fodder.

III. THE FAMINE PROBLEM AND MODERN RELIEF.

The Famine
problem.

The consolidation of British rule in India has put an end to rapine and war. Engaged in peaceful occupations, the people are rapidly multiplying; but the growth of new industries absorbs only a portion of the increase in population. The pressure on the land, therefore, increases, the supply of agricultural labour outruns the demand for it in the *maidan* districts and agricultural wages are low. Agricultural holdings get sub-divided and become small in extent owing to laws of inheritance. Primitive methods of cultivation are therefore followed and agricultural profits are low. Food grains and fodder are not usually accumulated for more than a year and only about 16 per cent of the occupied area is protected by irrigation, the rest being liable to suffer from the effects

of drought which, as pointed out above, recurs in at least 12 years out of a cycle of 50 years. Hence the famine problem.

The first Mysore Famine Code was ushered into existence amidst the agonies of the great Famine of 1876-78. In supersession of discordant orders and divergent methods, it was an authoritative declaration of policy and procedure in detail. The Famine Commission of 1880 commended the idea and the Government of India afterwards laid down the broad principles of famine administration in a draft provisional Code for British India and another for Native States. In adopting the draft provisional Code for British India, with modifications required to adapt it to the local circumstances and administrative machinery of Mysore, one point upon the importance of which the Durbar laid special stress was the provision of works for the relief of the agricultural population in the vicinity of their villages. This principle was maintained in the subsequent Code of 1896 and received the approval of the Government of India in their Resolution published on the 31st August 1901.

The Famine Code.

According to Section 49 of the Famine Code of 1909, the Revenue Commissioner is vested with the chief executive control of Famine Administration in addition to his ordinary duties, unless a separate Famine Commissioner is appointed.

Famine Commissioner

The Revenue Commissioner is kept informed at all times of the state of the season and the course of prices.

Standing preparations.

Complete and well-considered programmes of relief works are prescribed for each district showing the population and the maximum number of units in thousands for whom relief work is required. Reserves of tools and plant are stocked and lists of persons suitable on

emergency for famine establishments are prepared in each district.

Danger
signals.

Apart from the failure of rain and the upward tendency of prices, the following symptoms demand attention as being warnings of possible distress:—

- (1) Contraction of private charity indicated by the wandering of paupers ;
- (2) Contraction of credit ;
- (3) Feverish activity in the grain trade ;
- (4) Restlessness indicated by an increase of crime ;
- (5) Unusual movements of flocks and herds in search of pasturage ; and
- (6) Unusual migration of people.

Preliminary
action.

When the failure of rain causes anxiety, active preparations are made to put heart into the people. Accordingly meetings are held, the famine policy is explained, non-official relief agency and private charity are organised, and a central committee of the most influential residents is appointed in each taluk to advise generally, to stimulate private charity, collect subscription in cash or grain and later on, if necessary, to manage village works. Village inspection begins, programmes of public and village works are scrutinized to see whether the works included in them for the tract likely to be affected are sufficient, arrangements are made for the tools and plant of all kinds required for the selected works to be held in readiness for immediate use, preliminary arrangements are made for strengthening the Civil, Engineering, Police and Medical establishments, as necessity arises ; every effort is made to ensure and to encourage prompt disposal of applications for *Takāvi* advances for the sinking of wells, the construction or improvement of private tanks, etc. ; early steps to meet the scarcity of fodder or drinking water are taken and enquiries as to the extent to which suspension of revenue will be necessary, are instituted.

If the uneasiness intensifies, the Government would review the financial position and decide what allotments should be made in the event of famine relief being necessary and what services should be reduced for the purpose.

The preparations above referred to having been completed, further developments are watched. If the outlook does not materially improve, the fact whether there is merely scarcity or whether distress requiring relief exists, is determined by properly putting into operation a "test work." Every arrangement is made to ensure safety and health of the mass of people in the areas affected. When test works begin to attract people in large numbers, the existence of distress is considered proved. The condition of those who seek employment on the test works is closely watched and a look-out is kept by village inspection on the condition of those who stay in their villages. Simultaneously with the opening of test works, poor houses at the chief centres of the tracts under observation are opened.

The period
of test.

The measures adopted are naturally such as would fit in with the needs of the situation, according to the nature of the suffering of the people and the kind of relief that can be effectively applied as a remedy. The following are the measures usually adopted :—

Measures
adopted on
the
declaration
of famine.

(1) Permission for the temporary cultivation of tank beds.

(2) The throwing open of the State and District Forests and certain Amrut Mahal *kavals* for free grazing of cattle, the cutting and stacking of hay at convenient centres for the use of cattle and the grant of permission for cutting and removing the date leaves for cattle.

(3) Gratuitous relief to the old, decrepit and the infirm and *gosha* women.

(4) The grant of loans on a very liberal scale under *Takāvi* and the Land Improvement Regulation, the grant of

advances for earth-work to tanks and the purchase and storing of seed grains for sale to raiyats.

(5) The expansion of ordinary village and public works, roads works and other works of public utility.

(6) The remission of *hulbanni*, *mohatarfa* and land revenue in regard to wet lands and suspension of land revenue in regard to dry lands.

(7) Relief to weavers by way of advances.

