CHAPTER IV

AGRICULTURE AND IRRIGATION

THE Hassan district has two broad natural divisions, each with a distinct character of its own, the *malnad* on the west and the *maidan* on the east, having a long strip of land in between the two, exhibiting in some measure characteristics of both. The area enjoys a mild and equable climate and benefits of both the monsoons. There are places like Bisle *ghat* and Kempuhole *ghat* with magnificent and charming scenery, where the rainfall is more than 240 inches and Nuggihalli where it is only 19 inches, the barren lands of Dandiganahalli, the thick evergreen forests of Manjarabad, rich in sedimentary soil, and the serene atmosphere around Shukravarasanthe, which together present a diversified picture of the district. Agriculture (including horticulture) in this district is likewise noted for its diversity. Being the primary and very important sector in the present stage of development in the district, it contributed Rs. 1,591.20 lakhs to the district's income, while animal husbandry, fisheries, forestry and agriculture together contributed Rs. 1,936.07 lakhs, *i.e.*, about 72 per cent of the total income of the district, in 1960-61, whereas the total income of the district from all sectors during that year was Rs. 2,688.22 lakhs.

Agricultural population

The economy of the district is primarily based on agriculture, which is the chief occupation of the people as in other contiguous districts. In 1951, the number of cultivators of land wholly or mainly *owned* and their dependents was estimated at 5,13,803, making up 71.8 per cent of the total population of the district. The number of cultivators of land wholly or mainly *unowned* and their dependents was put at 18,474 which constituted 2.6 per cent of the population. The number of cultivating labourers and their dependents was 43,418 and the number of non-cultivating owners was 22,179, making up 6.1 per cent and 3.1 per cent respectively. The total agricultural population of the district was put at 5,97,874, which came to about 83.6 per cent of the total population. According to the 1961 census, the total population of 8,95,847 of the district, was broadly classified as 4,23,738 workers and 4,72,109 non-workers, the workers being further classified under nine categories according to their economic activities. So far as this chapter is concerned, the first two categories of workers, namely, cultivators and agricultural labourers are taken into consideration. The total number of persons under these two categories was 3,36,948, which constituted about 79.5 per cent of the total working force and 37.5 per cent of the total population of the district. The following table shows the distribution of agricultural workers by taluks, based on the 1961 census ;—

Sl. No.	Taluk	Number of cultivators	Number of agricultural labourers	Total of columns 3 and 4 (agricultural workers)	Total working force	Percentage of column 5 to 6
1	2	3	4	5	6	7
1.	Alur ..	15,863 (69.96)*	1,744 (7.69)	17,607	22,670	77.67
2.	Arkalgud ..	40,871 (80.14)	3,046 (5.96)	43,917	50,994	86.10
3.	Arsikere ..	51,782 (72.32)	5,123 (7.15)	56,905	71,605	79.47
4.	Belur ..	36,678 (69.44)	4,103 (7.76)	40,781	52,818	77.20
5.	Channarayapatna	63,159 (86.44)	2,604 (3.56)	65,763	73,065	90.00
6.	Hassan ..	54,678 (77.13)	3,164 (4.46)	57,842	70,883	81.59
7.	Holenarsipur ..	40,740 (85.67)	1,037 (2.18)	41,777	47,552	87.85
8.	Manjarabad (Sakleshpur) ..	9,602 (28.11)	2,754 (8.07)	12,356	34,151	36.12
	Total ..	3,13,373	23,575	3,36,948	4,23,738	..
	Percentage to the total working force ..	73.95	5.57	..	..	79.52

*The figures in the brackets show the percentages to the total working force of the respective aluks.

The above table shows that the proportion of agricultural workers or cultivators to the total working force was highest in Channarayapatna taluk followed by Holenarsipur and Arkalgud taluks. But this proportion was remarkably low in Manjarabad taluk, as a considerable number of people there are engaged in coffee plantations. But the largest percentage of agricultural labourers was found in Manjarabad taluk, followed by Belur, Alur and Arkalgud taluks.

Size of holdings

The size of cultivated holdings may be taken as an index of the size of farm business and consequently of the economic position of cultivators. The two factors that determine the size of holdings are the pressure of population on land and the area of cultivable land available. The All-India Rural Credit Survey (1951-52), District Monograph on Hassan, published in 1959, reveals the fact that a large majority of the farm units in the district were uneconomic and a good number of cultivators supplemented their income from other sources, mostly agricultural labour. The figures of the 1955-56 census of land holdings further confirm this. According to the Mysore Tenancy Agricultural Land Laws Committee Report (1958), the distribution of land-holdings according to size-groups of area owned, in acres, in the district was as follows :—

Sl. No.	*Size of group*	*No. of holdings*	*Total area held*	*Percentage of column 4 to the total area held*
1	2	3	4	5
1.	0 – 5 ..	50,428	1,23,848	20.43
2.	5 – 10 ..	22,936	1,60,129	26.41
3.	10 – 15 ..	6,688	81,300	13.41
4.	15 – 30 ..	5,725	1,17,105	19.32
5.	30 – 45 ..	1,168	42,311	6.98
6.	45 – 60 ..	418	21,889	3.61
7.	60 – 75 ..	161	10,558	1.74
8.	75 – 100 ..	152	12,545	2.08
9.	100 – 150 ..	105	12,554	2.08
10.	150 – 200 ..	40	6,701	1.11
11.	200 – 300 ..	17	3,685	0.61

1	2		3	4	5
12.	300 - 500	..	7	2,755	0.41
13.	500 – 1,000	..	6	3,862	0.64
14.	Above 1,000	..	1	7,114	1.17
	Total	..	87,852	6,06,356	100.00

Consolidation of holdings

The average extent of area per cultivated holding worked out to about seven acres in the district. The size of the agricultural holdings is one of the important factors that determine the productivity of land. As seen above, there were 50,428 holdings of five acres and below, covering an area of 1,23,848 acres, which constituted about 20.43 per cent of the total area. Such un-economically small holdings and fragmentations of lands constitute a serious obstacle to increasing the productivity of the cultivated area. Keeping this in view, the Mysore Prevention of Fragmentation and Consolidation Act, 1966, was adopted and it is in force since May 1, 1969. It seeks to put a check on all transfers of lands which result in fragments. According to the provisions of this Act, land-holdings under cultivation, varying in extent from half acre to four acres, are fragments. The holders of such lands cannot dispose them off to any one other than the contiguous holder. The Act also provides for consolidation of the existing fragments of lands so as to form economic holdings. The Assistant Consolidation Officer, working under the provisions of this Act, prepares a list of such fragments of lands, maps and statements showing the exact position of such lands and their details and works out the quantum of compensation to be paid or recovered. Such fragment lands are then taken away from them or added on to the holdings of other parties, after declaring the compensation to be paid to them, or allotted to others according to the consolidation scheme and the possession of such lands would be made over to them by issuing certificates of transfer after recovering the compensation amount from such parties without levying any stamp duty or registration fee.

Land utilisation

It was estimated that in 1969 about 50 per cent of the geographical area in the district was under cultivation. The reporting area of the district for land utilisation purposes, as worked out by the State Survey Department, is 16,17,681 acres, out of which the extent of land used for purposes of cultivation was 8,12,601 acres, *i.e.*, nearly 50 per cent of the geographical area, in the year 1968-69. The following table indicates the pattern of land utilisation in the district for the years 1950-51, 1959-60, 1965-66 and 1968-69 :—

(*Area in acres*)

Category	1950-51	1959-60	1965-66	1968-69
Forests ..	61,720	61,640	59,983	59,096
Uncultivable waste and fallow lands ..	64,720	1,13,980	1,38,316	1,64,030
Lands used for non-agricultural purpose ..	1,04,070	1,25,618	1,27,240	1,25,598
Cultivable waste ..	92,337	78,176	90,636	78,145
Pastures and grazing lands	3,72,620	3,56,036	2,84,262	2,52,944
Total cultivated area under crops ..	6,20,570	6,60,336	7,21,547	8,12,601

The area under permanent pastures and other grazing lands, area under forests and tree crops and cultivable waste are more in *malnad* and semi-*malnad* parts. Depending upon the seasonal conditions, the area under cultivation tends to differ from year to year. But by stepping up irrigation facilities, undertaking soil conservation measures, improvement of waste lands, etc., efforts are being made to increase the extent of land under cultivation. Sustained efforts are also being made to increase the total yield from the cultivated area by adoption of various measures, so as to make agriculture a profitable venture. (*See* also for particulars of land reclamation, etc., later in the chapter).

Agricultural seasons

The southern *malnad* is characteristically a region of heavy reliable rainfall with a single peak in July, the rainfall ranging from 75 inches to 150 inches. The semi-*malnad* region is typically a medium-rainfall region with double peak, the latter usually in October and the earlier and principal one in July, the range of rainfall being 35 inches to 50 inches. The southern *maidan* region is a region of cool and equable temperature receiving rather sparse and variable rainfall, coming mainly in thunderstorms with the main peak usually in October and the subsidiary one in May, the range of rainfall being 25 inches to 35 inches. A full account of the distribution of the rainfall and the climatic conditions prevailing in the district has been given in Chapter I.

As the major agricultural operations have to synchronise with the rains, the agricultural year is divided into four seasons, *viz.*, south-west monsoon period from June to September, north-east monsoon period or retreating monsoon from October to December, summer season or hot-weather period from March to May and cold-weather period from January to February. The hot-weather rains which come in the form of short-lived tempests are very

important to successful farming; they feed a number of tanks. These rains also enable the cultivators to prepare the lands for the following south-west monsoon season in the *maidan* parts and for setting up (planting of coffee seedlings) of coffee plants in the *malnad* parts. It is during the south-west monsoon period that the ploughed fields receive the seeds. During the cold weather period, the fields are reaped and the grains stacked. The north-east monsoon which comes in heavy showers is of great value as it brings plenty of water to the tanks in the *maidan* parts. The wet cultivation from the month of December upto March and April depends entirely on the north-east monsoons.

There are two main harvests—the kharif known as *mungari* and the rabi known as *hingari*. Both the important food-crops, ragi and paddy, are *mungari* crops for which ploughing starts in April, while sowing is done with the first rains of the south-west monsoon, usually by the end of May and the beginning of June and sometimes extending up to July; transplantation is done from July to September and harvesting and threshing from November to January or February. Oilseeds, cotton and most of the pulses are also grown as *mungari* crops.

Soils

The soils of Hassan district also show a marked diversity in different parts of the district, depending upon the nature of the parent rock and the climatic conditions of the respective areas. It has forest loams and red laterite, ferruginous and clayey soil of the hill slopes and the sandy or gravelly soil of the plains. Alluvial soils are comparatively rare even in the river valleys. The soils of the western taluks covering Alur, Manjarabad and Belur are derived from granites, laterites and schists. The depth is shallow to medium, colour red at surface and red to mottled red and yellow at depth, highly leached and poor in bases. These are mostly suitable for irrigated and plantation crops like coffee, tea, pepper, cardamom, areca, paddy and sugarcane. The soils of the eastern taluks comprising Hassan, Channarayapatna, Arsikere and Holenarsipur are red sandy soils, derived from granites, gneiss and schists. The soils are red to brownish in colour, shallow to fairly deep shallow, loamy to sandy loamy in texture intermixed with fairly large amounts of coarse gravel and pebbles. They are well drained but poor in bases and water holding capacity and are favourable for growing crops like paddy, sugarcane, coconuts, potato, vegetables and plantain crops under irrigated conditions and ragi, millets, pulses, groundnut, cotton, potato and jowar under rainfed conditions. Occasional patches of black soil appear in Arsikere taluk. The chief characteristics of this soil are that the colour of the soil is black to pale grey with lime modules and the soil is rich in bases and water holding capacity. These soils are conducive for the growth of crops like cotton, jowar, chillies, ragi and oilseeds mostly under rainfed conditions. But large areas of the district contain alkaline soils, nearly 65 per cent of the land having PH ranging

from 8.0 to 9.0. About 9 per cent of the soils in Belur and Manjarabad taluks are acidic in nature. Again the organic matter is low in 42 per cent of the soils, chiefly in Channarayapatna, Holenarsipur and Hassan taluks. But 25 per cent of soils mostly from Belur, Manjarabad and Arkalgud taluks are rich in organic matter. Twenty-nine per cent of the soils, chiefly in the western taluks are poor in available potash. Almost all the soils are poor in available phosphorus, only 5 per cent of soils being sufficient in this regard.

Forests

Forests play an important role in the economic life of the people of the district; they covered nearly 7.5 per cent of the total area of the district in 1966-67 or 1.5 per cent of the total area under forests in the State. They contributed about Rs. 46.4 lakhs to the district's income in 1960-61. The western parts of the district forming a portion of the Western Ghats are clothed with magnificent virgin forests. Some of these forest tracts along the slopes of the valleys have been taken up for coffee and cardamom cultivation, but they are sparse towards the east. They exert indirect influence on the climate, regulation of moisture, prevention of soil erosion and also the fertility of the soil. The bulk of the rich forest area with its high valued timber and other species like sandalwood, teak and rosewood, is found in the Manjarabad taluk of the district. The classification of forests of the district and the extent under each for 1967-68 is given below :—

Sl. No.	*Classification*	*Extent in square miles*
1.	State or reserved forests	172.576
2.	Protected or minor forests	1.540
3.	Village forests	1.700
4.	Reserved lands under Section 35	10.760
5.	Reserved lands under Section 4	8.880
6.	Village forests under the control of the Revenue Department.	1.390
	Total ..	196.846

Compared with the adjoining districts of Coorg, Shimoga, Mysore and Chikmagalur, the district of Hassan has a relatively smaller area under forests, but comparatively larger than that of Mandya. Out of the total area of 196.846 square miles mentioned above, 1.390 square miles of the forest area is under the control of Revenue Department. In addition to this, there

were a few forests under private management. They stood transferred to Government control with effect from June 1969, according to the new Mysore Forest Rules of 1969.

There are four types of forests, *viz.*, evergreen, moist deciduous, dry deciduous and scrubs, with about 22 types of valuable trees and about 45 different notable timber species, distributed over 59 plantations, which are grouped under five ranges, Sakleshpur range being the biggest range in the district. Kabbinale state forest in Sakleshpur range is the biggest state forest plantation. (For details in respect of the types of forests and the important species, *see* Chapter I). The Forest Department is implementing a plan for the development of forests and for utilising the existing forests in a better way. New economic plantations are also being raised. The following table gives the extents of the new plantations raised in the district under the plan schemes from 1962-63 to 1968-69 :—

Year	*Teak wood*	*Match wood*	*Eucalyptus and others*
1962-63 ..	10	50	134
1963-64 ..	50	50	1,003
1964-65 ..	40	100	2,120
1965-66 ..	60	30	1,730
1966-67 ..	80	60	2,979
1967-68 ..	30	nil	1,278
1968-69 ..	50	nil	1,340

Raising of new plantations of matchwood has almost been dispensed with since 1967-68. In order to raise the plantations according to an accepted programme, seven nurseries, located in the district, are engaged in raising seedlings of the species like Eucalyptus hybrid and Eucalyptus grandis, gravillia, glyricidia, bamboos, mahogany, raintree, peltophorum, etc. Three of the nurseries are located in Hassan, one in Arsikere taluk and one each in Belur, Holenarsipur and Manjarabad taluks. The total expenditure incurred on raising the seedlings of these species for 1968-69 was Rs. 50,700. The forests are brought up mostly under regular sylvicultural methods of treatment in the light of local conditions to attain natural regeneration. Most of the bamboo plants have died owing to gregarious flowering. Attempts are being made to raise them by resorting to artificial regeneration. The old plantations are being maintained and new additions are made occasionally by raising valuable species in blanks.

Some of the evergreen forests are leased out for plywood industries and WIMCO for exploitation of certain species only. They have been permitted to remove the matured trees according to a prescription. A working plan for the exploitation of *ghat* forests and dry deciduous forests is being prepared. The Forest Department has taken up long range developmental schemes in the district like soil conservation, rehabilitation of degraded forests, economic plantations, fast growing species, agave hedges and forest protection. An amount of Rs. 3,15,524 was spent in 1967-68 as against the allotted amount of Rs. 3,22,500 on these schemes. As a result of the several measures undertaken by the Forest Department the total revenue derived from the forests has shown an increase. The following table shows the revenue derived from the forests from 1963-64 to 1967-68 :—

Sl.No.	*Category*	1963–64	1964–65
		Rs. P.	Rs. P.
1.	Timber :		
	By Government agency ..	4,100—99	84,907—60
	By consumers and purchasers	2,90,446—07	3,14,614—71
2.	Firewood and charcoal : ..		
	By Government agency ..	8—00	1,708—90
	By consumers and purchasers	66,075—00	86,590—52
3.	Sandalwood :		
	By supply to Sandalwood Oil Factory, Mysore.	17,63,027—00	20,55,125—00
	Sales to private persons ..	8,869—56	32,164—57
4.	Grazing and fodder grass ..	2,359—00	3,382—82
5.	Bamboos ..	486—49	891—50
6.	Minor forest produce ..	12,236—50	17,653—50
7.	Drift and waifwood and confiscated forest produce.	2,344—30	..
	Total ..	21,49,952—91	25,97,039—12

TABLE (*contd.*)

Sl. No.	*Category*	1965–66	1966–67	1967–68
1.	Timber :—	Rs. P.	Rs. P.	Rs. P.
	By Government agency	30,493–40	65,746–50	1,09,047–21
	By consumers and purchasers	3,59,503–64	3,20,776–91	5,91,468–01
2.	Firewood and Charcoal :—			
	By Government agency	4,223–73	..	63–50
	By consumers and purchasers	86,322–50	98,725–96	1,01,155–98
3.	Sandalwood :—			
	By supply to Sandalwood Oil Factory, Mysore ..	23,(9,802–00	39,24,248–00	37,30,260–00
	Sales to private persons	39,559–20	66,857–74	77,148–65
4.	Grazing and fodder grass	3,513–00	1,506–00	2,622–50
5.	Bamboos	517–50	642–25	335–75
6.	Minor forest produce	16,855–00	12,163–20	32,660–25
7.	Drift and waifwood and confiscated forest produce ..	..	2,904–73	2,470–00
	Total ..	28,50,789–97	44,93,571–29	46,47,232–25

The total income from the forestry amounted to Rs. 46.47 lakhs in 1967-68, as against Rs. 21.50 lakhs in 1963-64. The income for 1967-68 was twice that of 1963-64. Timber is, of course, the main produce fetching a large income, next only to sandalwood.

