

CHAPTER IV

AGRICULTURE AND IRRIGATION¹

In Kodagu district, except agriculture, no other sector had significantly developed since a long time in the past. With a low population and restricted communication with the outside world, there were very limited skilled workers to meet the basic materials required (like pots, edible oils, baskets and clothing etc). The Kodagu Kings while gifting the lands for cultivation were often assigning *jamma* servants (slaves) to those to whom lands were gifted. Though this was not a common custom, it was in vogue since a long time. Before the introduction of coffee in the later half of the 19th century, agriculture was still the major source of livelihood for the population with paddy being the main staple crop. It is said that there were times when Kodagu produced surplus paddy even for exports and the excess was even unutilized and hence wasted.

The King Lingarajendra II in his XIth revenue order (*hukum*) had instructed the Parupattogars and Patels to systematically support agricultural activities. Indications were available regarding the provision of incentives for cultivation of paddy on new and barren lands by way of land revenue remission to the extent of 25 per cent, 50 per cent and even beyond. Farmers who were freshers and those who were in trouble received advance livestock, paddy and cash (on credit) from Government (on the 'palace account'). These incentives are provided for a sustainable flow of basic food requirements and to make efficient use of land resources. According to one revenue order, (*hukum*) "on Mondays, the Patel (village headman) had the responsibility to visit farmer's house to check whether they were cultivating properly their dry, wet and garden lands, whether the farmers were lethargic, negligent in their paddy cultivation tank and forest work". The Patel had

1. This Chapter also deals with Horticulture, Animal Husbandry and Pisciculture

powers to warn and punish the negligent. This is an indication of the degree of interest the Kings had in agriculture.

Modernization of Agriculture

Before the advent of coffee in Kodagu, paddy was the main crop. In 1834, paddy was cultivated in an area of 15,212 hectares. In the eastern part of Kodagu, ragi and other pulses were grown as dry land crops on a small scale. The first coffee plantation was established near Madikeri in 1854. In 1870, the total area cultivated was 70,693 hectares of which the area under paddy was 26,758 hectares and the area under other food grains was 5,200 hectares. An area of 30,956 hectares for coffee cultivation and 12,389 hectares for cardamom cultivation were released. The cultivation of cotton, groundnut and tea began in 1913 and rubber crop was cultivated from 1914. In 1936-37, 56,960 hectares were cultivated and many crops *viz* paddy, ragi, coffee, banana, tea, pulses, orange, cardamom, black pepper, coriander, chillies, beans and other vegetables were grown. By 1870 the developments in coffee cultivation grew faster than the corresponding developments in agriculture. In 1963, the total area cultivated was 94.8 thousand hectares which increased to 1.79 lakh hectares in 1989.

The Government of India in 1905, with the help of agricultural chemists of the Princely Mysore State and with the co-operation of the agricultural department of the Government of India established small demonstration farms [Madikeri 1.4 ha (3.5 acres), Murnadu 0.8 ha (2), Napoklu 1.2 ha (3), Virajpet 2 ha (5), Fraserpet (Kushalnagar) 0.8 ha (2), Somvarpet 0.8 ha (2), Gonikoppal 0.6 ha (1.5) Siddapura 0.8 ha (2) and Shanivarasante 0.4 ha (1)] for the trial of various new crops that may be considered suitable for introduction in the district. In order to supervise these demonstration plots, each plot had a supervisor receiving a salary of Rs. eight per month.

Upon the advise of agricultural chemist in 1907, of the 9 demonstration plots, all but Siddapur were closed. As a results of the research emanating from the research stations it was found that sericulture was not suitable in this district. Crops like ragi, blackgram, horsegram, chillies, maize, jowar, potato, sugarcane, tapioca, American cotton, paddy, groundnut, banana, mulberry and green manure plants were tried in these farms. The information on the cost of cultivation of all these crops was generated. The results indicated that mulberry in Kodagu was not feasible. With the help of the Department of Agriculture of the Madras province, research was conducted on controlling the orange borer and the possibility of introducing sericulture in Kodagu. In 1923, research station was established to conduct research on paddy and sugarcane in Virajpet. Due to lack of trained personnel, the research stations at Siddapur and Virajpet were closed in 1925 and 1926 respectively. In that period, due to the non-existence of the agriculture department in Kodagu, the trained agricultural personnel joined revenue and other departments. A committee formed in 1926 considered the establishment of the agriculture department and recommended the establishment of the agriculture department in August 1927. A person trained in agriculture from the revenue department was appointed with the responsibility of examining the developments in the neighbouring areas in Mysore and in Madras province and to undertake trials and demonstrations to educate the Kodagu farmers. However, permission was not granted to open Government agricultural experiment station.