(8) Grain compensation allowance to officials on low pay and village servants.

Policy before
the monsoon
breaks.

As the hot weather draws on to an end, the question would press for consideration whether all or any of the large works should be closed at once and the workers thereon distributed on small public works and village works near their homes, their dependents being admitted to village gratuitous relief, or whether such works should be kept open till the monsoon has actually declared itself. At the same time, steps would be taken to distribute donations, if any, received from charitable relief funds and *Takāvi* advances for the purchase of seed and cattle.

Policy at the
commence-
ment of the
rains.

Premature action would be guarded against and measures of relief not entirely withdrawn until after the monsoon has actually declared itself. As soon as the commencement of the rains opens employment in the fields, the task would be raised for the able-bodied workers; and dependents and weakly gangs or weakly persons individually tasked would be, as far as possible, drafted to their homes, such of them as require relief, especially the children, being brought upon the village gratuitous relief lists until the harvesting of earliest principal crops brings a substantial increase to the earnings of the able-bodied.

Closure of
relief.

The process of gradual closure of works would begin as soon as the demand for field employment sets in, and

all works would be closed by the time the earliest principal autumn (*Kārtik*) crop is ripe. When the earliest of the principal autumn crops is gathered in any tract, gratuitous relief would be generally closed, the recipients being given a valedictory dole, in grain or cash, sufficient to support them for about a fortnight.

The aim of the relief operations undertaken during the period of distress prior to the actual prevalence of famine conditions has been to prevent congregation of needy labour on large works, comparatively small works being fairly well distributed all over the affected tracts. To put heart into the raiyats by a liberal distribution of loans at the outset has also been aimed at by the measures adopted both in 1908-09 and 1923-24.

IV. PROTECTION AGAINST FAMINE.

The principal protective measures thus far successfully taken have been the extension of railways, so as to admit of the import and distribution of food grains to all parts, and the extension of irrigation and other facilities for increasing cultivation. Plans for suitable relief works are also kept in readiness to be put into operation at the first appearance of necessity arising from scarcity.

Protection
against
famine.

A permanent system of intelligence exists in all districts, under which the necessary agricultural and vital statistics are collected regularly at fixed intervals by the village and taluk officers and submitted to the Deputy Commissioner. The rainfall returns are carefully studied. The rise of prices is also carefully observed. Predisposing circumstances of wide-spread agricultural depression, such as successive failure of the early and late rains, abnormal rainfall, failure of one or more harvests, movements of large numbers of people in search of food or labour, and noteworthy increase in the mortality among

System of
intelligence.

human beings or cattle, etc., are also carefully observed and considered.

Irrigation.

Experience has shown that everywhere throughout the State, save in a narrow strip of assured rainfall along the western border, irrigation is necessary as a protection against occasional famine and the vicissitudes of ordinary seasons; while throughout the State it is useful in affording employment to the agricultural classes in the interval between the reaping of the dry crops in December and the setting in of the rains in May. None of the more valuable crops, such as sugar-cane, garden produce and the best qualities of rice can be grown profitably without irrigation; and on an average the value of the produce of a single crop is said to be nearly quadrupled in ordinary years by an assured supply of river water and increased thirty-fold in a year of drought.

Existing State Irrigation Works.

The conformation of the country, eminently adapted as it is for the construction of tanks, has been almost fully utilised for this purpose from time immemorial. There are, in addition, numerous canals or river channel works. Many of these have been improved or constructed by the State and nearly all are under State management.

Large Works.

The Marikanve Reservoir (Vani Vilas Sagara) was completed in 1908 at a cost of Rs. 44 $\frac{3}{4}$ lakhs. It has a capacity of 30,025 millions of cubic feet. The reservoir is expected to fill at least once in five years and to admit of an annual supply of water for irrigation of about 30,000 acres of rice lands. The channels taken from the right and left banks of it extend to a length of 29 miles and command 12,500 acres of wet land each. The reservoir is capable of furnishing water for irrigation all round the year.

Another large work recently undertaken is the Cauvery Reservoir at Kannambādi at an estimated cost of Rs. 365 lakhs in all. With an assured supply of water from the reservoir, the way has been paved for the cultivation of high class perennial crops not hitherto grown in this valley. Arrangements are being made to cultivate, with the aid of the storage, about 10,000 acres of sugar-cane under the existing and new channels.

Direct irrigation from channels such as those taking off from the Cauvery and its tributaries is also a sure protection against famine. Most of the river channels lie in the Cauvery Valley. Their total number is 53 and their aggregate length slightly under 1,000 miles.

River
channels.

The tanks are of two classes, namely :—

Tanks.

- (1) major tanks, and
- (2) minor tanks,

There are in the State 2,668 major and 22,228 minor tanks. On an average there is one tank for every $1\frac{1}{2}$ square mile in the State. Efforts are being made to restore both major and minor tanks requiring repairs. There are also large stores of sub-soil waters below tank beds and in the sandy streams, which might be tapped and lifted by pumps worked by some kind of motive power, and some progress has been made in this direction.

The total number of wells in the State is 40,464 irrigating on an average 2 acres per well and paying an assessment of Rs. 5 per acre or 10 per well. The wells are very numerous in the Kolar and Tumkur Districts.

Wells.