The spike disease, a virus disease, is prevalent in parts of Arsikere and Hassan ranges. Efforts are being made to check the spread of this disease to other parts.

Wild animals of the forests are protected under the Game Rules. According to the new rules, the issue of licences for hunting has been stopped and some of the old licences have not been renewed. There is a deer park at Kolalubore. But elsewhere in the district the deers are becoming almost extinct. A few stray elephants roam about in Arkalgud, Alur, Sakleshpur and Belur forest range borders and sometimes cause havoc. They are, however, scared away by the staff of the Forest Department.

Irrigation

One of the possible modes by which the produce of the earth can be increased is by providing for a good supply of water to the fields. Irrigation can afford security against the vagaries of rainfall. It appears that the re-building work of the Sreeramadevara Anicut on the Hemavathy river and improvement of the channels below it were taken up as early as 1856, the year in which a regular Department of Public Works was organised in the State. In 1861, the developmental works of the district came under the jurisdiction of Hassan Public Works Division. The channels drawn by means of anicuts put across the rivers—the Cauvery, the Hemavathy and the Yagachi belong to an earlier period. As the district comprises *malnad,* semi-*malnad* and *maidan* parts, the sources and the systems of irrigation also vary. In *malnad* and semi-*malnad* areas, there are a number of small anicuts, tanks and pick-ups constructed across the rivers. In the *maidan* parts, tank irrigation is predominant. Only a small area is under well irrigation. About 19 per cent of the net sown area in the district is under irrigation, while the proportion of irrigated area in the State as a whole is 10.2 per cent of its cultivated area. This indicates that the irrigated area in the district is nearly twice that of the State average. But still the irrigational facility in the district is very inadequate. In 1966-67, the area irrigated in the district from all sources was 56,343 hectares or 1,39,237 acres. Out of this, an area of 10,749 hectares or 26,562 acres was irrigated by canals, 34,083 hectares or 82,226 acres by tanks, 1,717 hectares or 4,243 acres by wells and 9,797 hectares or 24,211 acres by other sources. There has been a gradual increase in the irrigated area, as can be seen from the following table :—

(*Area in acres/hectares*)

Year	*By canals*	*By tanks*	*By wells*	*By other sources*	*Total*
1951–52 ..	17,841	63,744	148	15,766	97,499
1956–57 ..	17,261	64,524	285	16,492	98,562
1961–62 (in hectares)	7,099	31,303	375	8,099	46,876
(in acres)	17,542	77,358	927	22,174	1,26,261
1966–67 (in hectares)	10,749	34,083	1,717	9,797	56,343
(in acres)	26,562	82,226	4,243	24,211	1,39,237

Canal Irrigation

The three main rivers of the district, the Cauvery, the Hemavathy and the Yagachi, from main sources of surface water for the several canals of the district drawn from the anicuts built across them. Canal irrigation is mostly in the taluks of Holenarsipur, Arkalgud and Channarayapatna. There are, at present, eleven important canals in the district running to a total distance of 175 miles and irrigating an area of 17,165 acres ; including the minor ones, the total irrigated area comes to over 26,562 acres. The northern channel drawn from the Sreeramadevara Anicut in Holenarsipur taluk is the longest in the district, having a length of 51½ miles and an achkat of 5,974 acres or nearly one-third of the total area irrigated by all the canals of the district. Out of the total 17 canals, two are drawn from the Sreeramadevara Anicut thrown across the river Hemavathy, two from the Krishnarajendra Anicut built across the river Cauvery, five from various other anicuts put across the river Yagachi and the rest from small embankments put across small streams. The following table shows the names of important channels, their lengths and the area of their achkats under them :—

Sl. No.	*Name of anicut and channel*	*Length in miles*	*Achkat* (in acres)*	*Total achkat (in acres)*
1	2	3	4	5
1.	Sreeramadevara Anicut across the river Hemavathy, Holenarsipur taluk :			
	(*a*) South Channel (Holenarsipur taluk)	25	1,867	7,841
	(*b*) North Channel (Holenarsipur and Channarayapatna taluks)..	51½	5,974	
2.	Krishnarajendra anicut across the river Cauvery, Arkalgud taluk :			
	(*a*) Kattepura Channel	14½	1,500	3,700
	(*b*) Ramanathapura Channel	19	2,200	
3.	Anicut across the river Yagachi and its tributaries :			
	(*a*) Haluvagilu Channel (Hassan taluk)	6	1,100	4,469
	(*b*) Changaravalli Channel (Hassan taluk)	13	1,200	
	(*c*) Kittur Channel (Belur taluk)	8	264	
	(*d*) New Kadlur Channel (Belur taluk)	17½	1,556	
	(*e*) Old Kadlur Channel (Belur taluk)	5½	349	
4.	Across other streams :—			
	(*a*) Madaghatta Channel	8	543	1,155
	(*b*) Malali Anicut Channel	7¼	612	
	(*c*) Other small streams	..	..	396

**Achkat* means the total extent of land capable of being irrigated by a particuler irrigational work.

Sreeramadevara Anicut

The Sreeramadevara Anicut is the most notable of the anicuts in the district built in the early days. It is put across the Hemavathy river, about five miles north-west of Holenarsipur. It was originally built by Dannayaka Hebbar in 1533 A.D. It had breached thrice and was finally repaired during the administration of Dewan Purnaiah. In 1863, when it breached again, a new anicut was put across the river just below the former spot by the Public Works Department at a cost of Rs. 2,78,504. Two channels take off from the two sides of the dam; the north channel runs to a distance of 51½ miles in Holenarsipur and Channarayapatna taluks and continues further to a distance of 12½ miles in Krishnarajpet taluk of Mandya district, the total length of the canal being 64 miles. The south channel runs to a distance of 25 miles in Holenarsipur taluk. The north bank canal irrigates an area of 5,974 acres, while the south bank canal irrigates 1,867 acres. These are the two longest canals, irrigating the largest area in the district, about 30 per cent of the total area irrigated by all canals in the district.

Krishnarajendra Anicut

The Krishnaraja Katte or the Krishnarajendra Anicut is built across the river Cauvery in Arkalgud taluk. A body wall of size-stone masonry with sloping apron is built across the river to a length of 1,040 feet, the crest level of the anicut being R.L. 2,655.17. Two canals are taken from either side of the dam, Kattepura canal on the right bank and Ramanathapura canal on the left bank. The Kattepura canal is 14½ miles long which runs in Arkalgud taluk irrigating an area of 1,500 acres. The Ramanathapura canal is 19 miles long and irrigates an area of 2,174 acres.

Hirekatte Voddu

A small earthen embankment (Voddu) was put across the river Vedavathi near Thimmanahalli village in Javagal hobli of Arsikere taluk long before 1772 by the ancient rulers. It appears that it had breached nearly a century ago. In 1958-59, an estimate for the restoration of this *Voddu* was made and an outlay of Rs. 2,12,000 was incurred in this connection. Then more comprehensive works were undertaken and the expenditure sanctioned for the purpose by 1966-67 amounted to Rs. 15,50,000. The work of construction of the dam is nearing completion and it is expected that the water will be made available for irrigation shortly.

The dam is 3,210 feet long and 18 feet high from the deepest foundation and designed to have a flood discharge of 41,950 cusecs of water. The reservoir when full will cover an area of 106 acres. It has submerged 15 acres of land taken over from private cultivators, who have been paid compensation. The right and the left bank canals run for a distance of about 10 miles each and irrigate an area of 15,000 acres each in Arsikere taluk of

this district and Kadur taluk of Chikmagalur district. Both the canals are designed to carry 29 cusecs of water with a full supply depth of 2.75 feet.

Tanks constituted the main source of water supply to the fields from time immemorial. Water is stored in these tanks and used for raising crops. The tanks are used mainly to supplement the rainfall and provide water to feed the crops once or twice at the ripening stage in the *malnad* parts of the district and to raise one crop in the *maidan* parts. There are a fairly good number of tanks in the *malnad* areas, constructed one below the other so as to conserve flood and rain water, while they are found scattered in other parts of the district. They receive water during the monsoons. **Tanks**

It is recorded that during a period of four years from 1920-21, the total expenditure incurred was Rs. 51,653 for new constructions and Rs. 59,638 for repair works. Since 1923, the entire responsibility for these works has been with the Public Works Department. About four decades back, there were 240 major tanks and 5,295 minor tanks, together irrigating about 1,03,218 acres in the district, as indicated below :—

Taluk	*Major Tanks*		*Minor Tanks*	
	No.	*Extent irrigated (in acres)*	*No.*	*Extent irrigated (in acres)*
Hassan ..	49	8,674.37	1,061	12,482.29
Manjarabad ..	14	1,860.36	1,029	13,231.28
Belur ..	58	6,704.28	1,187	18,616.00
Arsikere ..	34	6,386.05	138	4,008.08
Channarayapatna ..	38	6,222.22	216	4,180.21
Holenarsipur ..	14	1,077.33	252	2,066.36
Arkalgud ..	13	1,294.14	797	7,697.06
Alur (Sub-taluk) ..	20	2,377.33	615	7,335.25
Total ..	240	34,599.08	5,295	68,618.33

In order to step up the irrigated area under tanks, considerable attention is being paid to annual repairs of tanks and field channels also. The works pertaining to tanks are being done under various minor irrigation schemes, which are being implemented as Plan Schemes. During the First Five-Year Plan, an outlay of Rs. 18,41,208 was made for minor irrigation works, whereas during the Second and Third Five-Year Plans, the outlays amounted to

Rs. 65,34,635 and Rs. 1,11,41,927 respectively. Consequently, the irrigated area under tanks increased to 1,34,903 acres, including the *achkat* of 1,436 acres which were under 136 breached tanks, as in 1967-68. The following statement shows the taluk-wise percentages of irrigated area under tanks in relation to cultivated area in Hassan district as in 1967-68 :—

Taluk	*Total irrigated area (in acres)*	*Total cultivated area (in acres)*	*Percentage of column 2 to 3*
Belur ..	27,931	72,578	38.49
Alur ..	17,850	52,290	34.14
Hassan ..	23,848	89,829	26.56
Sakleshpur ..	15,277	73,479	20.79
Holenarsipur ..	11,740	59,591	19.70
Arkalgud ..	11,250	79,574	14.17
Channarayapatna ..	23,958	1,63,200	8.56
Arsikere ..	13,049	1,35,957	9.59
Total ..	1,34,903	7,26,678	18.59

The foregoing table indicates that Belur taluk has the largest percentage of irrigated area under tank irrigation, while the Channarayapatna and Arsikere taluks which have larger cultivated areas, have lowest percentages of irrigated areas, lower than that of the district's average. The two latter taluks are in the *maidan* area, receiving very low rainfall, and are often subject to scarcity conditions owing to failure of monsoons.

There were, as at the end of 1967-68, 330 major tanks, 5,538 minor tanks and 60 pick-ups, together irrigating 1,33,468 acres. Of these tanks, the Anathy tank in Channarayapatna taluk with an *achkat* of 690.38 acres, and Vishnusamudra tank in Belur taluk, with an *achkat* of 717.12 acres are the biggest tanks in the district. They are very old tanks and the years of their construction are not known. Construction of another tank across the Hebbahalla stream is nearing completion. This tank, after completion, will irrigate an area of 2,654 acres under its command and thus will become the largest tank in the district. The following statement indicates the taluk-wise distribution of tanks and pick-ups and the extents irrigated by them as in 1967-68 :—

(*Area in acres*)

Taluk	*Major tanks*		*Minor tanks*		*Pickups*		*Grand total*	
	No.	*Achkat*	*No.*	*Achkat*	*No.*	*Achkat*	*No.*	*Achkat*
Hassan ..	70	10,212.37	992	11,882.22	8	1,752.20	1,070	23,847.39
Arsikere ..	40	6,853.35	148	4,541.30	5	1,640.00	193	13,035.25
Channarayapatna	49	8,940.39	179	4,370.38	11	619.00	239	13,930.37
Belur ..	67	9,623.30	1,303	13,461.17	10	3,484.00	1,380	26,569.07
Arkalgud ..	20	2,250.18	767	8,670.34	5	298.00	792	11,216.12
Holenarsipur ..	17	2,284.20	277	4,665.12	16	4,790.00	310	11,739.32
Manjarabad ..	14	1,244.07	886	15,033.07	..	..	900	15,277.14
Alur ..	53	4,917.02	986	11,608.16	5	1,325.00	1,044	17,850.18
Total ..	330	46,327.28	5,538	73,234.16	60	13,905.20	5,928	1,33,467.24

The largest number of tanks are found in Belur taluk, followed by Hassan and Alur taluks ; next come Manjarabad and Arkalgud taluks. The *malnad* and semi-*malnad* parts are having a larger number of tanks. Out of the total number of 5,928 tanks in the district, 330 are major tanks, 5,538 are minor tanks and the rest are pickups. The area irrigated by the minor tanks constitutes about 54 per cent of the total irrigated area. The average acreage per tank comes to about 22.5 acres. The classification of tanks according to the extent of area irrigated by them in each taluk arranged in the size-groups from less than ten acres to 500 acres, as in 1968-69, is given at the end of the chapter. According to this statement, the size-group of tanks irrigating ten acres and above but less than 50 acres claims the largest area of 51,302 acres or about 42 per cent of the total irrigated area, whereas the three size groups, *viz.*, 50 to 100 acres, 10 to 50 acres and less than ten acres, together irrigate 86,470 acres. However, the size-group of less than ten acres has the largest number of tanks.

Chakenahally tank

The construction of a new tank across the Hebballa stream in Kuncha Valley near Chakenahally village in Holenarsipur taluk has been almost completed. There are three more tanks already in existence, even before the construction of this, across this stream just above the reservoir and two just below the reservoir which together irrigate 800 acres of land.

The Chakenahally tank project was originally sanctioned for Rs. 8 lakhs to irrigate 552 acres in 1958-59, but was subsequently revised so as to irrigate 2,654 acres, the estimated cost being Rs. 41.3 lakhs.

The tank is so designed as to have a flood discharge capacity of 17,460 cusecs of water. The length of the dam including the spillway section is 2,843 feet with a maximum height of 57 feet from the deepest bed level. Two channels have been excavated to carry the waters of this tank ; the right bank canal goes to a distance of eight miles with a carrying capacity of 40 cusecs of water, and the left bank canal runs to a distance of nine miles with a carrying capacity of 25 cusecs of water at the head reaches. It is proposed to use the waters of this tank for 654 acres of paddy fields and 2,000 acres of irrigated dry fields, in addition to 600 acres of the existing acreage.

Well irrigation

Wells provide access to the subterranean water or to the waters of the rivers which run deep below the level of the ground. Importance of well irrigation, specially in the *maidan* parts of Arkalgud, Arsikere, Holenarsipur and Channarayapatna taluks of the district is considerable. According to the census of irrigation wells conducted by the Bureau of Economics and Statistics, Bangalore, there were 1,716 irrigation wells in the district with a total irrigated area of 2,379 hectares in the year 1967-68.

The table given below exhibits details of the distribution of wells and the area irrigated under them in each taluk as in 1967-68 :—

(*Area in hectares*)

Sl. No.	*Name of taluk*	*Number of wells*	*Area irrigated*	*Area irrigated per well*
1.	Alur ..	71	110	1.93
2.	Arkalgud ..	376	666	1.77
3.	Arsikere ..	380	265	1.11
4.	Belur ..	126	192	2.04
5.	Channarayapatna ..	247	362	1.65
6.	Hassan ..	211	252	1.89
7.	Holenarsipur ..	228	378	2.25
8.	Manjarabad ..	77	154	2.80
	Total ..	1,716	2,379	1.77

Arsikere taluk has the largest number of wells followed by Arkalgud, Channarayapatna and Holenarsipur. The two taluks of Arsikere and Arkalgud together possess about 44 per cent of the total number of wells in the district, while Arkalgud, Channarayapatna, Holenarsipur and Arsikere together claim about 72 per cent of the total number and irrigate nearly one-half of the total area under well irrigation. The *malnad* taluks of Manjarabad, Alur and Belur possess the least number of wells. The average area irrigated per well in the district is highest in Manjarabad taluk, followed by Holenarsipur and Belur taluks. Generally, a well fitted up with an electric pumpset irrigates a larger area than those that are fitted up with other devices. The common devices followed to lift the water to the surface are *yetha* (by manual labour), *kapile* drawn by a pair of oxen, persian wheel rotated by a pair of oxen, oil engine pumpsets and electric pumpsets. The last two methods have gained popularity in recent years. The *kapile* is more popular in Channarayapatna and Arkalgud taluks. There were only seven wells fitted up with the persian wheel in the whole district in 1967-68. There are a large number of electric pumpsets and oil engine pumpsets in Arkalgud, Arsikere and Channarayapatna taluks. According to the figures furnished by the State Electricity Board, the total number of irrigation pumpsets energised in the district up to the end of January 1970 was 1,445, Arkalgud taluk having the largest number. Sinking of irrigation wells in drier areas, particularly, in places where other sources of irrigation do not exist, has received more attention in recent years. The table given

below exhibits the trend in the construction of irrigation wells :—

Year	*Number of wells sunk*	*Year*	*Number of wells sunk*
1960 ..	38	1965 ..	195
1961 ..	60	1966 ..	269
1962 ..	81	1967 ..	246
1963 ..	70	1968 ..	241
1964 ..	208		

In order to supplement the limited financial resources of the cultivators, the Government are giving loans through several agencies for sinking of irrigation wells. The following table shows the agencies through which the funds were made available and the number of wells constructed under each source up to the end of 1968.

Sl. No.	*Source of finance*	*No. of wells sunk*
1.	Private sources	498
2.	Liberalised loan scheme	353
3.	Land Development Bank	394
4.	Local development works and community development funds	289
5.	*Taccavi* loans	39
6.	Co-operative Societies	15
7.	Other sources	128
	Total ..	1,716

Since 1965, the Land Development Banks have been entrusted with the task of financing the well-sinking programme and they have so far advanced Rs. 31,17,088 in the district. In this connection, Channarayapatna claims the largest benefit, followed by Arkalgud and Arsikere taluks.