The summary of the work done by the agriculture department between 1927 and 1937 are as under. The introduction of improved ploughs, the popularisation of artificial manures for paddy, the popularisation of orange borer control work, good paddy yields by reducing seed rate, use of *G.E.B. 24* paddy variety, fodder crops, *koleroga* of arecanut and prevention against the shedding of orange leaves and fruits were successfully conducted. In 1934, an orange research station was established in Gonikoppal to conduct research on the manurial requirements, other cultural requirements, control of pests and diseases and vegetative propagation.

The department of agriculture was temporarily expanded in April 1937. Accordingly three agricultural demonstrators and one agricultural supervisor were appointed. A total of six agricultural centres were established in Kodagu, at the rate of two centres for each demonstrator. Each demonstrator was required to tour 20 to 25 days in a month to demonstrate the results of agricultural research to the farmers. An Apiculture Inspector was also appointed to educate the farmers regarding apiculture in 1937. In July 1937, provision was made to teach agriculture to 5th and 6th standard students of Virajpet high school. An area of 1.6 hectares (4 acres) of wet land and some area of dry land along with agricultural implements were provided for agricultural experiments. In 1938, Gonikoppal Agricultural Research Station had two divisions - the orange garden established in 1934 and the paddy farm adjoining orange garden, established in 1937. But it was not possible to conduct the experiments on orange successfully because about 2.4 hectares (6 acres) of orange orchard belonged to a private planter and there were objections from the planter for harvesting the crop from the experimental site. Hence, it was strongly recommended to acquire the orange land from the planter. In the case of paddy, the research station had leased 1.8 hectares (4.5 acres) to conduct experiments.

The Hudikeri Paddy farm had 2.8 hectares (7 acres) and was supervised by the demonstrator of the Gonikoppal Research Station. Experiments on different paddy varieties, and their requirements of manure were conducted. The Napoklu research station had 5.2 hectares (13 acres) of leased-in land. Here experiments of different paddy varieties, pineapple, cardamom, coffee, banana, orange and vegetable crops were conducted and the requirements of organic and inorganic manures, use of improved agricultural implements were examined.

The Muttarumudi Agricultural Research Station had 1.4 hectares (3.5 acres) of paddy land and 5 acres of dry land. Here the paddy varieties prevalent in the areas in the neighbouring Mysore, Madras and Bombay were experimented. The paddy varieties popular in Delhi and Madhya Pradesh areas were not successful in this area. In 1938, agricultural research stations were opened in Shanivarasante and Sitapura. In the Shanivarasante Research Station, 2.8 hectares (7 acres) of land was obtained to five year lease from private source. Here experiments on different paddy varieties, improved ploughs, cost efficiency in paddy transplanting and use of manures were conducted. The Sitapura Research Station had 2.2 hectares (5.5 acres) of dry land and successfully demonstrated that ragi, jowar, groundnut, chillies, brinjal, tobacco, soyabean, potato and pineapple could be grown.

In the Virajpet High School, 1.6 hectares (4 acres) of wet lands were leased in. Here with the involvement of school children, experiments on different paddy varieties, timely application of manures and use of improved ploughs were conducted. Similar experiments were conducted in

Ponnampet, Napoklu and Somvarpet higher primary schools. In the Napoklu agricultural research station, a model school garden was developed to conduct experiments. In this station, new experiments on ginger, turmeric, soyabean, vegetables, apiculture and poultry were conducted.

With the supervision of the University of Agricultural Sciences, Bangalore, Agricultural Research Stations were established in 1965 at Madikeri and Ponnampet in order to develop paddy varieties suitable to the local agroclimatic conditions. In addition to these research stations, the coffee research sub-station in Chettalli (from 1946 under the control of Coffee Board), the Central Horticultural Research (established in 1972) at Chettalli and Gonikoppal and Spices Research Station at Appangala (established in 1974) under the control of Spices Development Board are taking the responsibility of conducting research on commercial crops like coffee, cardamom and orange in the District.

Agricultural Research Station, Madikeri

The Agricultural Research Station was established in 1951 at Madikeri by the Department of Agriculture and handed over to the University of Agricultural Sciences, Bangalore in 1965. The intention was to develop high yielding, blast resistant paddy variety suitable to the hilly areas of Kodagu. The station has a total area of seven hectares with an irrigated area of 3.5 hectares. Since 1969, research efforts on paddy were intensified. For the hilly region the *Intan* variety of paddy exhibited the best over all performance when compared with the local varieties of *K.B.356*, *M.B.319*, *B.K.B.* and *Jirige sanna* (C.436), and high-yielding varieties such as *I.R.8*, *Jaya*, *Jagannath*, *I.R.5* and *Pankaja*. Hence the State Variety Release Committee adjudged the *Intan* variety as the best paddy blast resistance varieties, *I.E.T.7191* and *I.R.10781-75-3-2* varieties were being experimented. In 1987 *I.E.T. 7191* was recommended for the hilly region to combat paddy blast. This station is also experimenting with *mudigere* variety of cardamom.