A system of railways expressly designed to serve as a protection, by importing and distributing food grains in

Railways.

times of scarcity, radiates from Bangalore and there is no district without a railway running through some part of it. Since the great famine of 1876-78, when the only railway was the Bangalore branch of the Madras Railway as far as Bangalore Cantonment, the pressure of severe distress has been averted by the construction of new lines traversing the interior of the country.

Other efforts
to increase
material
prosperity.

Much has been done in other departments to promote general prosperity. The land revenue has become progressively moderate in assessment and elastic in collection during times of drought. Loans are given by the State, at low interest and on easy terms of repayment, for land improvement and for the purchase of seed and bullocks, etc. Separate departments of Government are charged with the work of starting Co-operative Credit Societies for ameliorating the condition of the people, with the carrying on of experiments in agricultural improvements and with the development of arts, industry and commerce in the State. Since the year 1911-12, the Economic Conference and its various Committees have had for their special aim the improvement of the material condition of the people in various directions.

Famine
Insurance
Fund.

To avoid an unnecessary resort to borrowing when the State is called upon to meet a heavy demand for famine relief, Government decided in the year 1906-07 to lay by two lakhs of rupees a year as an insurance against famine. Since that year, a provision of two lakhs of rupees was regularly made for some years, and the provision was in 1916-17 even raised to Rs. 5 lakhs a year. In recent years, this provision has had to be dropped owing to financial stringency.

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CHAPTER XIII.

ECONOMIC CONDITION OF THE PEOPLE.

Meaning of
"Economic
Life."

SPEAKING in a general way, the economic life of a people means, their capacity to earn a livelihood. This capacity depends primarily on how they are organized, whether we consider them as consisting of individuals or families, or as forming a more compact group, a State or a Nation. The more highly developed a society or community is, the more complex is its economic life. Its wealth-earning activity affects it as much as its wealth-using activities. Though this is so, we may for practical purposes restrict the wealth-earning activity itself as its economic activity. It is this capacity that determines its well-being and in the determination of the progress made by a country or a community, it is in this sense that we should judge of its progress. In this chapter, an attempt will be made to trace briefly the development of the wealth-earning capacity of the people as such, and as individuals forming the State; in other words, what has been the growth or decline of wealth of the average man in Mysore during the past fifty years or so and what has been the growth or decline of wealth of the State as a whole during the same period. A word of caution seems necessary at the outset. The materials for the study of present economic conditions are not readily available, and as a study of them, in the true historical spirit, presupposes an amplitude of materials which we do not possess, it would be unreasonable to claim anything more for what is set down below than that it is only an attempt to indicate what they are to enable further investigation into the points raised possible in the future. Neither

social nor economic institutions are permanent; they are constantly changing. To understand aright what is, we must know whence it has developed, and, so far as we can, also whither it is tending. We ought also to remember that great changes in the economic condition of a nation or a class are not brought about in a moment at the command of an individual, or of a great number of men organized in a State, though both the action of an individual and that of the State are powerful forces. "Bearing these facts in mind," as Ely well puts it, "we may free ourselves from two opposing errors, from which many false views of our future take their rise. On the one hand, we may hope to escape the pessimism that springs from working at the existing order of things as unalterably determined; and on the other hand, we may escape that unreasoning and unreasonable optimism which belittles the importance of our fundamental ideas and institutions, and which inconsiderately hopes to change these in the twinkling of an eye, by the simple expedient of the vote of a majority" or the fiat of a Government.

The condition of the people during the period immediately anterior to the restoration of the kingdom to the ancient Ruling Dynasty need only be briefly referred to here. Buchanan-Hamilton in his *Journey* gives a graphic description of it and the interested student should turn to his volumes and study them through and through, if he desires to have a first-hand knowledge of it. The unsettled nature of the country, the destruction wrought by invading armies, the exploiting nature of the Government that prevailed and the poor opportunity left for trade and commerce in the land are all well brought out by Buchanan-Hamilton in his work, which to the serious economic student of Mysore ought to prove invaluable for a study of the conditions that existed towards the close of the Eighteenth Century. From his remarks we

Conditions during the beginning of the nineteenth century.

gather that in the country close to Seringapatam, the then seat of the Government, agrestic slavery was *universal*: agriculture was practically the only occupation known; and the system of agriculture pursued had "capital defects" in it. "Ameliorating succession of crops is utterly unknown; scarcely any attention is paid to the improvement of the breed of labouring cattle, and still less to providing them with sufficient nourishment." So wrote Buchanan-Hamilton, in 1800. He adds that manufactures were "never considerable" and trade almost "confined to the importation of provisions, clothing, and luxuries for the Court and army." Writing of Bangalore and near about, Buchanan-Hamilton remarks that the trade of the country was just recovering. The inhabitants who had deserted the place were then coming back but the trade was not even a fourth of what it was during Haidar's time. Writing of the country round Dod-Ballapur, Buchanan-Hamilton remarks that it had been "formerly under cultivation, but now," he adds, striking a melancholy note, "it is almost entirely unoccupied." He then records as follows:—

"Many farmers in every part of the country are so poor that they cannot stock a farm of one plough; and for this purpose, two, or even three, are sometimes obliged to unite their capitals. A man who keeps three or four ploughs is a wealthy person." Wages were extremely low; a man got 6 *fanams* a month, a woman, 5. During the invasions of the 18th century, the invading armies as much as the defending ones did irreparable injury to this part of the country, so much so, says Buchanan-Hamilton, that "one half at least of the inhabitants perished from absolute want."