In the district, about 29.62 per cent of the wells provide water to raise one crop in a year and 38.40 per cent to raise two crops in a year and 31.9 per cent to raise two to three crops. There is a scheme under Agricultural Engineering Section of the Agricultural Department to help the cultivators in putting up test-bores for digging irrigation wells and to sink new bore-wells

for irrigation purposes. A financial provision of Rs. one lakh was made for sinking 50 bore-wells in the district during the Third Five-Year Plan period. There are, at present, two well-boring units in the district.

Nagarthi lift irrigation

The work of the lift irrigation scheme near Nagarthi village in Holenarsipur taluk, on the Hemavathy, was completed, except the excavation of canals, in 1969 at a total cost of Rs. 1,85,000. Two pumpsets of 75 H.P. each have been fitted up to lift the water. It is proposed to have two channels on either side from the ridge cistern. The right channel will be 16,000 feet long, while the left channel will be only 6,000 feet long. The total area benefited by this scheme would be 600 acres.

Kamasamudra lift irrigation

The Kamasamudra Lift Irrigation Scheme, which was taken up during the year 1969, at an estimated cost of Rs. 1,30,000, on the Hemavathy near Kamasamudra village in Holenarsipur taluk, is nearing completion. Five pumpsets of 10 H.P. each have been installed in the pump house; 1,650 feet long 18 inches diameter RCC pressure pipes have been used. It is proposed to have two channels on either side; the left channel goes to a length of 2,800 feet, irrigating 64 acres, and the right channel is longer running to a distance of 10,600 feet irrigating 256 acres. It is contemplated to raise two crops per year under the command area.

Ravathanahalli lift irrigation

The Ravathanahalli Lift Irrigation Scheme has been recently taken up by the Public Works Department at an estimated cost of Rs. 2.8 lakhs on the river Yagachi in Hassan taluk. A small masonry cistern at the end of the raising main pipe will be provided for purpose of storing the water before letting it out to the fields. Three electric pumpsets of 90 H.P. each will be installed for the purpose. It is proposed to irrigate an area of 1,032 acres by this scheme.

Cropping pattern

The *malnad* parts have mostly one crop from rain-fed terraced paddy fields. Cultivation in these parts is skilled but by no means intensive. The farmer is able to grow not only a reliable subsistence crop, but sometimes also cash crops like cardamom, orange, coffee and pepper. Superimposed on the traditional pattern of farming generally prevalent in these parts, however, is the cultivation of coffee (in Manjarabad, Alur and Hassan taluks) in plantations, and to a smaller extent other crops like tea and cardamom (in Manjarabad taluk). The recorded acreages of oilseeds in these parts are very low. The semi-*malnad* parts exhibit a striking contrast to the *malnad* proper. Here, though rice is the most important cereal, there are appreciable acreages of ragi as well as smaller acreages of other cereals in Belur, Arkalgud and Hassan taluks. Coconut has a strong hold in Arsikere, while potato is associated with Hassan and Channarayapatna taluks.

There is an increasing proportion of acreages under fruits and vegetables and also of pulses and oilseeds, while Sea Island cotton and tobacco are predominant in Arkalgud taluk. In the *maidan* parts, double-cropping forms an important feature, chiefly in irrigated tracts. The dry fields are mostly used for ragi growing as well as for cultivation of groundnut as a commercial crop and in some places for growing tobacco and cotton. Ragi is usually intersown with a line of mixed fodder-jowar along with gingelly, pulse or castor. Sometimes, irrigated ragi is also grown with much higher yield than the dry ragi. The wet lands are used for growing paddy or sugarcane. A considerable part of the dry area in Arsikere and Channarayapatna taluks is under coconut cultivation. Under canal irrigation, where one crop is grown at present, in the taluks of Arkalgud, Holenarsipur, Channarayapatna, Hassan and Belur, the pattern followed is to grow green manure followed by paddy as a kharif crop. In the rainfed areas, ragi, groundnut, hybrid maize and hybrid jowar followed by horsegram, potato followed by Poorna ragi, Sea Island cotton or MY. 14 cotton are grown. In places where two crops are grown under tank irrigation, the pattern is different. Paddy followed by groundnut, ragi or hybrid maize in summer season, paddy and sugarcane alternately, once in two years, are grown. In areas where well and lift irrigation facilities are available, hybrid maize followed by groundnut or ragi in summer season, paddy followed by hybrid maize and hybrid jowar, ragi or groundnut in kharif season are grown. The sub-joined table gives the acreages of different crops :—

Classification	1951 (*Area in acres*)	1961 (*Area in acres*)	1966 (*Area in hectares*)*
1	2	3	4
Food crops :—			
Cereals and millets ..	2,81,453	3,86,904	1,85,059
Pulses ..	87,514	1,13,602	34,431
Total for foodgrains ..	3,68,967	5,00,506	2,19,490
Sugarcane ..	2,919	5,086	3,325
Condiments and spices ..	34,258	31,721	13,467
Fruits and vegetables ..	21,416	24,130	5,688
Other food crops ..	1,641	1,530	..
Total food crops ..	4,29,201	5,62,973	2,41,970

1	2	3	4
Non-food crops :—			
Oilseeds	68,772	42,926	35,394
Fibres	16,816	17,520	2,501
Drugs and narcotics ..	45,902	43,112	22,189
Fodder crops ..	53,483	55,465	9,800
Green manure	4,674	N.A.	..
Other non-food crops ..	238	3,376	1,312
Total for non-food crops ..	1,89,885	2,06,233	71,439
Total sown area ..	6,19,086	7,46,702	3,13,409
Area sown more than once	20,117	21,402	16,456
Net area sown	5,98,969	7,25,300	2,96,953 (7,36,591 acres).

*One hectare is equal to 2.47105 acres.

It can be noticed from the above table that the area devoted to foodgrains is on the increase. It rose from 3,68,967 acres in 1951 to 5,00,506 acres in 1961 and 5,44,444 acres in 1969. In percentages it rose from 61.60 in 1951 to 73.91 in 1966. The total area of non-food crops decreased from 30.6 per cent of the sown area in 1951 to about 26 per cent of the sown area in 1966. The increase in the sown area over the 15 years was to the extent of about 1.37 lakh acres, which helped to increase the food production. According to the figures furnished by the Deputy Director of Agriculture, Hassan, the estimated food production for the year 1968-69 was 1,91,352 metric tonnes, whereas the total requirement of foodgrains, calculating at the rate of 500 grammes per person, would be 1,87,500 tonnes. Thus there was a surplus of 3,852 metric tonnes of foodgrains during the year.

Main crops

The district had 2,96,953 hectares of land under cultivation (net sown area) in 1967-68 which constituted about 45.4 per cent of the geographical area of the district, while this percentage had gone up to about 50 in 1968-69. The distribution of acreages of most important crops among the various taluks of the district, as in 1967-68, is as follows :—

(*Area in hectares*)

Crops	*Alur*	*Arkalgud*	*Arsikere*	*Hassan*	*Belur*	*Channa-rayapatna*	*Hole-narsipur*	*Manja-rabad*
Rice ..	7,029	5,126	1,194	10,549	5,540	7,463	3,517	12,311
Ragi ..	2,922	15,566	35,714	9,766	22,715	19,195	14,751	101
Jowar ..	..	299	5,172	506	1,912	162	26	..
Total food crops ..	11,006	31,144	50,743	25,334	48,180	35,504	19,162	20,896
Other food crops ..	876	9,161	8,527	3,193	17,346	6,664	757	144
Total pulses ..	32	6,934	7,754	1,577	12,046	5,581	506	..
Coconut ..	..	362	12,182	529	11,382	1,012	486	..
Areca ..	6	819	23	127	22	202	39	14
Potato ..	62	127	32	175	30	984	32	..
Sugarcane ..	66	46	81	922	1,335	834	40	..
Cardamom ..	45	..	..	96	..	..	..	8,326
Tea ..	..	..	..	..	..	..	..	354
Groundnut ..	..	226	1,255	705	937	687	809	..
Total oilseeds ..	14	1,139	51,560	1,792	13,642	1,953	1,295	..

Source: **Bureau of Economics and Statistics.**

Ragi and rice are the most important cereals of the district and they are grown in all the taluks, while the acreage under ragi in Manjarabad taluk is negligible ; the acreage under rice in Arsikere taluk is small. Jowar is grown mainly in Arsikere taluk. While Arsikere and Belur are noted for coconut cultivation, sugarcane is grown mainly in Belur, Hassan and Channarayapatna taluks. While cardamom is almost confined to Manjarabad taluk, coffee is grown in Manjarabad, Hassan and Alur taluks. A short description of each of these important crops is given in the following paragraphs.

Ragi

An extent of about 1,21,000 hectares of the rolling plateau of the district is yielding the staple foodgrain of the district, ragi, popularly called " the poor man's wheat ", to a tune of about 68,000 metric tonnes per year. The coverage of this crop was nearly 40.6 per cent of the total net sown area of the district as in 1966-67. This district ranks third among ragi-growing districts of the State in so far as the acreage is concerned. Ragi is grown mostly under rainfed conditions, but it is also grown, to a small extent, as an irrigated crop. The following table shows the extent of area under ragi in various taluks :—

Taluk	1961–62 (acres)	1963–64 (acres)	1965–66 (acres)	1966–67 (*hectares*)
1	2	3	4	5
Alur ..	7,292	7,650	7,650	2,922
Arsikere ..	41,200	43,550	66,020	35,714
Arkalgud ..	38,169	38,480	38,463	15,566
Belur ..	9,068	24,132	24,132	9,766
Channarayapatna ..	57,000	58,200	56,130	22,715
Hassan ..	45,432	47,432	47,432	1,195
Holenarsipur ..	31,076	38,935	36,450	14,751
Manjarabad ..	50	35	250	101
Total ..	2,29,287	2,58,414	2,76,927	1,20,730

The *Kar* ragi is sown in the month of April or May, while the *Hain* ragi is sown in June or July. The latter matures about a month earlier. The *Hain* ragi is very popular in the taluks of Channarayapatna, Arsikere and Belur, while the *Kar* ragi is much favoured in Holenarsipur and Arkalgud taluks. Irrigated ragi is grown in only about a hundred hectares. Among the local varieties *giddaragi* or Kolar-*gidda* is popular. The improved strains are H. 22, R. 0870, E.S. 11, E.S. 13, Aruna, Poorna and Udaya.

Ragi is grown rarely as an independent crop. It is usually inter-sown with a line of mixed fodder-jowar, along with one or two pulses (horsegram, bengalgram, *avare* or *tur*) and gingelly or castor as an "akkadi" crop. While preparing the land for ragi crop, ploughing is done three to four times with the usual country plough or iron plough and in addition to this, *kunte* is also used. Four to six cart-loads of farm-yard manure or compost manure and a recommended dosage of fertilizer mixture are put into the field before sowing in respect of dry lands. In the case of irrigated ragi, which is a rabi crop sown about February, the application of manure is almost doubled. During the period of growth of the crop three to four inter-cultivations are done with the help of *kunte* or slit-harrow or blade-harrow. For purposes of harvesting, the plants are cut close to the ground and the sheaves are taken to the thrashing ground where they are dried and the grains are separated either by beating with the sticks, or by treading out the grains under the feet of oxen.

The ragi crop is sometimes infested by stem-borer (*Sesamia inference*) after about fifteen days of planting. The borer enters the stem of the plant very near the earth's surface. The central shoot dies, resulting in dead heart. They can be warded off by uprooting the affected plants and destroying them along with the larvae and spraying endrine at two c.c. or folidol at 1/2 c.c. per litre of water. Aphids may appear after about 25 days of planting and suck the sap of the plant, turning the plant yellow. They are destroyed by dusting B.H.C. 10 per cent or parathian 2 per cent. Disease complex, which may appear after about 25 days of transplanting the plant, is controlled by treating the seeds well in advance with three grammes of agrosan per kg. of seed before they are sown. The standing crops are sprayed with folidol 2 c.c. or endrine 2 c.c. or demecron ¼ c.c. with three grammes of oxyen chloride or two grammes diathane or two grammes of cuman in a litre of water. As the crop reaches the earhead stage, blight (*Helminthosporium-nodulosum*) may affect the crop; if so, the panicles would begin to dry up from top to bottom and there would be no grain formation. This can be controlled by spraying three grammes of copper or two grammes of diathane or two grammes of cuman mixed with a litre of water.

Paddy

Paddy (*Oryza sativa*) is as important as ragi. More than 52,729 hectares of the terraced gentle lower slopes of the valley and small square fields below the bunds and reservoirs of the crystalline plateau are covered with beautiful lush emerald-green rice fields. This coverage is about 11.3 per cent of the total geographical area of the district and secures for the district the seventh place among the rice-growing districts of the State. Out of this area, Sakleshpur claims the lion's share followed by Belur, Hassan and Alur taluks, the four taluks together covering nearly 70.8 per cent of the area under rice cultivation in the district.

About four-and-a-half decades back, the area under this crop was only 1,10,233 acres and there has been an increase of more than 25,600 acres since then. The following table shows the acreage under rice in the various taluks over the past few years :—

Taluk	1961–62	1963–64	1965–66	1967–68
Alur ..	17,384	17,370	17,370	17,970
Arsikere ..	2,220	2,397	1,210	250
Arkalgud ..	12,266	12,717	12,667	17,100
Belur ..	21,070	26,238	26,068	25,450
Channarayapatna	15,170	15,175	13,690	10,530
Hassan ..	16,441	18,441	18,441	1o,324
Holenarsipur	7,150	8,690	8,690	8,690
Manjarabad ..	28,586	28,736	30,420	39,608
Total ..	1,20,287	1,29,764	1,28,556	1,35,922

The reduction in the acreages in some of the taluks was due to the vagaries of the monsoon. The Manjarabad taluk, where the rainfall is more reliable, has shown recently an appreciable increase in the acreage. According to the figures furnished by the Deputy Commissioner, Hassan, the total estimated paddy production for the year 1968-69 was 3,46,405 quintals, whereas the total requirement of the district was only 2,79,737 quintals, leaving a surplus of 66,737 quintals.

Paddy is mostly grown under irrigated conditions. The number of varieties of paddy crop grown in the district are broadly grouped under monsoon paddy and summer paddy, based on the period of their cultivation. Monsoon paddy is sown in the month of June and July, transplanted in July or August and harvested in November or December. Summer paddy, on the other hand, is sown in February or March, transplanted in March or April and harvested in May or June. Bangarkovi, Coimbatore-sanna, Inchubatta, Bangarakaddi, Rathnachudi and Halubbalu are the kharif or monsoon crops. Chinabatta and Alur-sanna are the summer crops. The improved varieties of paddy are S. 1092, S. 661, S.R. 26, B.S. 705, S. 749, S. 718, S. 701, S. 317, C.H. 2, C.H. 45, and S. 199. The duration of these varieties ranges from 140 to 190 days. Japanese method of paddy cultivation is gaining popularity among the cultivators. The main features of this method are the reduction in seed rate, raised seed beds and transplanting in lines.

Sometimes, the stem-borer (*Schoenobius incertellas* Wlk) infests the crop at the time of earhead formation by getting into the stem

of the paddy plant and the plant ultimately dies. These are either trapped in a basin of water and oil or killed by spraying folidol ½ c.c. mixed with a litre of water at the time of transplanting and flowering stages of the crop. In the month of July or November, sometimes the grasshoppers (*Hieroglyphus banian F*) eat away the earheads and cause much damage. Their menace is controlled by dusting B.H.C. 5 to 10 per cent at the rate of 9 Kgs. per acre with 0.02 per cent aldrin at 60—80 gallons per acre. When the plants reach the maturity stage, the rice bugs suck milk from the grain, turning the earhead chaffy. These bugs are also controlled by dusting B.H.C. 10 per cent. The same process is followed in the case of case worm. Blast (causal organism being *Piricularia bryzae*), a kind of disease, infects the crop during the period of growth. In order to overcome this the seeds are treated with agrosan GN or ceresan at 2 to 2.5 grammes per Kg. Standing crops are sprayed with one per cent bordeaux mixture.

Jowar

Jowar (*Sorghum vulgare*) is a staple food crop as well as a fodder crop. Out of the total area of 7,357 hectares under jowar in 1968, 5,172 hectares were in Arsikere taluk, 1,192 hectares in Channarayapatna taluk and the remaining 992 hectares in Arkalgud, Hassan and Holenarsipur taluks. The crop is mostly grown as a rabi crop in the district. *Ibbani* jowar is sown during the months of November and December and harvested in January and February. Hybrid jowar is sown in the months of May or early June and harvested during the months between September and October. The recommended variety of jowar is Palmadi and its improved variety D. 340. This variety is sown in June or July and it requires 135 to 140 days to ripen; C.S.H. 1 is the high-yielding variety which requires about 110 days to ripen. The method of cultivation of jowar is almost similar to that of ragi, except that a very elaborate tilth is not necessary as in the case of ragi.

Pulses

The pulses occupy an area of 34,430 hectares or about 14.2 per cent of the cultivated area of the district. They are grown mainly in the taluks of Channarayapatna, Arkalgud, Arsikere and Hassan. Among these four taluks, Channarayapatna taluk is having the largest area of 12,046 hectares or about 37.8 per cent of the total area under pulses. Among the various pulses grown in the district *tur* or *togari* (*Cajnus indicus*) and gram are very important. In 1965, the two crops covered an area of 1,650 hectares and 939 hectares respectively.

Almost all the pulses are grown as mixed crops with ragi or jowar. *Togari* comes to maturity long after ragi or jowar is harvested, usually by the middle of January. Horsegram is grown with castor as a mixed crop. Sowing in respect of horsegram is

generally done by broadcasting, but sowing in plough furrows with a view to interculturing is very popular in the district. Horsegram is chiefly used as the main feed of the working cattle of the district. Pod-borer (*Agromyza obtusa* M), a stout yellowish brown moth and caterpillar with green or stray steaks, at times, destroy the pods of the plant resulting in a very low yield. They are killed either by dusting two per cent folidol or ten per cent B.H.C. at the rate of 8 Kgs. per acre or spraying ½ c.c. folidol mixed with a litre of water.

Chillies

Chillies form an important and indispensable article of dietary of the people of the district and fairly a large part of the area coming under condiments and spices is covered by this crop alone. It is a commercial crop grown under rainfed or irrigated conditions. In 1966-67, the area under this crop was 2,387 hectares, concentrated mainly in the taluks of Arkalgud, Channarayapatna, Belur and Arsikere. For purposes of cultivating this crop, the land should receive a deep tilth before the plants are planted and nursery seedlings of thirty days old or five weeks old are transplanted in the middle of July or early in August. During the period of its growth, interculturing, earthing-up of the plants and adding of manure at the time of hoeing are attended to. The green chillies can be picked up by the end of about three months. But the bulk of the pickings is done at the ripened stage which will be over by about the end of February. This crop brings in a good return to the farmers.