Agricultural Research Station, Ponnampet

In Ponnampet Research Station efforts towards developing blast resistant paddy varieties through chemical control and cultural methods are underway. The All India Coordinated Research Project on paddy and the National Agricultural Research Project are assisting in conducting research on agriculture and animal husbandry. The station has 23 ha of land with 8 ha under paddy. In addition, coconut, sapota, mango and pepper are being grown. The National Agricultural Research Project has established a swine research centre. Under the National Agricultural Extension Project the personnel from Agriculture Department are trained.

Land Utilisation

The number of agricultural labourers and cultivators are provided according the 1981 census in the following table (Table No.1)

Table No.1

The number of Agricultural Labourers and Cultivators as in 1981.

Sl. No.	Particulars	Madikeri tq.	Somvarpet tq.	Virajpet tq.	Total (District)
1.	Total geographical area (Sq.Km)	1,449	999	1,646	4,102
2.	Total population	1,17,726	1,63,832	1,80,330	4,61,888
3.	Rural population	93,002	1,38,327	1,58,896	3,90,225
4.	Total Main workers	49,373	71,622	87,705	2,08,700
5.	Total cultivators	13,741	16,396	18,506	48,643
6.	Agricultural labourers	6,754	7,162	19,108	33,024
7.	Other workers	4,892	2,827	1,928	9,647
8.	Total cultivated land (ha) (1987-88)	40,203	45,176	59,419	1,44,798
9.	Land holding per agricultural labourer and cultivator (ha)	1.96	1.96	1.82	1.89

Source : District Census Handbook, Kodagu District, 1981.

The percentage of population of different categories of workers according to 1991 census (provisional) in rural and urban areas of the district (as percentage of total workers) is provided in the following table (Table No.2)

In 1991 there were 2,17,708 main workers in Kodagu, of whom 1,89,742 are living in rural areas. Among the main workers, 1,40,703 are males. According to the census a worker is defined as a person who works for at least 183 days in a year. The category 'other workers' includes the workers who work in fishery, forestry, plantation, road and construction work, commerce, transport and storage sectors. While cultivators work on their own or lease-in-land, the agricultural labourers work on lands of others. According to 1981 census the agricultural labourers formed 39.13 per cent of total workers in Kodagu while it was 65.03 per cent in the State. The reason for this gap is the non-inclusion of plantation workers in the category of agricultural labourers.

The following table provides comparative statistics of the pattern of land utilization since the last four decades. (Table No.3). The land utilization pattern according to the annual season and crop reports (from 1955-56 to 1990-91) is furnished in the tables (Table No.4 and No.5).

According to the 1980-81 agricultural census Kodagu had only one per cent of the land holdings in the State occupying the last position. The details for the agricultural census of years 1955-56, 1970-71, 1976-77, 1980-81 and 1985-86 are provided in the following table (Table No.6).

In 1980-81, the individual land holdings formed 98.64 per cent of all holdings occupying 94.32 per cent of the land area, holdings jointly owned formed 0.82 per cent occupying two per cent of the land area and holdings owned by the corporate sector formed 0.54 per cent occupying 3.68 per cent of the area. There were 55,000 individual holdings with 1,74,000 hectares. The area

Table No. 2

Percentage of Population of different categories of workers 1991 (Provisional)

Details	Census Year	Rural			Total (Urban + Rural)		
		Male	Female	Total	Male	Female	Total
Cultivators :	1981	25.92	29.16	19.76	23.31	25.59	18.61
	1991	22.59	25.40	17.90	20.07	21.96	16.62
Agricultural Labourers :	1981	17.64	15.75	21.22	15.82	13.74	20.12
	1991	16.88	15.14	19.78	15.18	13.22	18.75
Cottage industry Workers :	1981	0.89	1.06	0.56	0.99	1.17	0.62
	1991	0.88	0.98	0.72	0.93	1.02	0.77
Other Workers (including plantation workers) :	1981	55.55	54.03	58.46	59.86	59.50	60.65
	1991	59.65	58.58	61.60	63.82	63.80	63.86

Source : District Census Handbook, Kodagu District 1981 and 1991 Census (Provisional) Report.