Recovery
after war,
1800-1805.

Such was the position in 1800. At the end of five years' of settled Government, Colonel Wilks, Resident at Mysore, in his Report dated 5th December 1804, estimated the progress made in statistical

statement from which the following particulars are gleaned :—

	1801	1804
Coples, villages and hamlets ...	23,523	25,303
Total villages and hamlets in the books.	28,333	31,272
Houses	5,00,786	5,76,459
Families	4,37,665	4,82,612
Population reckoning $4\frac{1}{2}$ persons to each family.	19,69,510	27,71,754
Ploughs	2,98,738	3,24,548
Looms	20,761	1,30,942
Weavers in Cotton	"	10,180
Weavers in <i>Kumbli</i>	"	34,800
Cultivators	"	10,86,760
Manufacturers of salt	"	9,137
Workers in brass	"	52
Forges of iron	105	853
Shops of various kinds	11,204	13,840
Oil mills	1,242	2,991

During the period of five years in question, all the irrigation tanks had been restored. In 1799, Wilks observes that they "had universally fallen into the most lamentable state of decay; and tanks, which had been broken and disused from two to two hundred years, were visible in every part of the country, and very many more were overgrown with jungle, and forgotten or unknown." In 1804, by the "unceasing" attention of Pūrnaiya, the then Dewan, every embankment, and *nullah* then in use, was in Wilks' words, "in perfect order." He adds, writing in 1804, that many hundreds of each of the several descriptions of these works which were useless in 1799 have been restored, and tanks forgotten for two hundred years, have been reclaimed from the depths of the forest. "The relative states of the peopled villages in 1799 and

1804, above exhibited, will afford more distinct means of appreciating the extent of these exertions. The area of the State, as estimated, in 1782, by Major (afterwards Colonel) Mackenzie was 37,626 square miles, and the estimated population, 1804, being 21,71,754, as above stated, the population per square mile, 1804, was approximately 58. Allowing some margin for errors in the computation which was admittedly on the basis of families—reckoning $4\frac{1}{2}$ persons per family—the depopulation may be set down to the devastating effects of the incessant warfare that raged in the land during the struggles of the 18th century. Haidar's usurpation was an accomplished fact in 1760. At that time, many of the Districts of Mysore were permanently occupied by Mahratta troops, and Gopal Rao Hari, the first feudal chief of Miraj, invaded Mysore in the same year. It was again invaded by Banni Visaji Pandit in 1761; by Madhava Rao in 1765, 1767 and 1770; by Triambak Rao in 1771; by Ragunatha Rao in 1774; and by Hari Pant Phadke in 1776 and 1786. Wilks records that his investigations on the spot showed "the merciless ravages committed in 1791 and 1792 by Parasuram Bhao." Buchanan-Hamilton can be quoted in confirmation of the effects of these recurring ravages but it ought to suffice if it is stated that their cumulative effect was to operate as a check against the growth of population in the State. "In consequence of these incessant calamities," to quote Wilks once again, "many districts, formerly well peopled, do not exhibit the vestige of a human being; and Chitaldrug, in particular, may be considered as deprived of the great mass of its inhabitants." These causes, powerful to a degree and too terrible to contemplate, cannot but have left their impress on the country. The figures, such as they are, show their effect in unmistakable fashion. But the recovery of the first few years was significant to a degree and well showed that, with a settled Government

and an administration not unwilling to do its best for the people, things could improve, speedily if slowly.

About a quarter of a century later, in 1834, Sir Mark Cubbon drew up a report which furnishes valuable evidence bearing out this inference. In 1799-1800, the gross revenue had been estimated at about twenty-one lakhs of Kantirai pagodas (about Rs. 63 lakhs); in 1803-1804, this stood at twenty-five lakhs Kantirai pagodas (about Rs. 75 lakhs). In 1809, it reached close upon thirty-two lakhs of Kantirai pagodas (about Rs. 96 lakhs), the average for the eleven years of Pūrnaiya's management being no less than nearly twenty-eight lakhs Kantirai pagodas (about Rs. 54 lakhs). The highest amount reached during the period of Krishnaraja Wodeyar III (1811-1831) was over thirty lakhs Kantirai pagodas in 1816, the average for the 21 years of his rule being nearly twenty-six lakhs of pagodas (about Rs. 78 lakhs). Sir Mark Cubbon estimated the population, in 1834, at 45 lakhs, inhabiting 32,425 villages and hamlets. The number of tanks he put down at 19,800; wells 16,371; cultivators paying rent, at 3,83,702; and ploughs at 2,99,982. Comparing these figures with those given by Wilks for 1803-1804, we note that during the intervening period of twenty-five years the population had more than doubled, inhabited villages had increased by about one fourth; and cultivators quadrupled themselves, though there was, if the figures can be believed, an actual decrease (by about 25,000) in the number of ploughs. It is possible Wilks' figures were only approximate, considering the conditions in which they were obtained. It must also be added that Sir Mark Cubbon's estimate of the total population at 45 lakhs was also an over-estimate. A computation made in 1840-41 showed that the population stood then at a little over 30 lakhs. Taking this as the nearest approach to the total in 1834, *i.e.*, a quinquennium

Economic
progress
between 1805-
1834.

previously, it shows an increase over the figures for 1804 by about 10 lakhs, or about one-third in addition.