Groundnut

Groundnut (*Arachis hypogaea*) is another cash crop grown in all the taluks of the district, except Manjarabad. Out of the total area of 4,619 hectares under this crop in 1968-69, 1,255 hectares, i.e., nearly one-fourth of the total area, were in Arsikere taluk alone. Next came Channarayapatna. The following table gives taluk-wise area under groundnut :—

(*Area in acres*)

Taluk	1961–62	1963–64	1965–66	1967–68
Alur ..	..	..	..	82
Arsikere ..	2,040	2,900	2,560	2,560
Arkalgud ..	750	795	806	382
Belur ..	1,356	1,742	1,742	1,742
Channarayapatna ..	2,500	2,500	2,015	3,857
Hassan ..	1,499	1,700	1,700	1,345
Holenarsipur ..	400	1,800	2,000	1,800
Total ..	8,545	11,437	11,123	11,768

The irrigated variety called improved Spanish groundnut is more popular in the district. It is sown in the month of January

or May and it requires 105 to 110 days to mature. Asiriya Mwitunde is another improved variety sown in June or July; it requires 130 to 140 days to ripen. In addition to these, other varieties like D. 340, H.G. 7, H.G. 8 and H.G. 10 have also been introduced. Groundnut is grown both as kharif crop and summer crop under rain-fed and irrigated conditions. The land is ploughed three to four times before the seeds are sown in the month of May or June. The ploughing is done ordinarily with the help of the country plough or mould-board plough; the seeds are sown in deep furrows. During the period of its growth, hoeing is done twice or thrice. The crop is ready for harvest in September or October. When the crop is about two months old hairy caterpillar or leaf-miner (*Stomopteryx nerteria* M) are likely to appear and eat away the complete green portion of the crop. They are killed by dusting the crop with B.H.C. ten per cent or two per cent of folidol dust at the rate of ten to twelve Kgs. per acre. Tikka (causal organism being *Mycosphaerella personata)* is a deadly disease which may infect the groundnut crop when it is two months old and remain throughout the period of its growth. To remedy this, the standing crop is sprayed with three grammes of copper mixed in a litre of water or dusted with sulphur at the rate of ten to twelve Kgs. per acre.

Castor, gingelly, sesamum, rape and mustard are the other oilseeds grown in this district. The total area under oilseeds excluding groundnut, in 1968, was 30,776 hectares.

Sugarcane

Sugarcane (*Saccharum sp.*) is another commercial crop of the district, which covered an area of 3,324 hectares in 1967. Comparatively, Hassan, Holenarsipur and Channarayapatna taluks have far larger areas under this crop; these three taluks covered an area of 6,937 hectares or about 79.60 per cent of the total area under the crop in 1967-68. In 1961-62, the area under this crop was only 5,086 hectares, which was increased to 8,826 hectares in 1967-68. In 1924-25 the area under sugarcane was only 5,825 acres. The following table shows the taluk-wise areas under this crop during the period from 1961-62 to 1967-68:—

(*Area in hectares*)

Taluk	1961–62	1963–64	1965–66	1967–68
Alur ..	153	160	160	153
Arsikere ..	25	210	16	220
Arkalgud ..	123	114	114	346
Belur ..	910	2,278	2,278	2,277
Channarayapatna ..	3,000	3,200	3,300	1,412
Hassan ..	680	2,261	2,061	3,248
Holenarsipur ..	195	1,170	..	1,170
Total ..	5,086	9,393	7,889	8,826

Cheni and *Pattapatti* are the popular local varieties of sugarcane. *Cheni* or *marakabbu* is a thin white cane which takes twelve to eighteen months to mature, but gives good juice and is largely grown in the district. *Pattapatti* is not so hard as *Cheni,* but responds well to manuring and capable of yielding fine jaggery. The improved varieties introduced recently are C.O. 419 and I.C. 26 which now occupy about 60 per cent of the total area under sugarcane. Fourteen months' crop is planted in June—July and harvested about August—September next year, while eighteen months' crop is planted about June, and harvested in about November, next year; twelve months' crop is planted about December and harvested in about December next year. Oil-cakes and chemical manures are applied when the plants are about three months old. Hand-weeding, digging between the rows, earthing up of the canes and wrapping of the canes in their own dead leaves are some of the operations which have to be attended to at the relevant stages. The water requirement of the crop depends upon the variety of the cane, the nature of the soil and the amount of rainfall. The average yield per acre according to a yield survey conducted by the Agricultural Department in 1967-68 was 36 tons and 962 kgs. per acre. The total cane production in the district for 1968-69 was estimated at 2,25,000 tons. Out of this, about 75 per cent of the cane was used for preparing jaggery and the remaining for seed and chewing purposes. In order to ward off the attack by what is called the pine-apple disease (causal organism being *Ceratostomella pardoxa*) the setts are treated with agallol mixing of 2.5 grammes in a litre of water, before they are planted. When the plants are about two months old, the stem-borers (*Chilotraea infuscatellus* Sn., *C. auricilia* Dudg) or top shoot-borers (*Seirpophaga nivella* Fabr) may affect and kill the plant. In such cases affected canes are uprooted, and destroyed with larvae or sprayed with two per cent endrine mixed in a litre of water.

With a view to increasing the sugarcane production, a separate scheme called the Sugarcane Development Scheme was introduced and it is in operation since 1st April 1963. The scheme is under the overall technical control of the Sugarcane Development Officer, Bangalore. The scheme aims at increasing the yield of sugarcane per acre by introducing improved varieties of cane and improved methods of cultivation. Organisation of crop competitions at district-level, distribution of setts of improved variety and of fertilisers through co-operative societies and private dealers, conducting of demonstrations in preparing compost from sugarcane trash, guidance to the farmers to control pests and diseases and demonstrations on various items like deep-ploughing and its effects, use of ridger, line-planting, application of fertilisers, seed treatment, plant protection, wrapping up of the canes, maturity tests, use of cane-cutters to harvest the crop and

improved furnace construction and jaggery preparations. These are among the various activities that are being carried out under the Sugarcane Development Scheme.

Cotton

Among the fibre crops, cotton (*Gossyepium spp.*) is the most important one in the district. This cash crop, especially, the new variety called the Sea Island cotton (Andrews), brings a good return to the farmers. Cotton seeds are a valuable cattle food. About 11,990 hectares of the cultivated area in the district are covered by the cotton crop, mostly in Arsikere, Arkalgud, Hassan and Holenarsipur taluks. In 1937, the area under this crop was only 3,120 acres, of which 2,150 acres were in Arsikere taluk alone. In recent years, there has been a substantial increase in the acreage under this crop as shown by the following table :—

Year	*Extent in acres*
1924-25	1,688
1937-38	3,120
1954-55	10,185
1958-59	12,970
1962-63	13,332
1967-68	11,990

Cotton is grown as an independent crop by itself or as a subordinate crop. It grows well on black cotton soils, red soils and medium black soils. The land is ploughed three to four times with the country plough before the seeds are sown. In respect of *Doddahatti* sowing is done in May. In the case of other varieties, the sowing season is over by the end of July. *Doddahatti* ripens by about October, whereas other varieties ripen upto December. As the boles are formed, pests like pink boleworm (*Platyedra gossypiella* Sauria) and spotted boleworm (*Earias fabia S., Earias insulana B.*) may bore into the boles resulting in the discolouration of the lint. In order to remedy this, the standing crops are dusted with two per cent folidol mixed with ten per cent D.D.T. at the rate of 8 Kgs. per acre against pink boleworm ; the spotted boleworms are destroyed by spraying endrine at two per cent mixed in a litre of water. Jassids (*Empoasca devastans* Dist) and Aphids, the other pests which attack the plant, feed themselves on the leaves. They are controlled by spraying folidol and dusting sulphur at the recommended rate. Black arm (causal organism being *Xanthomonas malvacearum*), Anthracnose (causal organism being *Glomerella gossypi* and *Golletotrichum indicum*), and wilt (causal organism being *Fusarium vasinfectum*) are the common diseases of cotton prevalent in the district. The spread of these diseases is checked by growing disease-resistant varieties, treatment of the seeds with ceresan, uprooting the affected plants and spraying folidol at rates depending upon the nature and seriousness of the disease.

The important commercial varieties of cotton in the district are *Doddahatti* (*G. Hirsutum*), classified under American or new world cotton and M.A. 11 and C.N. 86. The advantages of *Doddahatti* are early maturity, better yield and higher percentage of lint. Recently, another improved variety called the Sea Island Cotton (Andrews) has been introduced in the district. It is an extra long staple variety with staple length varying from 1.25" to 1.37", ginning outturn of 33 per cent and a spinning capacity of about 80 standard warp counts. The Mysore-14 is another standard cotton variety popular in the district. It is derived from M.A. 5 and Tide Water.

Sea Island Cotton Scheme

In order to increase the yield of cotton and the area under cotton, two schemes are being implemented in the district, *viz.*, the Sea Island Cotton Scheme and the Cotton Development Scheme. The first scheme was introduced in the district during the year 1958-59 by the Indian Central Cotton Committee, Bombay. It was under the administrative and financial control of the Indian Central Cotton Committee till 31st March 1963 and was subsequently handed over to the State Department of Agriculture. In order to popularise the cultivation of Sea Island Cotton among the cultivators of the district, the committee was supplying seeds, fertilisers and plant protection chemicals on loan basis. The Government are now issuing crop loans through the Sea Island Cotton Co-operative Society, Ramanathapura. Upto the end of 1968-69, cash subsidy at the rate of 50 per cent of the total chemicals used for the purpose of spraying over Sea Island Cotton crop was given to the cultivators. Now they are supplied to them at 50 per cent subsidised rates. The Sea Island Cotton Co-operative Society undertakes the supply of seeds, fertilisers, chemicals, etc., and marketing of the produce. The society owns a godown and a ginning factory. Exhibitions, field days and training camps at district and taluk levels are arranged under this scheme every year by the Sea Island Cotton Assistant.

Cotton Development Scheme

A comprehensive scheme for cotton development is in operation in the district since March 1963. Continuous supply of generation seeds of My-14 cotton variety, maintenance of purity and reputation of the standard variety released for the Mysore—American Kharif Cotton Zone and proper enforcement of the Cotton Control Act, Transport Act and Ginning and Pressing Factories Act, pest control operations, demonstrations on compost preparations and use of plant protection chemicals under a Centrally-sponsored scheme, assistance to grow hybrid varieties, observance of field days, publication of literature on improved methods of cotton cultivation and such other activities are undertaken under this scheme. The total expenditure incurred under this scheme for 1968-69 was Rs. 30,000.

It is stated that an area of about 15,000 acres was covered under cotton crop during the year 1968-69 resulting in the production of about 7,000 bales of lint. Arsikere is the main marketing centre for cotton in the district. Nearly ten to fifteen per cent of the cotton is marketed at the Regulated Market, Arsikere, and the Co-operative Cotton Processing Society, Arsikere and the rest of the produce is purchased by private dealers.

Agricultural development

Conscious efforts to develop agricultural economy at the district-level date back to 1951 when planning was accepted as a major instrument of economic growth both by the State and the Central Governments. Even before this, there were several smaller schemes aimed at agricultural development. However, the movement was put on a firm basis with the implementation of the First Five-Year Plan. It has already been stated earlier that the district has just attained self-sufficiency in respect of food-grains and the surplus grains are being exported to the neighbouring districts. This position has to be stabilised and strengthened. Progressive agriculture is not a simple operation, but has become a complex task involving definite skills. Continuous efforts are needed to keep up the tempo of development and to improve further the quantity and quality of production, with utmost economy.

Waste lands

In order to add to the area under cultivation, the waste lands, dry lands and fallow lands that have gone out of cultivation owing to some reason or the other and are fit for cultivation have to be brought under the plough. Consequent on the survey of Government waste lands in the State, it has become possible to assess the extent of such waste lands, and also lands that are released from *Kavals* and from Agricultural or Forest Department in the district. According to the figures furnished by the Deputy Commissioner, Hassan, the area available for cultivation in 1968-69 was as follows :—

(*Area in acres*)

Taluk	*Gomal*	*Kharab*	*Assessed waste*	*Released forest land*	*Released kaval lands*	*Total*
Hassan	4,926.17	269.30	2,023.04	..	..	7,209.11
Arsikere	7,406.26	..	2,219.14	..	..	9,626.00
Channarayapatna	14,784.36	..	4,861.07	..	1,374.28	2,120.31
Arkalgud	3,964.09	136.16	4,764.14	500.00	557.17	9,922.16
Holenarsipur	9,099.21	..	4,710.32	218.29	871.23	14,900.25
Belur	22,179.00	..	3,648.16	..	..	25,827.16
Alur	5,647.19	2,328.30	..	..	..	7,976.09
Sakleshpur	21,056.16	..	4,520.39	..	..	25,577.15
Total ..	89,064.24	2,724.36	26,748.06	718.29	2,803.28	1,22,060.03

From the above table it becomes clear that a substantial additional area of 1,22,060 acres, of which gomal and assessed waste lands form a large bulk, can be utilised for cultivation. The *Kharab* lands are found mainly in Hassan, Arkalgud and Alur taluks, while lands released from the Forest Department and *Kavals* are mainly in Channarayapatna, Arkalgud and Holenarsipur taluks. In addition to the cultivable waste, an extent of 36,892 acres was lying fallow, besides 27,850 acres of land which have gone out of cultivation as a result of water-logging and rise in salinity. According to the Divisional Forest Officer, Hassan, lands measuring about 5,943 acres of forest area are to be handed over to Revenue Department for bringing them under cultivation. Efforts are being made to effect the transfer of these lands early. There are several schemes in the district for reclaiming the waste lands as also for improving dry and fallow lands.

Land reclamation

The Tractor and Bulldozer Organisation of the Agricultural Department is aiding the reclamation of lands. According to the figures furnished by the Assistant Agricultural Engineer, Hassan, there are also about 157 tractors owned by private parties. In the year 1968-69 there were two tractors and two bulldozers in possession of the Tractor and Bulldozer Organisation. They were hired out to the farmers for purposes of cultivation and reclamation of lands. The hire charges for tractor ploughing varies from Rs. 25 to Rs. 32 per acre, depending upon the depth of ploughing. The charges for hiring bulldozers varied from Rs. 20 to Rs. 35 per hour depending upon the type of the bulldozer used. In 1968-69, the Departmental bulldozers worked for 1,323 hours. Lands are also reclaimed by manual labour in places where mechanical application is not possible. In such cases, the farmers are encouraged to do so by giving them a subsidy at the rate of 25 per cent of the total cost incurred subject to a ceiling limit of Rs. 50 per acre upto 5 acres, if the work turned out by them is according to the approved plans and estimates. In 1966-67, an extent of 400 acres of land was reclaimed and subsidy to a tune of Rs. 18,602 was paid. As against this, 724 acres of waste lands were reclaimed in 1969-70 and a subsidy of Rs. 17,926 was paid. In addition to this, an area of 246 acres was also reclaimed without paying any subsidy, during the same year.

Soil conservation

Soil conservation work has been taken up in the district as per the provisions of the Mysore Land Improvement Act, 1961. Financial assistance is extended to the farmers either through the Divisional Soil Conservation Officer or the Land Development Banks for purposes of improving the lands by levelling and bunding them. In order to prevent soil erosion and formation of gullies and also to conserve moisture, construction of contour bunds on catchment basis at suitable places from ridge to valley has been taken up by the Government with the active co-operation of the

farmers. The work turned out under this Scheme since 1966 is given below :—

Year	*Extent in acres*
1966-67	4,844
1967-68	808
1968-69	6,500
1969-70 (upto 30th April)	149
Total ..	12,299

In view of the fact that maintenance of contour bunds in a good condition is as important as their construction, a separate financial provision has been made for their maintenance. In addition to this, dry farming in bunded areas is being popularised among the farmers by organising demonstrations and providing training to selected farmers.

Reclamation of alkaline and acid soils and of waste lands by manual labour has been taken up in places where large areas, which were under cultivation, have gone out of cultivation due to water logging and development of alkalinity or acidity or salinity in the soil. The extent of such lands in the taluks of the district can be seen from the following table :—

(*Area in acres*)

Taluk	*Waste land*	*Alkaline and saline soil*	*Water logged soil*
Hassan	3,500	75	20
Arsikere	4,000	350	35
Channarayapatna ..	5,500	250	45
Holenarsipur	2,500	200	35
Arkalgud	3,500	40	15
Manjarabad	5,000	35	25
Belur	2,000	25	15
Alur	700	25	10
Total ..	26,700	950	200

In 1966-67, the reclamation work was taken up in Holenarsipur taluk only and an area of 4,844 acres was covered by spending Rs. 1,55,000. In 1967-68, bunds were constructed to an extent of 833.2 acres and waste-weirs in an area of 2,998 acres. In order

to improve the saline and acidic lands, the Government intend to supply lime to the farmers at 50 per cent subsidised rates. Under the Soil Amelioration Scheme, the soils of Manjarabad, Alur and parts of Arkalgud taluks, which are acidic in nature, are being treated with lime at the rate of half to one tonne per acre depending upon the soil Ph. Nearly 208 tonnes of lime were distributed in Sakleshpur sub-division during the year 1968. As there is no soil-testing laboratory in the district, the farmers send the soil samples to Mandya and get them tested. The Assistant Agricultural Officers are assisting the farmers in this connection.

Efforts are being made for intensifying the cultivation in the district by regulating the supply of major inputs like water, organic manure, fertiliser and improved seeds and by popularising new techniques, the use of improved implements, pesticides, etc. As to the supply of water, it has been already dealt with under irrigation. An account of the other factors is given in the following paragraphs.

Organic manures

There are three types of organic manures, namely, green manure, farmyard manure and compost. Judicious and timely application of these organic manures can much increase the yielding capacity of the soil. In order to make the most of these resources at district, taluk and village levels, a Manurial Development Scheme has been put into operation in the district. It aims at the fullest possible exploitation of rural as well as urban waste for the preparation of compost. Financial assistance by way of loans and subsidies has been made available to the farmers as an incentive. The farmyard manure is better than any other type of organic manure, but it is not available in required quantity, much of it being used as a substitute for fuel in rural parts. The Department of Agriculture has organised eleven centres for producing and popularising compost manure. Among these, Hassan centre is the biggest one, which is producing about 1,500 tons of compost every year. These centres give training to farmers, hold field days, etc., about preparation and application of compost manure.