Table No. 3

Details of the land-use in the district for selected years from 1970 to 1990

Sl.No.	Details	1970-71	1980-81	1986-87	1990-91
1.	Percentage of net sown area out of the geographical area	33.58	34.47	36.36	36.69
2.	Percentage of net area sown more than once	2.4	2.37	31.10	1.95
3.	New-sown area (ha) per cultivator	3.47	2.91	4.52	3.11
4.	Percentage of net irrigated are out of net sown area	7.72	2.30	2.97	2.83
5.	Percentage of gross irrigated area	7.52	2.40	3.63	3.90

Table No. 4

Sl.No.	Details	1985-86*	1986-87	1987-88	1988-89	1988-89			1990-91
						Madikeri tq.	Somvarpet tq.	Virajpet tq.	
1.	Total Geographical area:								
	a) According to Professional survey	410.2	410.2	410.2	410.2	1.45	0.99	1.65	410.2
	b) According to village records	410.8	410.8	410.8	410.8	1.45	0.99	1.66	410.7
2.	Forest area	134.7	134.7	134.7	134.7	47.6	20.8	66.3	134.6
3.	Area not available for cultivation								
	a) Barren and uncultivable	31.0	31.0	31.0	31.0	13.6	8.9	8.5	31.0
	b) Land for non-agricultural use	23.7	23.7	23.7	23.7	4.4	16.1	3.2	23.7
4.	Cultivable area excluding barren land								
	a) Permanent pastures and other grazing lands	17.8	17.8	17.8	17.8	4.2	3.1	10.5	17.8
	b) Cultivated area under miscellaneous trees and orchards	39.2	37.9	37.9	37.9	22.3	2.7	12.9	37.9
	c) Barren land suitable for cultivation	14.2	12.1	12.1	11.9	10.1	0.9	0.9	11.9
5.	Fallow land:								
	a) Area under current fallow	1.6	3.2	11.4	4.0	1.4	2.8	0.2	4.9
	b) Other fallow land	1.6	1.0	1.4	1.3	0.9	0.1	0.3	1.3
6.	Net sown area	147.6	149.4	140.8	148.2	40.7	43.8	63.7	147.7
7.	Area sown more than once	3.5	4.6	4.0	2.9	0.3	2.5	0.1	3.0

Kodagu District

Source : District Statistical Office, Kodagu

* each year ending with 30th June.

Table No. 5

Land-use pattern according to the Annual-Season and Crop Reports in Kodagu District - figures in '000 ha

Sl.No.	Details	1955-56	1960-61	1965-66	1970-71	1975-76	1977-78	1984-85
1.	Total geographical area:							
	a) According to Professional survey	410.8	409.4	409.4	410.8	410.8	410.8	410.2
	b) According to Village records	411.4	409.4	409.4	410.8	410.8	410.8	401.8
2.	Forest Area:	133.8	135.6	135.7	135.7	135.7	135.6	134.7
3.	Area not available for cultivation							
	a) Barren and uncultivable land	31.0	31.0	32.2	32.2	32.2	32.2	31.0
	b) Land for non-agricultural use	23.6	19.9	18.3	20.4	22.2	24.2	23.7
4.	Cultivable area excluding barren land							
	a) Permanent pastures and other grazing lands	26.8	31.2	28.2	29.3	18.9	18.9	18.4
	b) Cultivated area under miscellaneous trees and orchards	47.6	37.1	37.3	39.8	39.7	39.7	39.5
	c) Barren Land suitable for cultivation	60.8	51.4	47.1	38.0	21.8	20.8	14.8
5.	Fallow Land:							
	a) Area under current fallow	0.5	0.4	1.4	3.1	0.7	0.6	2.0
	b) Other fallow land	6.6	5.7	2.9	2.3	6.8	34.1	1.2
6.	Net sown area	80.7	97.2	106.4	110.0	132.0	132.0	145.5
7.	Area sown more than once	0.0	0.7	0.6	12.5	5.6	5.5	2.8

Source : Trends in Land Utilisation in Karnataka (1955-56 - 1970-71), DES. Bangalore.

under jointly owned holdings and corporate sector holdings formed 0.37 per cent and 2.4 per cent of all holdings in the district respectively. The district average holding size is higher than the State average for all the census years except 1955-56. The details of land holding for 1985-86 agricultural census are given in the following table (Table No.7).

The average holding in 1955-56 was 2.47 hectares and it increased to 4.05 hectares in 1980-81. According to 1985-86 census, due to the increase in the number of land owners the average holding size reduced to 3.25 hectares. There were 9,244 small farmers (1-2 hectares) and 12,712 marginal farmers owning 12,215 hectares and 6,441 respectively according to 1976-77 census.