Economic
progress
between 1834-
1862.

A quarter of a century later, *i.e.*, in 1861-2, the revenue stood at about $100\frac{1}{4}$ lakhs of Rupees as against the average of about 78 lakhs of Rupees twenty-five years ago. Population figures are not available for the years in question, but as the population in 1860 was 3,281,000, in 1863, 3,872,209, in 1864, 3,895,687 and in 1865, it stood at 4,013,601, it cannot have been far removed from the neighbourhood of 38 lakhs in 1861. The increase of about 10 lakhs during a quarter of a century seems normal, remembering the rate of growth during the previous twenty-five years.

Effects of
famine of
1866-67 and
subsequent
growth of
population.

The famine of 1866-67, however, proved disastrous, especially to the Nagar Division, where its effects were most intensely felt. The population went down by about 15,000 in that year or roughly by about 38 per cent as compared with the returns of the preceding year, which had been computed at 3,900,735. The ratio of increase of population during the decade 1840-41 to 1850-51 is found to have been as high as 13 per cent, while in the decade extending from 1851 to 1860, the rate was 11.5 per cent and in the decade 1860-1870, it was 7.5 per cent. The results of the regular Census of 1871 showed that the population must have been under-estimated in the previous valuations, an inference confirmed from other sources as well. In 1871, the population stood at a little over 50 lakhs; in 1881, at a little over 41 lakhs, showing a decrease of 17.19 per cent; in 1891 at 49 lakhs, showing an increase of 18.09 per cent; 1901 at 55 lakhs; in 1911, 58 lakhs; and 1921, at nearly 60 lakhs. The progressive increase is worthy of note, despite the disastrous effects of the famine of 1866-67. (See Vol. I, Chapter IX, *Population*, above).

With the growth of population and the modernizing of the administration and the resulting benefits of trade and commerce, with the opening up of the country by improved communications, the growth of State revenue has been more marked. As stated above, the revenue stood at about 100 lakhs of rupees in 1861; in 1865-66, it reached 109 lakhs; in 1872-73, it was nearly 110 lakhs; in 1885-1886, it went up to over 116 lakhs; in 1902-03, it was well over 208 lakhs; 1912-13, it was a little over 276 lakhs; in 1917-18 it reached the high water-mark of over 315 lakhs; since when, it has oscillated at about 300 lakhs. These figures show that the progress achieved during the past century and a quarter has been, despite certain adverse circumstances, great.

Growth of
State
Revenues.

That there has been appreciable progress in the condition of the people of Mysore since 1881 admits of no doubt, as is evidenced by the following figures grouped under different heads:—

Economic
progress since
the rendition.

STATEMENT 'A.'

Head	1881-82	1921-22
1. Population ...	42'92 lakhs	59'78 lakhs
2. Prices of food crops.—		
Rice ...	12'86 seers per rupee.	4'54 seers per rupee.
Ragi ...	27'23 seers per rupee.	10'26 seers per rupee.
Bengal-gram ...	14'06 seers per rupee.	3'77 seers per rupee.
3. Wages.—		
	From To	From To
Skilled labour ...	Re. 0-4-0 to Re. 1	Re. 0-8-0 to Rs. 3
Unskilled labour...	Re. 0-2-0 to 0-10-0	Re. 0-4-0 to Rs. 2
4. Miles of road ...	4,243	5,528
Miles of Railway...	58	571

STATEMENT 'B.'

Item	1881-82	1921-22
1. Area under occupation	45.44 lakhs of acres.	78.84 lakhs of acres.
2. Savings Bank deposits	Rs. 10.68 lakhs	Rs. 62.32 lakhs
3. Number of ploughs ...	5.83 lakhs	8.65 lakhs
4. Number of live stock ...	42.28 lakhs	100.41 lakhs
5. Value of exports ...	Rs. 91.90 lakhs	Rs. 411 lakhs
6. Value of imports ...	„ 174.95 lakhs	„ 317 lakhs

Incidence
and ratio of
land
assessment
to total
produce.

The incidence of land revenue per head of population was Rs. 1-11-7 in 1881-82 and Rs. 1-15-0 in 1921-22. The value of annual agricultural production in the State, as estimated in 1915, stands at Rs. 14 crores and the land assessment for the corresponding year at Rs. 1.20 crores. It will thus be seen that the ratio of land assessment to total produce is as 3.35.

The following table as to death rate will also prove instructive in this connection :—

Year	Population			Ratio of deaths per mille of population
	Persons	Urban	Rural	
1871 ...	5,055,402	557,963	4,497,439	
1881 ...	4,186,188	561,899	3,624,289	17.02
1891 ...	4,943,604	675,617	4,267,987	17.70
1901 ...	5,539,399	712,569	4,826,830	19.07
1911 ...	5,806,193	729,119	5,077,074	20.19
1921 ...	5,978,892	862,628	5,116,264	77.81*

*Epidemic of influenza raged in the State during 1918.