There has been a significant increase in the production of rural and urban compost in recent years as shown by the following statement :—

Year	*Urban and rural compost in tonnes*
1956—57	1,881
1960—61	29,333
1969—70	1,49,394

Glyricidia, sunn-hemp, sesbania and *honge* are the popular green manure plants of the district. Of these, glyricidia is very popular and it is particularly good for rice-growing lands. These green manure plants are grown on the paddy fields as a main crop or on the bunds, or as an *akkadi* crop on the dry lands. Seedlings of these plants are being raised and supplied to the farmers free of cost. During the year 1968, 1,08,713 cuttings were so distributed.

Chemical fertilisers

The principal supplier of fertilisers to the cultivators is the Government. But private manufacturers like FACT, Parry, Shaw Wallace, Trombay, etc., are also tapping at the doors of the farmers. The cultivators use the fertilisers largely in the irrigated tracts and hence the volume of fertiliser consumption considerably depends on the extent of land under irrigation. It also depends on the type of the soil and the crop grown. The practice of applying these fertilisers to the soils of dry lands is also gaining ground, specially in respect of hybrid varieties. The chemical fertilisers are being applied to crops like potato, sugarcane, paddy, irrigated ragi and hybrid varieties. In order to make their use more popular, the Department of Agriculture is holding periodical fertiliser festivals, film shows and demonstration plots on the fields of farmers. Diamonium phosphate, a compound fertiliser with 18 per cent nitrogen and 46 per cent (P 205) phosphoric acid, has become popular among the cultivators. The following table shows the quantity of chemical fertilisers distributed by Government through co-operative institutions in the district during the years 1967-68 and 1969-70 :—

Sl. No.	*Category*	1967–68	1969–70
		(*in tonnes*)	
1.	Nitrogenous fertilisers (in terms of ammonium sulphate).	5,220.000	5,777.339
2.	Phosphate fertilisers (in terms of single super).	6,108.000	1,510.132
3.	Potash (in terms of murate potash)	1,790.000	419.250
	Total ..	13,118.000	7,706.721

This distribution was channelised through the Taluk Agricultural Produce Marketing Co-operative Societies, Marketing Societies and Service Co-operatives. In 1969-70, a fairly large quantity of 11,969.471 tons of chemical fertilisers was also distributed by private agencies.

Improved Seeds

It has been found, according to the Techno-Economic Survey of Mysore, that improved seeds when utilised without admixtures

have given on an average a ten per cent increase in the yield. Therefore, the Government have taken up a comprehensive programme of distribution of improved seeds and their multiplication in the district. There are two seed farms, one at Chillanaikanahalli in Belur taluk and another at Yelware in Arsikere taluk, in this district, possessing 63.37 acres and 59.06 acres of lands respectively for purposes of multiplying seeds of ragi, groundnut, jowar, castor and also raising green manure. The main function of these two farms is to multiply the nucleus seeds of the research stations and supply them to registered seed-growers for further multiplication and sale to the farmers. The drawback of these farms is the lack of proper irrigational facilities which has made it difficult for them to cope up with the demands of the farmers. The sub-joined table shows the quantity in demand and distribution of improved seeds and the areas covered during the two years 1967-68 and 1969-70 :—

Particulars of seed	*Demand (in quintals)*		*Distribution (in kilograms)*		*Area covered (in acres)*	
	1967-68	1969-70	1967-68	1969-70	1967-68	1969-70
Ragi	2,859	2,280	2,612	1,058	65,303	37,842
Paddy	3,194	3,200	2,142	1,148	21,213	14,447
Jowar	216	300	187	196	3,116	3,700
Groundnut	1,028	1,500	1,882	600	3,120	1,200

The marked variations in quantities of distribution and the area covered were due to the failure of rains, which made the farmers to use chemical manures reluctantly and in limited quantities. Free technical advice is given to the farmers by the staff of the Department of Agriculture and also arrange demonstration plots to apprise the farmers of the proper use of these improved seeds.

Plant protection

Protection of the standing crops against the menace of pests and diseases is important. It was estimated that the loss in yield due to the menace of pests and diseases was more than 10 per cent in the year 1967-68. There is a comprehensive Plant Protection Scheme in the district for fighting pests and diseases. A good stock of pesticides is maintained for distribution at the required time. The Department has also taken up propaganda work on preventive measures that can be adopted against pests and diseases. Some of the equipments for the purpose are supplied to the farmers at 50 per cent subsidised rates. There are eight micronisers with the Department in the district, which are hired out to the farmers. There is a special mechanic in the Department who tours all the taluks and attends to major repairs of the equipments. As a preventive measure, the foundation seeds of the seed farms are treated before distributing them to the registered growers. The

chemicals, which are useful in controlling the diseases and which are required for seed treatment, are purchased and distributed among the cultivators at 25 per cent, 50 per cent and 75 per cent subsidised rates and at full rates also. The extent of area covered under this scheme during the years 1967-68 and 1969-70 is given below :—

(In acres)

Sl. No.	*Particulars*	1967–68	1969–70
1.	Seed treatment	19,526	9,357
2.	Rat control	683	8,200
3.	Control of polyphagus pests ..	12,878	7,062
4.	Intensive plant protection ..	20,000	10,291
5.	Control of weeds	500	2

High-yielding Variety Programme

The High-Yielding Variety Programme was introduced in the district during 1966-67 with the objective of covering a large area under high-yielding variety paddy, maize and jowar. The cultivators of the district have become aware of the better yields they fetch and are eager to take to the practice of these varieties. Among the paddy varieties, T. 65, T.N. 1, I.R. 8, T.N. 3, A.D.T. 27 are gaining popularity as hybrid varieties. The progress of the High-Yielding Variety Programme in the district during the years 1967-68 and 1969-70 is given below :—

Sl. No.	*Crop*	*Target fixed (in acres)*	*Area achieved (in acres)*	*Seeds distributed (in qtls.)*	*Fertilisers applied (in kgs.)*	*Loans and advances (in Rs.)*
		1967-68				
1.	High-yielding variety paddy	1,000	387.25	372.85	1,289.00	..
2.	Hybrid jowar	..	39	1.80	1,170.00	55,032
3.	Hybrid maize	1,500	395.40	237.00	183.00	
		1969-70				
1.	High-yielding variety paddy	6,300	1,179	97.43	1,023.438	1,91,120
2.	Hybrid jowar	700	428	22.19	574.800	
3.	Hybrid maize	6,500	5,862.20	280.44	95.150	
4.	Mexican wheat	35	35	11.00		

The targets could not be achieved in full owing to failure of rains. Hybrid jowar and maize are gradually catching the imagination of the farmers. The Department is helping the farmers by way of loans and advances for cultivation of the hybrid varieties.

Oilseed Development Scheme

A comprehensive Oilseed Development Scheme has been in operation in the district since 6th April, 1966. It aims at multiplication and distribution of improved seeds of various oilseed crops and at bringing more area under these crops by following mixed cropping and double cropping. During the Third Five-Year Plan period, a sum of Rs. 21,000 was provided for this purpose. The three important oilseed crops that are covered under this scheme are groundnut, sesamum and castor. Out of the total area of 20,170 acres in 1969-70, 10,900 acres were under groundnut, 5,060 acres under sesamum and 4,110 acres under castor. Several half-field demonstrations are being held on the fields of the farmers under each crop. In 1969-70, a subsidy of Rs. 462 was paid to the groundnut and castor seed growers. During the same year, an area of 108 acres was covered under improved oilseeds, 1,860 acres under intensive cultivation of groundnut and 2,016 acres under plant protection measures. The programme for double cropping in respect of groundnut was taken up in 1969-70. The foundation seeds of Spanish improved groundnut, H.G. 8 groundnut, Asiriya Mwitunde groundnut and N.P.H. castor were multiplied and distributed under this scheme. The expenditure incurred under this scheme for the year 1969-70 was Rs. 12,018.52, as against Rs. 8,148.05 for the previous year.

Agricultural implements

The improved agricultural implements that are becoming popular are 'Mysore plough, ureka, kher and K. M. plough, gurjar plough, improved iron plough, bund-former, wet land puddler, leveller, sugarcane crusher and jaggery making equipment. Tractors and power-tillers are also slowly making their way into the district. According to the figures collected in 1966, there were about 1,78,550 wooden ploughs, 7,958 iron ploughs, 954 sugarcane crushers, 80 tractors and 74 *ganas* in the district. There is a gradual change-over from the country wooden ploughs to iron ploughs, specially among those who have taken up high-yielding varieties for cultivation. In order to popularise the use of improved implements, the Government are issuing loans for their purchase and also supplying some of them at 25 per cent subsidised rates.

Co-operative Farming

The programme of co-operative farming is intended to organise petty land-holders so as to form economic units of agriculture by mobilising their lands and resources. The organisation of joint farming societies was taken up in the district on a pilot basis. There were 21 farming societies with 6,429 members and 2,558 acres and 61 guntas of land under their command as in 1968-69. Out of these, three were collective farming societies, one was tenant

farming society and seventeen joint farming societies. The Department of Agriculture is offering technical advice to the members of these societies in respect of pests and diseases, cropping programme and the like. Among these societies, Hebbanagatta Co-operative Collective Farming Society, Ltd., Hebbanagatta, in Arsikere taluk, has been considered a good farming society in the district. It had an area of 150 acres of land in its possession as on 31st December 1969, of which 115 acres were reclaimed and brought under cultivation with an irrigated area of 12 acres at that time. It had four wells and installed two irrigation pumpsets, effecting permanent improvements to the lands at a cost of Rs. 25,600 by way of reclamation of land and construction of contour bunds in 1967. The important plantation crops being grown by this society were coconut in 33 acres and banana in two acres. Nearly 2,000 coconut plants have been planted of which 150 plants have already been giving good yield. It is stated that the income of the society when all the coconut plants begin to yield fruits would go up to one to two lakhs of rupees a year. The biggest among these societies is the Attigudda Tenant Farming Society which had, in 1969-70, 636 acres of land at its command. Mention may be made about the second biggest society in the district, *i.e.*, the Vrundavanahally Co-operative Collective Farming Society Ltd., which possesses 300 acres of dry land, of which 150 acres of land have so far been reclaimed and brought under cultivation.

Famines

In 1908, acute distress conditions prevailed in parts of Arsikere and Channarayapatna taluks where the rainfall had been much less than the average of previous five years. The wet crops failed and the yield of dry crops was poor. Added to this, there was a general scarcity of food stuffs and fodder in the district. About 91,254 persons residing in the two taluks were affected. Similar conditions prevailed in 1918-19 also, but the situation was not so acute as it was in 1908. The *maidan* parts of the district, particularly the Channarayapatna and Arsikere taluks, have been subjected to frequent scarcity conditions because of failures of monsoon. It has been observed that in the areas that are subject to chronic scarcity conditions, there are, in a cycle of five years, one year of normal harvest, one year of good harvest, two years of scarcity and another year of famine or near famine. From 1964 onwards, there were scarcity conditions occurring year after year. The distress during 1965 and 1966 was more acute, the rainfall in those years being less than the average of previous 35 years. According to the figures furnished by the Deputy Commissioner, Hassan, the average rainfall in respect of Arsikere and Channarayapatna for 35 years from 1933 to 1968 was 345 mm. and 376 mm. respectively, while the corresponding average for the district was 669 mm.

Relief measures

Relief works like advancement of *taccavi* and land improvement loans, remission of land revenue assessment, importing of

foodgrains into the area and distribution of the same at cost price, supply of fodder from *malnad* parts for the use of cattle, taking up repairs of the existing irrigation works, emergency feeding programme, sinking of new irrigation wells, taking up soil conservation works, starting of other relief works by the Public Works Department, etc., are undertaken when scarcity conditions occur. State forests were thrown open for free grazing of cattle. During the years 1965-66 and 1967-68, the total land revenue suspended was of the order of Rs. 2,85,575 and Rs. 14,85,304 respectively and the non-collectable land revenue at the end of 1968 stood at Rs. 26,93,129. Great attention was paid to relief works in Channarayapatna and Arsikere taluks as they suffered most. Some permanent relief measures like soil conservation works, sinking of irrigation wells, construction of small tanks and pick-ups were also taken up. The following table indicates the extent of relief works executed in the district from 1965-66 to 1969-70 :—

Year	*No. of villages affected*	*No. of relief works taken up*	*Expenditure*
			Rs. P.
1965–66 ..	1,879	308	3,92,899.87
1966–67 ..	1,879	618	6,75,894.00
1967–68 ..	1,911	1,097	6,34,000.00
1968–69 ..	1,911	2,292	37,14,674.52
1969–70 ..	N.A.	864	7,98,615.71

Floods

In 1911, the two rivers were in spate causing heavy damage to the standing crops. The Yagachi is sometimes called a "Mad River" as it gets flooded all of a sudden carrying away men, materials and livestock. Again in 1924, both the Hemavathy and the Yagachi were in floods by which large areas of agricultural fields were inundated all along the banks. Similar events were reported in 1955, 1960 and 1963, causing considerable damage to fields, men and other property. After the completion of the dam across the Hemavathy at Gorur, it would help to control the floods of this river.

HORTICULTURE

The district of Hassan possesses suitable climate and soils for the cultivation of fruits, vegetables and plantation crops. Important

horticultural crops that are grown in the district are plantation crops like coffee, coconut, cardamom, pepper and arecanut, subsidiary and tuber crops like potato, sweet potato, tapioca, vegetable crops of exotic and indigenous varieties and fruit crops like mango, banana, guava, sapota, cashew, jack fruit, oranges and other citrus varieties, pineapple, papaya, grape, etc. According to the Superintendent, Seed Multiplication Centre, Hassan, the total area covered by these crops by the end of 1969-70, was 1,99,980 acres. The Department of Horticulture is having several experimental farms, progeny-*cum*-demonstration orchards and multi-purpose horticultural farms for helping the development of these crops. The particulars of these farms are given below :—

Sl. No.	*Name of farm or nursery*	*Area in acres and guntas*	*Seeds and seedlings produced*	*Fruit plants planted*
1.	State Seed Production Farm, Somanahalli Kaval	353.33	Potato and cauliflower ..	Sapota, guava and jack
2.	Horticultural Farm, Arkalgud	100.00	Areca, coconut, cashew and fruits	Orange
3.	Horticultural Farm, Sakleshpur	301.00	Cardamom, areca, orange, pepper and cashew.	Orange
4.	Horticultural Farm, Alur	27.00	Fruits, vegetables and orange	Sapota, guava, papaya, jack and orange.
5.	Horticultural Farm, Holenarsipur ..	25.00	Coconut, areca, papaya, jack, cashew and vegetables.	Guava, sapota and jack
6.	Horticultural Farm, Belur	20.11	Vegetables, pepper, areca, coconut and ornamental plants.	Orange, sapota and guava
7.	Hassan Town Nursery, Hassan	9.35	Areca, coconut, cauliflower ..	Fig
8.	Silver Jubilee Orchard, Hassan	5.10	Fruits and vegetables ..	Sapota, guava, grape, papaya and mango ..
9.	Horticultural Nursery, Channarayapatna ..	1.00	Vegetables and cashew ..	

State Seed Production Farm

The State Seed Production Farm is situated at Somanahalli kaval, about ten miles from Hassan town. A production centre was started at this farm in 1964, under the crash programme, for the production of foundation seeds of potato and cauliflower. The entire area is divided into five blocks, each consisting of two plots—one for raising seedlings and foundation seeds and the other for raising fruit plants. There are three irrigation wells, a major storage tank with a capacity of holding 60,000 gallons of water, a cumulative pond, a laboratory, a farm house and a storage chamber in the farm. The problems connected with the cultivation of potato are being tackled here. All the twenty-six varieties of potato seeds, released by the Central Potato Research Institute, are sown in this farm on an experimental basis. It is reported that the three varieties of seeds, *viz.*, Kufri Kuber, Kufri Chandramukhi and Up-to-date, can thrive well in the district. Experiments on the incidence of pests and diseases on potato plants and on the fertiliser dosages are being conducted and the results are dessiminated to potato-growers. It is proposed to produce here potato seeds in large quantities. There are 2,000 sapota, 200 guava and 100 jack fruit plants in the farm.

Coffee

The district is noted for its coffee plantations. The cultivation of coffee in the district has an eventful background. A few European planters who made a beginning in Manjarabad taluk in the later part of 13th century encountered, in the beginning, considerable difficulties in making their venture a success. It is probable that the successful efforts made in this direction by Mr. Jolly of Parry and Company who seems to have started the first coffee plantation in the State, in the neighbouring district of Shimoga as early as 1823-25 and by Mr. Strokes who had his garden started in 1835, caught the imagination of a few in the district who also made sporadic attempts. But a firm beginning in this district was made by a European, Fredric Green, who started his garden for growing coffee in 1843 in Manjarabad taluk. Ten years later, he was joined by Robert H. Elliot who started his garden at Churchinahalla, about twelve miles to the south of the garden of Fredric Green. Gradually other Europeans joined the above two pioneers and in 1875 their number had risen to about ten in the district. Their venture would have yielded the best results and opened the eyes of the inhabitants but for a serious disease which killed almost all the plants. However, the attempts of a few planters in replacing the dead plants by the new coffee plants brought from the neighbouring district of Coorg yielded good results and the cultivation of coffee was revived. Thereafter, the industry progressed, though with several ups and downs, and by about 1939, the number of European planters in the district had risen to 24, while the number of Indian planters was 60. In 1946-47, the area covered by the coffee estates in the district was 19,062 acres. There has been a gradual increase in the area,

year by year, as also in the number of coffee estates as shown in the table presented below :—

Number of estates and area under coffee in Hassan district from 1946-47 to 1968-69

Sl. No.	Season	Number of coffee estates			Area (in acres)		
		Registered	Un-registered	Total	Arabica	Robusta	Total
1.	1946-47 ..	N.A.	N.A.	N.A.	17,133	1,929	19,062
2.	1947-48 ..	N.A.	N.A.	N.A.	16,289	2,187	18,476
3.	1948-49 ..	1,190	277	1,467	16,481	2,637	19,118
4.	1949-50 ..	1,255	213	1,478	15,628	2,682	18,310
5.	1950-51 ..	1,280	202	1,482	16,084	2,706	18,790
6.	1951-52 ..	1,299	203	1,502	16,139	3,180	19,319
7.	1952-53 ..	1,321	203	1,524	15,685	3,433	19,118
8.	1953-54 ..	1,318	135	1,453	15,522	3,457	18,979
9.	1954-55 ..	1,670	160	1,830	15,369	4,633	20,002
10.	1955-56 ..	1,791	107	1,898	14,829	4,878	19,707
11.	1956-57 ..	2,281	87	2,368	16,071	5,024	21,095
12.	1957-58 ..	2,605	74	2,679	16,528	5,015	21,543
13.	1958-59 ..	2,600	56	2,656	17,809	5,051	22,860
14.	1959-60 ..	2,614	59	2,673	17,708	5,466	23,174
15.	1960-61 ..	2,630	56	2,686	19,210	4,897	24,107
16.	1961-62 ..	2,245	101	2,346	20,440	5,235	25,675
17.	1962-63 ..	2,308	76	2,384	20,525	5,116	25,641
18.	1963-64 ..	2,276	60	2,336	21,484	5,238	26,722
19.	1964-65 ..	2,152	40	2,192	21,502	5,182	26,684
20.	1965-66 ..	2,200	30	2,230	23,028	4,949	27,977
21.	1966-67 ..	2,194	13	2,207	23,534	4,688	28,222
22.	1967-68 ..	2,170	3	2,173	21,414	4,917	26,331
23.	1968-69 ..	2,188	11	2,199	N.A.	N.A.	N.A.