Increase of
occupations.

The people of Mysore are still inhabitants of villages. The village population according to the Census of 1921 is 88.7 per cent. Though the growth of towns has not

kept pace with the lapse of years, still there has been some progress. Both under the State and under the Railways and private bodies, occupations have increased by not less than 50 per cent during the past 36 years, and such of the servants as are employed under them on high pay are above want. Industries and trade afford opportunities for employments now to a larger number of people than before, though it is a question if the bulk of those whose income is less than Rs. 500 a year do not experience some hardship when prices of food grains and house rent rise abnormally high, as they have done during the last decade.

The condition of the ordinary agriculturists (73·1 of the population) is by no means prosperous as indebtedness still continues among them owing to a variety of causes. They possess, however, much greater staying power than other classes of the community, as the low land assessment and the steady increase in agricultural profits due to high prices enables them to tide over the vicissitudes of the seasons with greater ease.

Condition of special classes of people :—
(a) Ordinary agriculturists.

The condition of landless agricultural labourers is not uniformly satisfactory. Their wages have not risen in proportion to the increase in agricultural profits. Many of them are prevented by their conservative instincts from leaving their homes in search of labour. They are ordinarily among the first to suffer when there is any widespread distress.

(b) Agricultural labourers.

The condition of the weavers, as a class, has not improved. Want of capital and competition with foreign produce combined with want of education and thrift and power of organised action have reduced them to a state of poverty.

(c) Weavers.

(d) Skilled labourers.

The condition of the skilled labourers and artisans (7·6 per cent), such as brick-masons, stone-masons, stone-carvers, carpenters, brick-layers, washermen, barbers, basket-weavers, potters, gold-smiths, silver-smiths, etc., has improved considerably as their wages have gradually risen in proportion to the rise in the cost of living.

(e) Merchants, Traders, Money-lenders, etc.

The income of those who invest their capital in trade (4·1 per cent of population), industries and manufactures or in lending money, has also risen owing to the increase in the demand for their investments, the growth of inter-provincial trade and the more frequent commingling of the people of different parts.

(f) Domestic servants.

The growing demand for domestic services has increased the number of servants (0·7 per cent) employed, and their wages have also gone up.

Comparison with progressive Western countries.

Though the conditions have vastly improved since the beginning of the nineteenth century, it admits of no doubt that the economic condition of the people of Mysore, when compared with that of the more progressive countries of the West, is rather low as might be demonstrated by a few figures. Canada has a population of 7 millions, Australia 5 and Mysore represents the mean of the two, or 6 millions; but a comparison of the figures under the heads, education, revenue, expenditure, number of post and telegraph offices, number of miles of railways open, average earnings per head per annum and trade per head, shows that Mysore is nowhere in the race for economic progress. The Commonwealth of Australia possesses property valued at £1,000 millions or Rs. 1,500 crores. Rough calculations indicate that the total value of property in Mysore, excluding the Gold Mines, amounts to about Rs. 125 crores. The value of farm produce calculated per head of population

in Australia is estimated at Rs. 138 and including dairying, pastoral produce, etc., at Rs. 351. In Mysore, the corresponding figure is Rs. 24. In industries and manufactures, Australia produces articles valued at Rs. 171 per head and Mysore only Rs. 7 per head. The value of total production in Australia comes to Rs. 621 per head as against Rs. 31 or about twenty times that of Mysore. In Australia, again, there are 3 acres of cultivated land per head of population against 1 acre per head in Mysore. The estimated total trade of Mysore amounts to Rs. 26 per head and that of Australia Rs. 495 per head. Approximately the wealth of Mysore may be estimated at about Rs. 203 crores or Rs. 338 per head of population. The corresponding figures for the leading countries in the British Empire, before the war, were, United Kingdom Rs. 6,000, Canada Rs. 4,440 and Australia Rs. 3,960. The annual agricultural production of the State was estimated, in 1915, at about Rs. 14 crores and the industrial production at Rs. 4 crores, making a total of 18 crores or an average production of Rs. 31 per head of the entire population. In good years, with prices ruling high, this rate may go up to Rs. 37 or Rs. 40 per head. On the other hand, the average income in the countries mentioned above ranges from Rs. 500 to Rs. 720 per head. The annual addition to the wealth of the United Kingdom before the war was estimated at 400 millions per annum. In Mysore, it is doubtful whether any appreciable addition is being made at all to its wealth. The annual revenues of Mysore amount to about Rs. 3 crores. Those from taxation alone approximate to Rs. 2.5 crores including salt and *customs*, giving a rate of Rs. 4 per head. The corresponding figures for taxation in the United Kingdom in 1913-14 come to Rs. 54 per head, in Canada Rs. 50 and in Australia Rs. 49. It is thus clear that much lee-way has still to be made by the people of Mysore if they are

to attain to the efficient standards of the progressive peoples of the West.

Trade ,
accumulation
of wealth.

High prices affect landless classes and men with small fixed incomes. There has been a general rise in the standard of living among all classes. Very few persons, however, are able to save from their incomes and the general accumulation of wealth has not kept pace either with the growth of population or the extension of agricultural industry.

The changing
economic
conditions.

The great bulk of the people are illiterate and agriculture is their chief occupation. No country so largely dependent as Mysore is on agriculture can be said to be really prosperous. The margin between the ordinary standard of living and destitution among the people is narrow. At the first sign of scarcity, which is usually occasioned by failure of rain, the poorest of the people are plunged into a state of distress. On account of the rapid growth of communications, the whole world is becoming one country and the prices of the necessities of life and commodities are becoming more and more uniform. Those people will be able to live in health and comfort that have capacity to buy them; capacity derived from disciplined activity, trained skill and superior knowledge of the affairs of the world.

The economic strain is a growing, not a diminishing, evil. The population of the world is rapidly increasing. The struggle for existence is growing keener, facilities for communication are multiplying and prices of food-stuffs have gone up in almost every part of the world from 15 to 50 per cent. In these days of growing hurry and strenuous toil, the idle and the inefficient are already finding it hard to maintain existence.

Formerly Mysore was fairly self-contained in regard to the prime necessities of the people, such as, clothing,

building materials, etc., but owing to improvement in communication and keen foreign competition, most of these necessities are met from outside, at cheaper rates. A large number of people have in consequence lost their traditional occupations and been driven to agriculture.

Despite these changes, it must be acknowledged that the country has progressed within the past thirty years. People are now better housed, better clothed and normally better fed and the average standard of living has also risen; but the advance in these directions has only been partial. It has not permeated the masses. Even this has been due more to the general progress of the Indian continent as a whole than to any organised activity or desire on the part of the people, though they have not been slow to adapt themselves to the new conditions, when shown the way.

His Highness the present Maharaja Sri Krishnaraja Wadiyar, in his speech at the opening of the Economic Conference in 1911, referred to the need for economic improvement in words that deserve to be quoted here:—

Need for
economic
improve-
ment.

“The economic inefficiency of our people will be patent to any one who looks beneath the surface of things. Statesmen and economists tell us that in more advanced countries of Europe, the earning power of the people averages Rs. 400 or more per head per annum. In England it is taken at Rs. 600 to 700 per head. We have it on high authority that in India the average yearly income does not exceed Rs. 30 per head. As regards education, the proportion of the entire population who can read and write is over 90 per cent in the United Kingdom and Germany, and over 80 in Japan. In Mysore, the corresponding proportion is only 5 per cent. The average death rate in Mysore is about the same as in the neighbouring British Provinces, that is, over 30 for every 1,000 of population. The death rate of England and Germany is as low as 15 to 18 per 1,000. The comparison under the above three

main heads forcibly brings to light the extent of poverty, ignorance and low vitality prevailing in our midst and is a striking reminder of the economic inefficiency of our people. The methods and examples set by the people who have attained a high degree of economic efficiency have to be followed. The number of useless or unemployed people should be reduced. The number of skilled workers should be increased and their occupations multiplied. Agriculture should be practised on more scientific lines. The cultivators should learn to estimate cost of production and should be taught the elementary mechanical trades which have relation to agriculture. Manufactures and trade, the chief instruments for increasing wealth, should be specially encouraged. Skilled workers should be trained in wood, iron, clay, leather and textiles, and endeavour should be made to provide the people with their every-day cardinal wants, and education is the sovereign remedy for all economic evils."

Remedial
measures
adopted.

The remedial measures adopted to ameliorate conditions are dealt with to some extent in the chapters (I & II) relating to Economic Conference and Agriculture. Apart from what Government has done and is always willing to do to advance the material progress of the people, a great deal depends upon the people themselves, if they desire to go forward. There are at least three directions in which the temporal condition of the people can be improved. First, by withdrawing larger numbers to non-agricultural industries. The change from agriculture to industrial occupations has been slow; it could be quickened. Second, by distributing the pressure over under-populated tracts. In the Eastern division of the State, the mean density of population is 223 as against 149 in the Western. This disparity requires closer attention. Third, by increasing the produce of the existing area of cultivation. Any general improvement in the directions indicated must be a work of time. Government can shorten that time by giving, as it has been actively doing during the past

decade or so, the amplest facilities for education, for manufactures, for labour transport, mining enterprise, and trade. It has also been grappling with the problem of an increased and better distributed food supply. It behoves the people to secure needful changes in the general outlook on life, popularise migration to less populated parts of the State, and create generally an atmosphere favourable to the diversification of occupations. If they do not voluntarily adopt these remedies, their children or children's children will be forced, by the pressure of circumstances, to seek their aid. With the growth of education in the land, a change towards a better era need not be despaired of. The new constitutional changes have brought the people's representatives into direct touch with the administration of the State. Since the responsibility for the well-being of the people is partially at least theirs, from now, they will, no doubt, learn more about the State and its potentialities, and act in consonance with its actual needs. If they did this, there is no gainsaying the fact that before many years elapse, a brighter chapter in the economic well-being of this State will open, which will prove to be the fulfilment of the long cherished desire of His Highness the Maharaja which was thus summed up by him in his Address inaugurating the new Legislative Council and Representative Assembly :—

“I have no doubt that you will use your new powers to strengthen all the beneficent activities in the country, to spread education, to diffuse knowledge, to further industrial enterprise, both public and private, and to foster the civic virtues and the spirit of social service. More especially would I urge you to instruct the people to practise thrift, to lay by provisions and money against drought and famine, which are such a distressing feature of our agricultural situation.”