N.A. = Not Available

The most important coffee growing tracts in Hassan district comprise Sakleshpur and Belur taluks and Kenchammana-Hoskote area of Alur taluk which are largely covered by the Hemavathy river system. These tracts, popularly known as the 'golden land', are noted for high production levels in Mysore State. It is stated that the tracts situated on either side of the Hemavathy river

system, particularly Kenchammana-Hoskote, Ballupet and Aigoor tracts, are in no way inferior to the high-yielding tracts of the northern parts of Coorg. The windward side of the western *ghats* from Belur and Sakleshpur taluks leading on towards the west coast, the continuous hilly tracts stretching from Aigoor and Kenchammana-Hoskote to the highly productive tracts of Somawarpet-Shanivarasanthe of Coorg district on the south and the coffee plateau extending upto Alur are covered with rolling jungles of the glossy-leaved bushes and the majestic shade trees which protect the plants from the strong rays of the sun and yielding high production. Places like Aigoor, Eslur and Hanbal, which were once important for cardamom cultivation, have now become important coffee growing areas as cardamom gave place to coffee owing to better and securer returns from the latter. The table given below indicates the actual production of coffee in the district according to the size of holdings from 1964-65 to 1968-69:—

(*Production in tonnes*)

Size of holdings (hectares)	1964–65	1965–66	1966–67	1967–68	1968–69
Below 2 ..	88	446	259.620	248.658	270.573
2 to 4 ..	138	413	435.383	567.865	517.417
4 to 10 ..	775	1,377	1,172.600	1,641.608	1,618.345
10 to 20 ..	841	965	762.499	1,178.562	1,232.430
20 to 40 ..	732	637	643.174	1,011.077	761.076
40 to 60 ..	290	335	283.364	319.639	265.179
60 to 80 ..	521	508	331.074	289.045	286.996
80 to 100 ..	246	298	158.250	249.460	319.867
100 and above	1,438	1,247	958.845	1,493.195	1,710.045
Total ..	5,069	6,226	5,005.119	6,899.734	6,982.723

The two important varieties of coffee, grown in the district, are Arabica and Robusta. In the beginning Arabica coffee species was used for cultivation but it had to be replaced by *Liberica* coffee as an alternative owing to diseases appearing on the former. Hamilton appears to have been the first to notice natural hybrids between *Liberica* and Arabica and these were soon commenced to be grown on account of their vigorous growth and comparative freedom from leaf rust. Unfortunately, these hybrids and their progeny were generally not productive. At present, though Arabica is the dominant species under cultivation, there is an appreciable acreage under Robusta also. According to the figures made available by the Director of Research, Coffee Board Research Department, the area under Arabica coffee in the

district in 1967-68 was 21,414 acres with the total annual production of 5,850 tonnes, while the corresponding figures for Robusta coffee during the same period was 4,917 acres and 1,050 tonnes respectively.

Cultivation

The cultivation of coffee demands great care, skill and patience on the part of the grower. It flourishes well in red laterite soils along the gentle slopes of the hills of varying heights from 2,500 feet to 3,500 feet, with the annual rainfall ranging from 70" to 110". The coffee-grower's year commences with the blossom showers, which usually fall early in April preceded by two to three months of dry weather. During the period, just before blossom showers, the existing coffee bushes would be 'wintering', while the tiny branches of what are termed 'spikes' would be forming along the majority of the branches. Soon after the first rains, the spikes swell and in about ten days time, each tree would be covered with massed clusters of the fragrant starry white blossoms. On the other hand, those planters who want to start a plantation afresh, are engaged in preparing pits of about 24 inches depth, arranged in rows on the terraced slopes of hills. Then, 15 to 18 months old coffee seedlings are obtained from the nurseries and transplanted in these pits soon after the first rains. He will, thereafter, attend to items of work like manuring, earthing up of plants, weeding, topping, pruning, etc., regularly, year after year, till they begin to bear fruit in the fourth year of planting and thereafter annually.

Harvesting

There is a long period of waiting from the flowering stage to the ripening stage. During this period, the coffee-grower is busy in forking, trenching, weeding, manuring, general thinning out of overhead shade by removing a few branches of shade trees, filling up of vacancies in the fields with small plants from the nurseries, etc. It is only nine months after blossoming that the berries begin to ripen. So, from the month of November and onwards, the planter is busy gathering his crop. This work goes up to the end of February. The berries are then carried from fields straight down to the pulp house, where any green ones, if any, are picked out and dried separately. In the meantime, the ripe cherry is passed through pulpers where the skin is removed, and later on, the beans are passed through shieves into 'vats'. They are left there to ferment for about 36 hours, after which period they are washed so as to remove the sticky coating and any skins left after pulping. Later on, they are spread on tiled barbecues or bamboo mats to dry in the sun till the moisture evaporates. Thereafter, they are despatched to curing houses at Hassan.

Coconut

The Arsikere and Channarayapatna taluks in the district are noted for coconut cultivation. These two taluks claimed about 66 per cent of the total area of 70,867 acres under coconut cultivation in 1969-70. The area under coconut has increased from

34,752 acres in 1938-39 to 42,749 acres in 1951-52, 60,202 acres in 1961-62, 62,053 acres in 1964-65 and 70,867 acres in 1969-70.

The coconut palm flourishes well in highly red soils, sandy loams, light alluvial soils, rock debris and low-lying areas and tank beds. It requires equable climate, bright sunshine and well-distributed rainfall of about 40 inches and over. It cannot withstand heavy drought and as such, it is irrigated during dry season. For finding out the optimum fertiliser requirements for coconut palms in different areas, a simple Manurial Trial Scheme was started in 1965. A provision of Rs. 4,100 was made for the year 1968-69 for this purpose. It was reported that a single dosage of a fertiliser mixture of a three-fourth pound of nitrogen, half a pound of super-phosphate and a pound of potash was very good for the palms. It results in the bigger size of the nuts and also in improving the quality of nuts.

Pests and diseases

Rhinocerous beetle and red palm weevil are the two dangerous pests that may infest the coconut plants in the district. They are controlled either by picking them out or treating the plants with insecticides. Bud rot disease may cause damage to young seedlings. Stem bleeding, another disease, can damage the trunk of the plants. *Anabe roga* is a serious disease which proves fatal to the plants. A scheme for controlling *anabe roga* on coconut is in operation in the taluks of Arsikere and Channarayapatna since 1965.

The trees begin to bear fruit from the sixth or seventh year after planting and thereafterwards annually. It is a perennial plant and continues to bear fruit up to the age of 60 to 80 years. The nuts of a bunch mature nearly one year after flowering. The number of nuts in a bunch varies according to the size of the nuts; the bigger the nuts, the smaller is the bunch. It is estimated that a tree yields from 250 to 300 nuts a year.

Coconut Development Scheme

A Coconut Development Scheme is in operation in the district of Hassan since March 1965. The scheme aims at supplying good seedlings to the coconut-growers. For this purpose, a technical committee was formed in August, 1966. It was entrusted with the task of marking the characteristic mother palms on the formula suggested by the Coconut Research Station, Ernakulam. In the month of September 1966, another sub-committee was constituted. About 13,062 coconut trees were marked as mother palms in Arsikere and Channarayapatna taluks. In 1969-70, about 1,37,623 seed coconuts were procured. In the same year coconut seedlings to a tune of 1,86,384 were raised in the departmental nurseries and supplied to growers. As a result of these activities, the total estimated production of coconuts for

the year 1969-70 went up to 1,41,236 tonnes. A financial provision of Rs. 1,31,000 was made for the year 1968-69 for this purpose.

A.R.C. Schemes

The Agricultural Refinance Corporation has taken up a phased programme for the development of coconut cultivation in about 600 acres spread over the taluks of Hassan, Arsikere and Channarayapatna. It is advancing loans at the rate of Rs. 1,400 to 1,600 per acre depending upon the number of plants, with a total financial outlay of Rs. 45 lakhs for the district. The programme is spread over a period of three years. Since January 1968, the Corporation has sanctioned loans to the tune of Rs. 8,11,300 and an area of 78 acres has been fully developed. There is another supplementary scheme sanctioned by the Corporation, under which it is programmed to cover an area of 200 acres with a financial outlay of Rs. 67.50 lakhs.

Coconut Research Station

There is a Coconut Research Station at Arsikere, which is one of the eleven medium-size research stations under the control of the University of Agricultural Sciences, Hebbal, Bangalore. It was started by the State Department of Agriculture in 1958 and subsequently transferred to the University on October 1, 1965. It aims at solving urgent farm problems of coconut cultivation and overcoming the difficulties that stand in the way of higher production. The station is located about four miles from Arsikere town, on Arsikere-Hassan road, at an elevation of 2,200 feet above sea level. It has an area of 23.1 hectares, the soil types being red and red sandy loams. The major research work is on maintenance of exotic varieties, cultural and manurial trials and nursery practices. The major crops grown in the station on an experimental measure are coconut, ragi, jowar and horsegram. The results of the trials are made known to the cultivators by publication, undertaking demonstration plots on the fields of the farmers and conducting field days.

Cardamom

Cardamom (*Elettaria cardamom*) is one of the most ancient products of the district, found growing wild in the early days in the mountainous regions of Manjarabad taluk. Till to-day, Manjarabad is the single largest producer of this spice in the district. The Manjarabad (Sakleshpur) variety of cardamom is in great demand in the European markets. During the year 1969-70, the area covered by this important spice was 21,400 acres as against 11,530 acres in 1938-39, 15,133 acres in 1951-52, 20,156 acres in 1961-62 and 21,234 acres in 1964-65. Except for a few patches of lands under cardamom cultivation in Belur and Alur taluks, Manjarabad taluk holds virtually the monopoly position in cardamom production.

Cardamom is a perennial plant, lasting for more than ten to fifteen years. It grows well in moist, elevated and shady places

of forest loams which contain plenty of organic matter. It requires a fairly distributed annual rainfall ranging from 2,500 mm. to 5,000 mm. For many years, the plants were growing wild in Manjarabad taluk and the cultivators were left with the task of collecting the produce, processing them and transporting to markets. But many of these plants died away owing to a disease called *Katte* disease and the natural regeneration of these plants had almost ceased. The cultivators gradually began to raise new plants in places of old ones, by raising nursery plants and propagating the cuttings of healthy plants.

The cultivation of this crop demands great skill and patience on the part of the grower. Providing of support to cardamom seedlings, mulching after planting, planting of the shade trees, clearing of drainages, application of fertiliser mixtures, filling up of the vacant pits and such other works have to be attended to by the growers regularly, year after year, till the plants are about four years old. They begin to bear fruit in the fourth or fifth year of planting and thereafter annually. The economic life of each plant is put at 15 years, but it will continue to bear fruit for another 15 years more, if properly maintained.

Katte disease

During the period of growth of plants, in their initial stages and even afterwards, pests like stem-borer may get into the stem of the plant, the hairy caterpillars may eat away the foliages and thrips may suck the juice from the tender capsules. They can be controlled by systematic spraying of insecticides. The *Katte* disease and leaf spot disease are the two fatal diseases affecting cardamom plants. The *Katte* disease is a virus disease spread by the pest called aphid. The disease first appears on the young leaves and gradually spreads to the entire plant. The yield of the affected cardamom plants would be considerably reduced and ultimately they cease to bear fruit. At present, this disease is traced in an area of about 20,000 acres, the area under cardamom cultivation being 21,400 acres. The Department of Horticulture has been implementing a Katte Eradication Scheme since 1965. The Central Government is sharing 50 per cent of the expenditure on this scheme.

Cardamom Board

The Cardamom Board has set up a *Katte* disease control unit at Hethur in Manjarabad taluk. It is having the target of eradicating the disease in an area of 2,400 acres within a period of four years. With this aim in view, the Board is supplying cardamom seedlings, free of cost, to such of the growers who take up the work of uprooting the affected plants and planting healthy ones in their places. Incentive subsidy, in the form of plant protection chemicals and manure, calculated at the rate of Rs. 150 for every 200 diseased plants removed and healthy seedlings replanted, is also given by the Board. A regional office of the Cardamom Board, Cochin, has been set up at Sakleshpur under the

Cardamom Act, 1965. It is assisting the cardamom growers in following the improved methods of cultivation and processing of cardamon, in improving the marketing of cardamom in India and elsewhere, in undertaking or assisting researches, etc. It advances loans to cardamom planters, who evince keen interest in installing sprinkler irrigation equipment in their estates, on hire-purchase system, after collecting 25 per cent of the cost of the machinery as initial advance. For the purpose of replanting nursery seedlings in place of old ones which are found useless, the Board advances loans at the rate of Rs. 1,300 per acre on the security of un-encumbered alienable immovable property standing in the name of the respective planters. It enforces the provisions of the Cardamom Act, 1965, which is in force in the district since April 15, 1966. All the brokers incduding auctioneers and persons engaged in cardamom business are required to get themselves registered, under the provisions of the Act, and obtain licences.

Pepper Development Scheme

Pepper in another plantation crop of the district grown mostly as a mixed crop with coffee or cardamom. The total area under this crop was 834 acres in 1969-70. There is good scope for further development of this crop. A Pepper Development Scheme is being implementd since 1963 in the taluks of Belur, Alur and Arkalgud, where the crop is largely grown. Under this scheme the Department of Horticulture has taken up production of pepper seedlings in the nurseries. So far, it has distributed 10,79,207 pepper root-cuttings among the pepper-growers, bringing an additional area of 514 acres under pepper; the production of pepper has been raised from 232 tons at the beginning of the Scheme to 667 tons per year in 1969.

Arecanut

Arecanut (*Areca catechul L.*) is grown in Arkalgud, Belur, Manjarabad, portions of Alur, Channarayapatna and Hassan taluks. In Manjarabad taluk, areca palms are grown in the low-lying areas of coffee plantations. According to the Superintendent, Seed Multiplication Centre, Hassan, the total area under this crop by the end of 1969-70 was 6,033 acres.

Arecanut is grown in places of heavy, well-distributed rainfall, but it also comes up well in the *maidan* parts under irrigated conditions. It is ordinarily grown amidst shady fruit trees like banana, mango, orange and other trees like teak, *honge*, neem, etc. It flourishes well in black loamy soils, tank beds and deep valleys, in the laterite and red loamy soils.

The plants begin to bear fruit in about 8 to 12 years after planting. It takes eight to ten months for the flowers to mature into ripe nuts. The harvesting of arecanuts is from July to December in *maidan* parts and October to December in *malnad* parts.

Anabe roga is a major problem for the areca-growers, for the affected palms cannot survive at later stages of development of the disease, in spite of treating the palm with several insecticides. The further spread of the disease to other plants can only be checked by uprooting them and destroying them. A scheme for the control of this *Anabe roga* is in operation since July 1968, in the Arkalgud taluk of the district. Nearly 76 gardens in this taluk have been selected for purpose of conducting the survey. The affected palms are being treated wth Blitox, Dithane Z-78, etc. The results of these trials are awaited.

Potato

The cultivation of potato as a subsidiary food-crop is, of late, gaining popularity among the cultivators of the district. According to the Superintendent, Seed Multiplication Centre, Hassan, the area covered under this crop was 20,500 acres, by the end of 1969-70. The cultivation of potato is mainly concentrated in the taluks of Hassan, Belur and Arkalgud. The popular varieties of potato in the district are Kufri Kuber, Kufri Chandramukhi, Up-to-date and the local variety called Chikballapur variety. The cultivation of potato demands great care on the part of the cultivators, as it does not withstand heavy rainfall or stagnation of water. It thrives well in red loams and alluvial loams. The land is brought into a good tilth and furrows of eight or nine inches apart are made along and across the field. The cut tubers that are selected for seed purpose are sown in the furrows in the month of June or July, in the case of winter crops, and between November and January in respect of summer crops.

The Department of Horticulture has taken several steps for the development of potato cultivation in the district, like the establishment of a seed production centre at Somanahalli kaval, setting up of a laboratory and a cold storage plant, raising of potato seeds and distributing them among the cultivators, etc. A Potato Seed Multiplication Scheme is in operation in the district since 1964-65. The year-wise progress achieved under this scheme is indicated below :—

Sl. No.	*Category*	1965-66	1966-67	1967-68	1968-69
1.	Fresh area brought under cultivation (in acres) ..	60	50	65	47
2.	Quantity of seeds produced (in Kgs.)	29,439	85,626	50,194	1,30,355
3.	Potato sold for table use (in Kgs.) ..	15,510	52,116	24,193	60,988
4.	Seeds supplied to growers (in Kgs.) ..	6,469	7,400	2,721	27,787
5.	Amount realised by sale of seeds (in Rs.) ..	14,310	22,614	12,920	36,558

Cold Storage plant

The foundation seeds released for cultivation by the Central Potato Research Institute, Simla, were brought and stored in the cold storage plant located at Poona. These seeds were subsequently shifted to the district whenever they were required for sowing purpose. It was reported that some of these seeds were found either damaged or affected by some disease or the other during the period of transit. The establishment of the State Seed Production Centre at Somanahalli Kaval in the district increased the demand for disease-free foundation seeds. In order to meet this demand and lessen the wastage of foundation seeds and table potatoes, the Department of Horticulture constructed a storage plant at Hassan at a total cost of Rs. 4 lakhs. The plant is capable of storing 400 metric tonnes of potatoes. At present, the plant is also used by private merchants for storing healthy potatoes and other perishable articles, till they are sold out. It is proposed to increase the capacity of the plant to 1,000 metric tonnes.

Sweet potato and Tapioca

A scheme for the development of the subsidiary crops—sweet potato and tapioca—is in operation in the district since November 1963. The Horticultural Department is trying to replace the local varieties of these crops by high-yielding varieties and by introducing improved practices of cultivation. The total area under these subsidiary crops in 1968-69 was 985 acres.

Fruit and Vegetable crops

The Manjarabad and Belur taluks are well known for growing bananas and oranges. The fruits grown here are largely sent to Madras and Bangalore. The Hassan, Arkalgud and Holenarsipur taluks are noted for growing vegetables. The total area covered under fruit and vegetable cultivation was 24,130 acres in 1961-62, as against 21,416 acres in 1951-52. This area is reported to have gone up to 26,506 acres in 1969-70.

Vegetable cultivation

Vegetables like brinjal, cabbage, knol-khol, beans and chillies are grown in large quantities in the district. These vegetables are exported to the neighbouring districts of South Kanara, Coorg and Shimoga. The other common varieties of vegetables are tomato, ladies finger, potato, peas, carrot, cauliflower and greens. The total area covered under these vegetables, by the end of 1969-70, was 10,250 acres. Efforts are being made by the Department of Horticulture for increasing the area under vegetables by bringing more waste lands in river and tank beds, supplying seeds and seedlings, offering technical advice, and by convincing the cultivators about the successful improved cultivation methods through demonstrations, exhibitions, etc.

Vegetable Development Schemes.—Several schemes for development of vegetable cultivation have been taken up in the district. A general vegetable development scheme is in operation in the district since March, 1963. Under this scheme, a total

quantity of 680 Kgs. of disease-free seeds have been distributed. A Horticultural Produce Marketing Society has been started recently with the main purpose of marketing the produce. A financial provision of Rs. 8,000 was made in 1968-69 for this purpose. Another scheme for intensive production of quick-growing vegetabels and fruits was started in March, 1966. The cultivation of vegetables within a radius of five miles from each town has been intensified. In 1968-69, about 1,65,050 vegetable seedlings and 765 Kgs. of vegetable seeds were supplied to the cultivators. A financial provision of Rs. 4,800 was made for the year 1968-69.

A scheme for encouraging the cultivation of vegetables in tank beds and river beds after ragi or paddy harvest is also in operation in the district since 1964-65. Under this scheme, the Department of Horticulture has raised demonstration plots on the river beds of the Yagachi and the Hemavathy. About 2,71,140 vegetable seedlings and 489 Kgs. of seeds have so far been distributed among the cultivators under this scheme. An addition of such area of nearly 1,000 acres was brought under vegetable cultivation by the end of 1969-70. As a result of these activities, the vegetable production, under this scheme alone, is estimated to have gone up to 1,000 tons per year by the end of 1969-70.

Cauliflower Seeds Production Scheme.—The production of cauliflower seeds is the first of its kind in the whole of Mysore State. As early as 1961, cauliflower seeds were sown in the Silver Jubilee Orchard, Hassan, on an experimental basis. The seeds produced at this farm at Hassan were taken to Indian Agricultural Research Institute, Delhi, for conducting trials and the results of these trials were reported to have been encouraging and then the scheme for the production of cauliflower seeds was taken up in Hassan in 1963. In addition to this, there is also a scheme sponsored by the Indian Agricultural Research Institute, Delhi. Under this central scheme, a total quantity of 223 Kgs. of cauliflower seeds was produced by the end of 1969-70. The cultivation of cauliflower crop was also taken up in about ten acres of the State Seed Production Farm, Somanahalli Kaval for demonstration purpose. After these trials and demonstrations, three varieties of cauliflower seeds, *viz.*, Snow Ball, Pusa Katki and V.T., have so far been released for cultivation among the vegetable growers. It is also proposed to raise cauliflower seeds in large quantities to meet the requirements of the State. A financial provision of Rs. 20,000 was made for the year 1968-69 for this purpose.

As a result of all these developmental schemes, it was estimated that the total production of vegetables under all varieties went up to 35,000 tonnes by the end of 1970.

Fruit crops

The fruit crops covered an area of 16,256 acres in 1969-70. There are about 49 fruit gardens of economic significance in the

district. They are mostly found in the taluks of Hassan, Alur, Arkalgud, Belur, Holenarsipur and Manjarabad. Mango is an important fruit crop, grown in all the taluks except Manjarabad. The popular varieties of mango are *raspuri, badami,* and *malguava.* Banana and orange are grown, sometimes, as mixed crops with coffee plants. There is a scheme for the development of orange cultivation in Manjarabad taluk. The Agricultural Refinance Corporation is refinancing the orange-growers to a tune of Rs. 45 lakhs in three years, at the rate of Rs. 2,000 per acre. The Corporation has so far (since February 1968) sanctioned loans amounting to Rs. 4,04,850.

The Fruit Development Scheme is in operation in the entire district of Hassan since March, 1963. Under this scheme, fruit crops like papaya, sapota, guava, grapes and pomegranate are being introduced. The seedlings of various kinds of fruit plants, raised in the Departmental nurseries, are distributed among the fruit growers. So far 3,32,039 different kinds of fruit plants have been supplied to cultivators. In 1968-69 alone, the number of seedlings distributed were about 68,400 and the amount realised by way of sale proceeds was Rs. 8,985. The total fruit production in the district for the year 1969-70 was estimated at 85,500 tonnes.

Cashew Development Scheme

Cashew is grown in Sakleshpur, Belur, Arkalgud, Hassan and parts of Arsikere taluks. The Forest Department has also taken up the cultivation of cashew. The total area under this crop, including that of the Forest Department, was 252 acres in 1968-69. There is a scheme for the development of cashew cultivation in the district, implemented by the Horticultural Department. It is in operation since March 1963. During the two years, 1961 and 1962, the Department distributed 12,939 seedlings among the cashew growers and the additional area brought under the cultivation of the crop during those years was 122 acres and 22 guntas.

Other Schemes

The Applied Nutrition Programme was first taken up in Holenarsipur taluk during the early part of 1968-69, and later on, it was extended to Hassan and Channarayapatna taluks. Fifteen community and school gardens in each of these three taluks have been selected for the implementation of this programme. The Department of Horticulture has begun the work of planting fruit plants in these gardens. A plant protection scheme is also in operation in the district. Plant protection chemicals and equipments are being supplied to the cultivators at subsidised rates. A mass spraying work to prevent the spread of the disease of the potato plants is in progress. A total area of 9,855 acres under various crops like coconut, arecanut, cashew, cardamom, pepper, vegetables, etc., has been covered under this scheme.

The Horticultural Produce Marketing Society is advancing loans for the development of fruits, vegetables, cardamom, pepper,

cashew, etc. It also undertakes supply of seeds, nursery plants and distribution of fertilisers. In order to educate the cultivators, the Horticultural Department organises exhibitions in the various taluks under the auspices of local authorities. Annual fruit, flower and vegetable shows are also arranged at regular intervals and prizes are awarded to the best growers. Progeny-*cum*-demonstration farms have been established in all the taluks of the district, except Arsikere.

The ornamental gardens under the control of Municipalities and Taluk Boards are being developed. Plans and estimates for the development of other gardens also have been prepared. The Mysore Horticultural Society is providing technical know-how in maintaining ornamental gardens.

Fisheries

The three river systems which have facilitated the construction of several small anicuts, tanks and long irrigational canals form the major water bodies of the district in so far as fish culture is concerned. These major water bodies, together with 330 major tanks, 5,538 minor tanks and 1,716 irrigation wells, as also a number of ponds scattered all over the district, can support a varied fish fauna in the district. Not all these water bodies are quite useful for fish culture. The rivers flow in floods during the monsoon season and in the rest of the period they are either dry or appear as thin streams with rock pools here and there. As such, only a small length of these rivers has been made use of, though they run to a total distance of 147 miles in the district. In respect of tanks, wells, canals and such other water bodies, a survey was conducted by the Department of Fisheries in order to ascertain the feasibility of fish culture. It is estimated that a total area of 50,000 acres of water sheets can be brought under fish culture in this district. At present, 178 major tanks, 128 minor tanks, 34 village ponds, 23 irrigation wells and 30 miles of river length have been brought under fish culture.

Fish seeds

The total estimated requirement of fish seeds of the district is put at about ten crores. At present the district is being supplied with six lakhs of major carps and four lakhs of common carps for seed purpose by the Department. The Development Division at Hassan is trying to supplement the supply through local resources. There is a fish farm at Ramanthapur where one lakh fish fry can be produced. There are, at this farm, rearing ponds, nurseries, and a big well for the purpose. Some of the other water bodies are being also used for purposes of stocking and breeding fish, by taking to induced and extensive breedings. Spawns are collected from the rivers during the monsoon period and stocked in the water sheets. In 1966-67, the Department of Fisheries

raised about 58,050 major carp seeds as against 24,000 seeds in 1962-63.

Fish fauna

The fish fauna of the river water bodies of the district consists mainly of indigenous varieties—*Barbus micropogon, Labeo fimbriatus, Labeo calbasu, Labeo Sp., Labeo ariza, Cirrihina reba, Cirrihina fulungee, Wallago attu, Saccobranchus fossüis, Callichrous bimacutalus, Mastacemblus armatus, Notoptrus notoptrus, Ophicephalus Sp;* Bengal Carps—*Catla catla, Labeo rohita, Cirrihina mrigala;* and exotic varieties—*Cyprinus carpio*. The fish fauna of tank water bodies comprises indigenous varieties like *Barbus carnaticus, Wallago attu, Callichrous bimaculatus, Ophicephalus marulius, O. straitus, Ophicephalus punctatus, Ophicephalus gachua, Clarias magur, Saccobranchus fossillis, Notoptrus notoptrus, Cirrihina fulungee, Mastacembellus armatus, Rasbora caverii, Rasbora daniconius, Labeo* species and minnows.

This fish-wealth of inland water is limited and as such great care in exploiting the potential is to be exerted, in addition to proper cultivation and conservation. The fishing community is mainly composed of the Bestas ; there are also a few others like Uppaligas, Vokkaligas, Adikarnatakas, Edigas and Muslims, who sometimes do fishing. The total number of these persons, according to a rough estimation of the Department, is about 12,000. Of these about 1,200 persons have taken fishing as their main occupation and 4,500 as a subsidiary occupation and the rest as a seasonal occupation. The fishery industry as such is yet to be organised on a more scientific basis. A majority of fishermen are yet to make the best use of the varied opportunities offered by the Department of Fisheries. Fishing, like tanning, for instance, was not highly thought of as an occupation and even now some fight rather shy of engaging in fishing.

The common methods employed by the fishermen for exploiting the fishery resources in the district are general *battue* and regular fishing. The former method is employed when the water level in the pond or tank is very low. The fish are caught in drag nets or cast nets and basket traps, as the case may be, by raising the intercepting barriers with the help of brush wood, leafy branches and mud, and either draining the water from one side to another or wading through the water so as to convert it into a muddy pool, suffocating the fish. The regular fishing comprises net fishing, long line fishing and basket traps. Cast nets under net-fishing, commonly called *Beesubale* in Kannada, which can be handled by a single man with a little practice, is ordinarily used during all seasons. In the case of large-scale fishing, preferably in respect of varieties like carps, cat fish and *ophicephalus*, wall nets are used. They are cast early in the morning or late in the night and collected after an interval of twelve hours. Drift nets and drag nets are used in shallow water fishing which require a number

of fishermen to cast the net and collect the entangled fishes. Push nets or prawn nets are also used for the collection of prawns and minnows. In the case of long line fishing, coir cords of varying lengths and thicknesses are used to catch cat fish. Throw-line fishing is ordinarily used in rivers, while rod and line fishing is employed in all waters. Basket trapping is extensively followed in the rural areas. The filter method is followed during rainy season and plunge basket method during summer season for mass fishing.

Exploitation of the fishery wealth is taken up by the Fisheries Department, along with the public. Licences are issued in respect of catching fish in certain categories of water sheets, while a few others are auctioned. The following table shows the revenue realised by Departmental catches, auctions, issue of licences, etc.—

(*Amount in rupees*)

Sl. No.	*Particulars*	1958-59	1962-63	1966-67	1967-68
1.	(*a*) Quantity of fish caught by Fisheries Department ..	360 Lbs.	3,980 Kgs.	511 Kgs.	627 Kgs.
	(*b*) Amount realised ..	180.15	1,922.78	310.15	579.12
2.	(*a*) No. of licences issued ..	840	921	652	1,299
	(*b*) Amount realised ..	5,757	6,369	4,046	7,636
3.	(*a*) No. of tanks auctioned ..	28	21	20	64
	(*b*) Amount realised ..	1,609	1,247	1,272	3,075
4.	(*a*) Mileage of channels auctioned ..	93	80	75	60
	(*b*) Amount realised ..	652	423	318	462
5.	Total revenue realised ..	8,469	10,469	6,842	13,110

Conservation of fishes in these water bodies is a pre-requisite of increased production and as such, the Department of Fisheries is having a strict watch against the possible poaching and destruction of fishes. Fishing in the rivers for certain lengths is prohibited during certain seasons of the year. The *Vahni Pushkarani* near Ramanathapur is declared a prohibited area for fishing. Destructive methods of fishing like throwing explosives into pools in the rivers is prohibited.

Ice-*cum*-cold storage plant

An ice-*cum*-cold storage plant was installed at Hassan with the assistance of the Technical Co-operation Mission, United States of America, in 1963. Besides fish, other perishable commodities like fruits, vegetables, mutton and milk are also stored in this

plant. The plant is open to merchants who intend to store perishable articles. The plant has a capacity for storing three tons of fish. This plant forms a link between the fishermen of the coastal area and the consumers of the district. In 1964-65 only a thousand Kgs. of fish was stored; then it was increased to 19,000 Kgs. in 1967-68 and to 25,050 Kgs. in 1968-69.

Marketing

There are eight important centres where fishermen squat on the open space and sell dry as well as fresh fish regularly. There is a heavy demand for fresh fish. It is estimated that each centre deals with nearly 50 tons of fish, on an average, every year. The rate of fish ranges from Rs. 1.50 to Rs. 4.00 per Kg. depending upon the variety of fish and the place where they are sold. The main drawback in respect of these centres is that very little attention is being paid to sanitation. In order to provide a hygienic market for all these centres, the Department is giving loans to local bodies and Fishermen's Co-operative Societies, so that they construct shops for the sale of fish.

Intensive Development Scheme

The work of developing the fisheries on an intensive scale has been taken up in the two Community Development Blocks of Channarayapatna and Hassan. The scheme envisages stocking of fast-growing culturable varieties of fish seeds in all minor tanks and ponds, assessment of fish potential in rural parts by undertaking a regular survey, holding demonstrations as to the modern methods of fishing and tackling the problems of fishermen connected with fishing, supplying of nylon yarn, coracle and rare varieties of fish seeds at subsidised rates and offering training to the villagers in fish culture. The scheme is in operation in the Channarayapatna Community Development Block since 1963, and in the Hassan Community Development Block since 1967. In 1968-69, the Channarayapatna Community Development Block conducted a survey in 72 tanks, supplied 7,565 fish fingerlings and stocked 21 tanks with fish fingerlings, and realised a revenue of Rs. 496.75. The Hassan Community Development Block supplied 5 Kgs. of nylon yarn and 12 Kgs. of polythene floats to fishermen.

Fishermen's Co-operative Societies

There are four Fishermen's Co-operative Societies in the district at Hassan, Holenarsipur, Channarayapatna and Ramanathapur, with a total membership of 211 and a total share capital of Rs. 2,280. All these societies are functioning as primary credit co-operative societies. These societies are providing long-term loans for purchasing equipments like nets, boats, hooks, etc., and short-term loans to tide over the off-seasons and for other purposes. The Government have contributed Rs. 1,000 to the share capital of the Gangabhavani Fishermen's Co-operative Society, Holenarsipur. These societies are receiving assistance for managerial cost and other purposes. The fishery rights of two major tanks in the district are leased out to two of these Fishermen's Co-operative Societies on moderate charges. These societies,

are also helping the fishermen to get over their temporary financial difficulties.

Applied Nutrition Programme

The Applied Nutrition Programme is in operation in Holenarsipur, Hassan and Channarayapatna Community Development Blocks from the year 1968-69. It aims at producing protective foods like fish, eggs, vegetables and fruits and supplying them to vulnerable people like the pre-school children, expectant and nursing mothers. Under this programme, fish culturing in about 150 acres of waterspread area has been taken up. The fish seeds are reared upto fingerlings stage and supplied free of cost by the Department and 20 per cent of the fish catches are given to the feeding centres.

Important among the incentive measures taken up by the Fisheries Department in the district are : supply of fish fingerlings to the Community Development Blocks on subsidy basis, and to Village Panchayats free of cost at the initial stages, but subject to payment of 35 per cent of the total catches to the Department, payment of grants for renovation of minor tanks, offering of technical advice to the fishermen, conducting of periodical exhibitions, film shows, etc., and supply of fishing gears such as the nylon yarn, cotton yarn, floats, etc., at subsidised rates.