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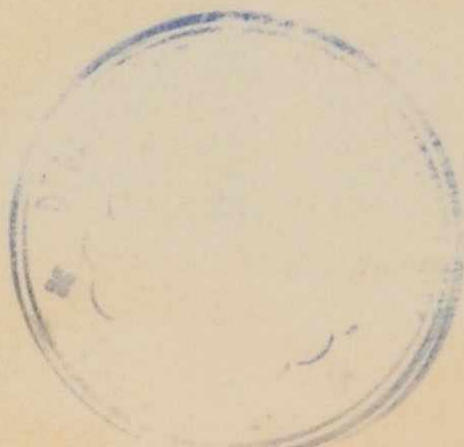
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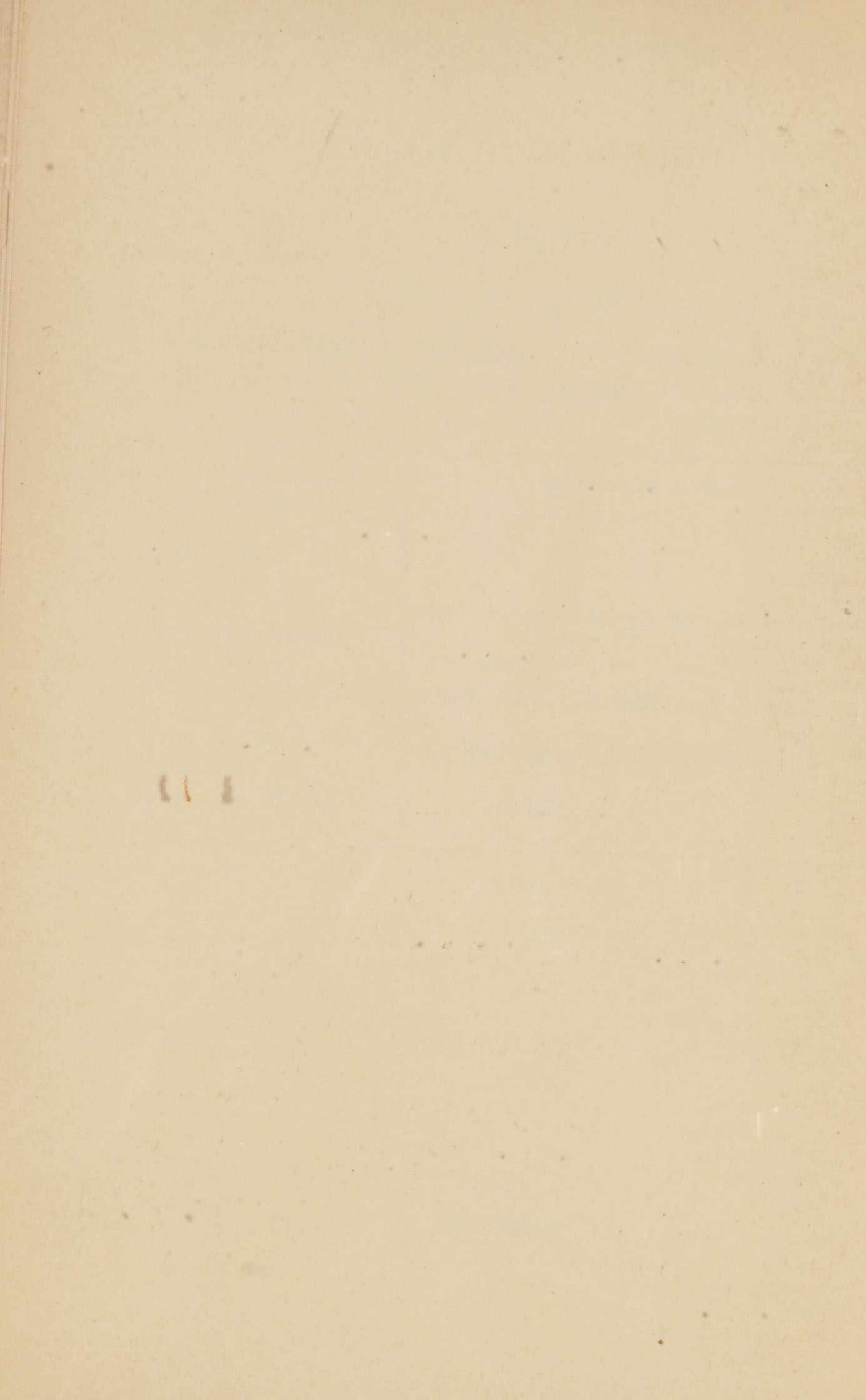
CHAPTER X.

Add the following at the end of the Chapter

The monthly expenditure incurred on the maintenance of Post Offices in Mysore State (based on average pay) is given below :—

Head of Expenditure	Amount incurred		
	Rs.	a.	p.
1. Expenditure on account of Post Offices ...	52,666	10	0
2. Expenditure Mail and Jutka lines.	8,992	6	0
3. Supervising Officials and Staff ...	4,051	3	0
Total ...	65,710	3	0





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