Animal Husbandry

Since time immemorial, bullocks, cows, sheep, goats and poultry have formed the important possessions of the farmers. The plough animal is still the bullock which is the main source of power for cultivation, lifting water, transportation of the produce to the market and supply of manure to the fields. This predominance of bullock power has not been diminished to any appreciable extent, as the district has not yet made much headway in the use of mechanical implements. The All-India Rural Credit Survey Report (District Monograph-Hassan) for 1951-52 says : " Taking all bullocks and he-buffaloes into account, there were, on the average, a pair of animals for every six to seven acres of cropped area. However, some among these animals might have been old and otherwise incapacitated and certain number would have been engaged in carting. Allowing for these factors, the average cropped area per pair of cattle would be somewhat higher ". It may be said that this position has not much changed since then. Out of a total cattle population of 6,96,073 in the district in 1966, the number of animals that were kept for work was only 2,35,344 which formed about 33.8 per cent of the total bovine population. Taking this into account, there were, on the average, a pair of working animals for every 6 to 7 acres of cropped area. The other animals, though not used on the farm, are useful to the farmer in various other ways. The following table

gives the classification of bovine population in the district according to the 1966 livestock census figures :—

Sl. No.	*Classification of cattle*	*Cow class*	*Buffalo class*
1.	Working bulls of over 3 years kept for work only	1,81,130	3,270
2.	Bulls and bullocks of over 3 years not used for breeding or work	9,322	1,018
3.	Bulls of over 3 years kept for breeding only ..	1,030	450
4.	Breeding cows of over 3 years kept for breeding or milk production	65,176	28,706
5.	Breeding cows of over 3 years kept for breeding which are dry	93,716	31,964
6.	Breeding cows of over 3 years kept for breeding which are not calved	65,570	7,195
7.	Cows of over 3 years used for work only ..	40,471	473
8.	Cows of over 3 years not in use for work or breeding purpose	8,066	727
9.	Young cows and bulls of one to three years of of age	1,24,770	33,019
	Total ..	5,89,251	1,06,822

In addition to these cattle, there were 2,34,331 sheep, 1,08,946 goats, 5,93,411 poultry and 13,464 other livestock. Thus the total livestock population of the district, excluding poultry, was 10,52,814, constituting about 5.1 per cent of the total livestock for the State. The total bovine population of the district, which was 6,96,073, constituted about 5.51 per cent of total bovine population of the State. In 1956, there were 6,82,422 cattle and it had gone up to 7,28,420 by the year 1961, but the number decreased to 6,96,073 according to the 1966 census. The general condition of cattle in the district is generally poor, particularly in the *malnad* parts.

Veterinary institutions

There are two veterinary hospitals, one at Hassan and the other at Sakleshpur and six veterinary dispensaries at Alur, Arkalgud, Holenarsipur, Belur, Arsikere and Channarayapatna. In addition to the above, there are 30 rural veterinary dispensaries. Some of the veterinary dispensaries have been upgraded. Such dispensaries are located at Ramanathapur and Konanur in Arkalgud taluk and Hallimysore in Holenarsipur taluk. The number of veterinary hospitals, veterinary dispensaries and rural veterinary dispensaries was 30 in 1961-62 and this number had increased to 38 by 1969-70. Livestock from nearby areas are

brought to the respective hospitals or dispensaries for medical treatment. In 1961-62, the number of animals treated in these hospitals was 1,68,813 and this number had increased to 2,12,234 by 1969-70. The number of animals castrated in 1961-62 was 20,433, whereas in 1969-70 it was 35,749. There is an artificial insemination centre at Hassan and sub-centres at Alur and Rayarakoppal in Alur taluk, Sakleshpur and Holenarsipur towns, Arkalgud town and Belur and Arehalli in Belur taluk. A poultry extension centre is located at Hassan and a poultry farm at Holenarsipur.

A Sheep Breeders' Association is established at Channarayapatna. There is a Key Village Scheme at Channarayapatna, with its sub-units at Kantharajapura, Cholenahalli, Dindiganur, Anekere, Baragur, Srinivasapura and Gulsinda.

Cattle development

Two well-known breeds of cattle found in the district are Amrith Mahal and Hallikar. Particular attention is being paid to conserving and improving these breeds of cattle. Amrith Mahal cattle are fiery and active and are noted for their power of endurance. Bullocks are specially suited for trotting and quick transport. We read from history, how Amrith Mahal bullocks played their part in the campaigns of Haidar Ali and Tipu Sultan. Some representative specimens of this breed are being reared at Hebbanaghatta Economic Farm, under the management of the Cattle Breeding Station, Ajjampur. The colour of the animal is generally grey, but instances of cattle having white colour are not rare. It possesses a well-shaped narrow head with a deeply furrowed forehead, bright and blood-shot eyes, well proportioned legs of medium length and hard but small teeth. They are, however, generally poor in milk yields.

Hallikar cattle, an excellent general purpose breed, are suited both for transporting the goods on roads and for ploughing on the fields. A typical Hallikar animal possesses long head with a bulging forehead, having a distinct furrow in the middle, close horns, taking off perpendicularly from the head, bulging slightly backwards in a graceful sweep and terminating in sharp points, long but compact body and light legs. The colour of the animal is generally dark or light grey with white patches round the face and dewlap. The district of Hassan is the home of this draught breed cattle.

There are some private cattle-breeders in Arsikere taluk. The Government is also maintaining some breeds in Amrit Mahal *Kavals* located in Arsikere, Hassan, Channarayapatna and Holenarsipur taluks. Amrith Mahal *Kavals* located in Arsikere, Hassan, Channarayapatna and Holenarsipur taluks are purely grass lands used for grazing purposes. Some private breeders are also permitted to use these *Kavals*. There are four *Kavals* in

Arsikere taluk to an extent of 3,584 acres and 36 guntas, three in Hassan taluk with an area of 2,814 acres and 27 guntas, three in Channarayapatna with 4,119.34 acres and one in Holenarsipur with 795.13 acres, making the total extent of *kavals* in the district to 11,314 acres and 10 guntas.

Hill Cattle

The cattle that are found in the *malnad* parts of the district are nondescript in nature. They are poor in milk-yielding capacity. It is generally believed that the maintenance of these animals is not economical. For the main purpose of improving the breed of the cattle in these parts, the Department of Animal Husbandry and Veterinary Services implemented a scheme called the Hill Cattle Development Scheme, during the Third Five-Year Plan period. An artificial insemination centre was started at Sakleshpur, with its two sub-centres at Hanbal and Belgod. The semen of jersey and murrah animals is being supplied by the National Dairy Research Institute, Bangalore, for improving the local breed. Cross-breeding, castration of scrub animals and disease control measures are also taken up under this scheme. By the end of the year 1969-70, about 2,120 cows and 2,020 she-buffaloes were artificially inseminated and 382 cow calves and 326 buffalo calves were reported to have been born since the date of the implementation of the scheme.

Fodder development is also being encouraged in the district. Root-slips are supplied to cultivators so as to induce them to take to fodder cultivation. A total expenditure of Rs. 21,098.96 was incurred in this connection from 1961-62 to the end of 1968-69.

Key Village Scheme

A Key Village Block was established at Channarayapatna in April 1960 for the development of Hallikar and other breeds of cattle in the district. The scheme envisages rapid improvement and multiplication of these breeds. There are seven sub-centres of this Block at Kantharajapura, Cholenahalli, Dindigur, Anekere, Bargur, Sreenivasapura and Gulsinda. A Hallikar bull and a Murrah buffalo are maintained at the main centre. The semens of these bulls are sent to all the sub-centres and the three veterinary dispensaries located in the *malnad* parts. As many as 2,612 artificial inseminations were done in 1969-70 as against 2,138 in 1961-62, and 2,267 in 1965-66. About 237 calves were reported to have been born in 1969-70, whereas the number in 1961-62 was 133 and in 1965-66 about 353. A total expenditure of Rs. 65,248 was incurred since the inception of the scheme to the end of 1969-70.

In order to provide good feed to the cattle, three acres of land have been set apart for the purpose of laying out demonstration plots for growing improved varieties of grass. This area is planted with Napier grass. So far 3,100 root-slips have been distributed among eight cultivators.

Artificial Insemination Centres

By the end of the Second Five-Year Plan, there were two artificial insemination centres and one sub-centre. Nine more artificial insemination sub-centres were opened during the Third Plan period. As at present, the number of artificial insemination centres is two and of the sub-centres ten. In addition to these, the artificial insemination work is also done in the veterinary and rural veterinary dispensaries. There are a Jersy, a Red Dane, and two Murrah buffaloes at the artificial insemination centre, Hassan. From 1960-61 to the end of 1969-70, about 54,629 artificial inseminations were done and about 8,731 calves were reported to have been born. The total expenditure for these years came to about Rs. 47,489.

Cattle fairs

The main sources of supply of cattle are the annual cattle fairs and weekly shandies. Cattle fairs are usually held between November and March every year. In 1969-70, about eight important cattle fairs were held and prizes valued about Rs. 4,615 were distributed. Particulars of these fairs are presented in the table below :—

Sl. No.	*Place of cattle fair*	*Duration of the fair*	*Approximate number of cattle*
1.	Hassan	15 days (from 20th December to 4th January)	32,000 to 40,000
2.	Gorur	8 days in January	4,000 to 5,000
3.	Ramanathapur	10 days in November	16,080 to 17,000
4.	Sakleshpur	10 days in January and February.	9,000 to 10,000
5.	Holenarsipur	10 days in March	3,500 to 4,000
6.	Bookanabetta	10 days in February	3,500 to 4,000
7.	Channarayapatna	8 days in February	4,500 to 5,000
8.	Belur	10 days in February	8,000 to 10,000

Hassan Cattle Show

The Hassan Cattle Show, which is held annually lasting for over a fortnight from the last week of December to the second week of January, was started 58 years ago (1911-12) by the then Deputy Commissioner of the district. Till 1918, the cattle show was being organised by the District Board and thereafter, its management was transferred to the Hassan Town Municipality. This cattle show which had a small beginning, is now one of the biggest fairs in Mysore State and has become a well-known annual event. Every year cattle-breeders from various parts assemble here with their cattle. The different breeds of cattle brought to the show are Hallikar, Amrith Mahal, and Malenadu Budda, etc.

A section of farmers who are engaged in rearing bulls, bullocks and heifers also sell them at the cattle show. The bulk of the buyers are from northern Karnataka areas, who buy quality breeds which can cope up with the tough agricultural operations in the dry northern parts of the State. Before the sixties, the trade here was mainly in bullocks, but since then a considerable number of cross-breed cows and buffaloes and other livestock are also brought for sale. During the days of this show, there is a brisk trade also in brass and copper utensils manufactured in Shravanabelgola, Hubli, Mangalore, etc., besides in farm tools and implements.

Since about two decades, an exhibition pertaining to industry and agriculture is also conducted as a part of the activities of the cattle show. This exhibition is also considered to be one of the biggest of its kind in the State. Several Government Departments and other agencies take part in it to educate the people about the progress made in different fields. There are spacious exhibition grounds with permanent stalls and an open-air theatre. Attractive cultural programmes of drama, dance, music, etc., are arranged in the open-air theatre here on the occasion.

Byerley Stud

There was a general belief that it was not possible to raise good animals in the *malnad* parts. But the trials conducted by Mr. and Mrs. F. G. Foster, in their Byerley Stud Farm, have shown that it is not always the case in all parts of *malnad*. The Byerley Stud, ' Kudure Thota ' as the local people call it, is situated near Ballupet in Sakleshpur taluk, which is at an elevation of about 3,500 feet above sea level, on the fringe of *malnad* and *maidan* parts with an approximate average annual rainfall of 45 inches. The farm presents a unique rural atmosphere and has comfortable temperature with air conditions ranging from light breeze to gale.

The activities of the farm are at present confined to the production of thorough-bred horses of quality and dairy cattle. The breeding work was started, in a small way, as early as 1959. Shortly after this, a Jersy bull was purchased and the services o this bull were amply made use of both within and outside the farm They had borrowed a stallion from Kunigal for horse breeding upt 1965, when they purchased a new stallion called " Red Indian ". By the end of 1966, the farm was expanded by obtaining 78 acre of land. As at present, the strength of the farm consists of six mares with their yearlings and five milch cattle with two heifers.

There are about a dozen paddocks, ranging from an acre t seven acres. Pusa and Napier grass for cattle and Rhodes for horse are grown. Some of the fodder species that are found in Australia and Africa have been brought and put on trial. In addition t fodder, oranges in about 12 acres, coffee in about three acres an

food-crops in about four acres are grown. Irrigated fodder is grown in about five acres.

As a result of the breeding work, the fourth or fifth generation of wholly *malnad*-bred cattle have begun to yield three gallons of milk a day per head of cattle. The horses bred in this farm have been taken for race purposes to Bombay, Madras and Calcutta and they are reported to have shown a good performance. The more known among these breeds are 'Om Shakthi', 'Bhajagovindam' and 'Sovereign'. It is also proposed to extend the activities of the farm to sheep, poultry and pig.

Sheep development

Sheep of the famous Hassan breed are found in Arsikere, Holenarsipur and Channarayapatna taluks and in some parts of Hassan taluk. They are known for their mutton and wool. The wool which is coarse, is mostly used for making blankets. The average annual yield of wool per sheep is estimated at 475 grammes. In order to improve the breed of sheep, the Department is implementing a programme. It is supplying ewes and rams of good breed on loan and subsidy basis. In the year 1965-66, 1,100 ewes and 44 rams were distributed among 220 breeders of the district on 50 per cent subsidy and 50 per cent loan basis, the total value of the sheep being Rs. 65,780 and that of rams Rs. 4,708.

Sheep Breeders' Association

The Sheep Breeders' Association at Channarayapatna had a strength of 266 members by the end of 1968-69, the sheep under the control of this Association being 6,775. It is managed by a committee headed by an elected non-official president, with the active assistance and advice of the Department. It does propaganda on modern sheep husbandry methods and undertakes seasonal shearing, clipping, docking, dosing and castration. The Department has lent the services of the necessary staff for this purpose. Collection and marketing of wool on a co-operative basis, as also demonstration of its profitable utilisation, such as *kambli* making, are also undertaken by the Association. The staff of the Association undertake periodical tours in the rural areas and provide also medical treatment for the sheep wherever necessary. The fabrics manufactured are mainly sold to the members of the Association. In 1969-70, the staff of the Association clipped 5,183 sheep and collected 1,082 lbs. of wool, out of which 92 *kamblies* were made and sold to its members at reasonable rates. During the same year, an expenditure to the tune of about Rs. 774 was incurred by the Department towards some of the activities of the Association.

Poultry development

There is a Poultry Farm at Holenarsipur, which was started as a poultry unit, during the First Five-Year Plan, under the National Extension Service. There is also a Poultry Extension Centre at Hassan, which was started in December 1960. These two schemes have been put into operation in the district, with

the main objectives of maintaining and distributing balanced poultry feed, providing training to interested persons in poultry-keeping, extending the facilities of mechanical brooding and rearing to local breeders, supplying improved cocks on exchange basis, supplying day-old chicks at subsidised rates, holding poultry shows to encourage poultry breeders, etc. White Leg Horn and Rhode Island Red are the two foreign breeds maintained at the two centres for the breeding purpose. They were originally supplied by the Central Poultry Farm, Hesaraghatta. The details of these two centres for the year 1969-70 are given in the table below :—

1.	Strength of the farms	623
2.	No. of eggs produced	20,930
3.	No. of eggs sold for hatching	2,277
4.	No. of chicks produced	1,086
5.	No. of chicks and birds distributed	466
6.	Total amount realised in Rs.	8,898-36
7.	Total expenditure in Rs.	24,648-16

In addition to these two centres maintained by the Department, there are about 20 poultry farms at Hassan proper and several other such farms at the important towns.

Piggery development

In order to improve the local breed of pigs, the Department distributed 18 exotic boars among the selected breeders of Holenarsipur taluk in 1968-69. During the next year, 25 exotic boars were distributed among the selected persons in Sakleshpur taluk. Nearly 205 upgraded piglets were reported to have been born in 1969-70. The total expenditure incurred in this connection was Rs. 3,600 for 1969-70 as against Rs. 2,700 in 1968-69.

Applied Nutrition Programme

An Applied Nutrition Programme was started at Holenarsipur in the beginning of 1967-68 and later on extended to Hassan and Channarayapatna. There are three poultry units at Holenarsipur. The total strength of the units is 186 birds. In 1969-70, nearly 28,980 eggs were produced in these units, of which 1,724 eggs were given for the feeding programme and 27,258 eggs were sold for table and hatching purposes, realising Rs. 5,590.52 as sale proceeds. Two more such poultry units, one each at Hassan and Channarayapatna, are being formed.

Animal diseases

Non-contagious diseases are not of serious nature and they can be easily tackled by the qualified personnel of the Department in the vaterinary institutions. Among the contagious diseases, Black Quarter, Haemorrhagic Septicaemia and Anthrax are some times prevalent in the district. The district is free from Rinderpest disease. In 1969-70, about 2,25,706 preventive vaccinations were

done in order to control the diseases. Parasitic Diarrhoea, among the cattle and sheep, caused by liverfluke, is found in the district. Against this disease, the Department conducted 5,139 vaccinations. During the same year, 18,988 vaccinations were conducted against sheep-pox. Systematic protection of all young birds has been taken up against the poultry disease called Ranikhet. One day in a week is specially devoted for vaccination as a preventive measure against Ranikhet. In 1969-70, nearly 59,030 such vaccinations were done by the Department.

Statement showing particulars of tanks in Hassan district as in 1968–69

Name of taluk	*Tanks with achkat of 500 acres and above*		*Tanks with achkat of 200 acres and above but less than 500 acres*		*Tanks with achkat of 100 acres and above but less than 200 acres*		*Tanks with achkat of 50 acres and above but less than 100 acres*		*Tanks with achkat of 10 acres and above but less than 50 acres*		*Tanks with achkat of less than 10 acres*	
	No.	*Acres*	*No.*	*Acres*	*No.*	*Acres*	*No.*	*Acres*	*No.*	*Acres*	*No.*	*Acres*
Hassan	..		18	4,970.01	22	3,047.27	53	3,641.26	354	7,610.37	615	2,825.08
Arsikere	..		12	3,481.25	20	2,895.09	34	2,380.20	99	2,515.26	24	122.25
Channarayapatna	1	690.38	12	4,089.30	23	3,096.36	33	2,118.21	115	3,078.17	44	237.15
Belur	1	717.12	8	1,978.27	20	2,643.11	86	2,873.00	530	11,530.31	725	3,342.06
Arkalgud	..		4	810.38	6	715.16	32	2,047.32	335	4,329.25	410	1,917.21
Holenarsipur	..		2	837.39	10	1,277.27	23	1,572.12	114	2,586.11	145	675.23
Sakleshpur	..		..	..	6	764.16	55	2,869.08	446	9,545.35	383	2,097.35
Alur	..		..	..	8	1,074.10	56	3,820.36	416	9,004.25	559	2,625.27