SOILS

In Kodagu district red loamy and lateritic soils are common. The red loamy soils are found on the hilly to undulating landscape on granites. The granite gneisses and schists areas are found in the transitional tract of the Western Ghats as a long strip. These soils can be sub-divided into (1) Soils of upper slopes, (2) Soils of undulating mid slopes, and (3) Soils of Valley plains. The soils of upper slopes are found on converse ridges and steep side slopes. Rock out-crops, stoniness and gravelly phases are commonly found on this landscape. Shallow to moderately deep gravelly sandy loam to sandy loam soils are found in these tracts. Ragi, groundnut and pulses are the common crops. In the transitional tracts, medium category forest trees are prevalent. In the undulating slopy lands, the soils vary from dark brown to dark red colour with the top soils being sandy loam or clay loam. In the deeper layers loamy, clay loamy and gravel mixed sandy loamy soils are found. These soils are well drained with moderate permeability. They support coconut, coffee, cardamom, orange and cashew in transitional and hilly tracts. Under irrigation, paddy, ragi and vegetables are grown. The valley tract soils are found in the less slopy and plain lands of the valleys. These soils are very deep, very dark grey brown, brown to dark, reddish brown, sandy loams to clay on surface and usually clay in sub-surface horizon. In the transitional hilly tracts, paddy, coconut, arecanut and vegetables are grown. In the irrigated areas, paddy, sugarcane, banana, arecanut and vegetables are the important crops.

In the transitional tracts of granite gneiss, rocky with gravelly soils and plain lands with lateritic soils are found. These soils are uniform over different depths with yellow mixed red to black mixed red soils. Crops like paddy, sugarcane, coconut, banana, arecanut, cardamom, cashew, pepper, coffee, tea and orange are grown.

The soils of Kodagu are acidic with the pH varying from 3.5 to 6.5. Soils are rich in nitrogen, deficient in phosphorous and with medium amounts of potash. The eastern part of the district has black soils with good water holding capacity. In summer, these soils crack heavily. The central area of the district has light black loamy and clay loamy soils. The Western part has gravel mixed lime deficient soils. The soil composition varies from place to place in the district.

Considering the rainfall patterns, magnitude and distribution, the soil types, height from the sea level, agro-climatic conditions, crops grown and the *flora* and *fauna*, the Kodagu district is classified as the hilly tract. This tract receives most of its rains in the south-west monsoon. Most parts of the district are about 800-900 metres above the mean sea level and other parts are 450-800

Table No. 6
Agricultural Census of Recent Decades

Census Year	Number of land holdings	Percentage to State's total	Area (ha) operated	Percentage of the state's area	Average holding (ha) in the district
1955-56	51,510	2.08	1,27,170	1.17	2.47
1970-71	36,786	1.04	1,36,258	1.20	3.70
1976-77	40,467	1.06	1,46,683	1.29	3.68
1980-81	42,864	1.00	1,73,982	1.48	4.05
1985-86	55,212	1.10	1,79,916	1.50	3.25

Table No. 7
The area under different size of land-holdings according to 1985-86 agricultural census

Land holdings (hectares)	No. of land owners		percentage change	Geographical area (hectares)		Percentage change	Average area	
	1980-81	1985-86		1980-81	1985-86		1980-81	1985-86
Below 1 hectare (Marginal farmers)	11,388	19,075	67.50	6,015	8,529	41.79	0.52	0.44
1-2 hectares (Small farmers)	9,630	11,588	20.33	13,791	16,558	20.06	1.43	1.42
2-4 hectares (Semi medium farmers)	9,670	11,739	21.39	27,422	33,050	20.52	2.83	2.81
4-10 hectares (Medium farmers)	8,708	9,681	11.17	53,230	57,985	8.93	6.11	5.98
10 hectares and above (Large farmers)	3,468	3,191	- 7.98	73,524	63,794	- 13.23	21.20	19.99
Total	42,864	55,274	28.95	1,73,982	1,79,916	3.41	4.05	3.25

(For details see chapter 8)

metres above the mean sea level. In most of the areas, red clay loamy soils could be seen. This tract supports paddy, cardamom, coffee, tea and orange.

The total area under all crops in 1988-89 was 1,51,007 hectares of which food crops were grown on 73,590 hectares forming 48.7 percent of the area. Coffee, cardamom, pepper and other commercial crops were grown on 77,487 hectares forming 51.3 percent, cereals and millets on 47,819 hectares, pulses 746 hectares, cardamom 13,848 hectares, black pepper 1,265 hectares, orange 5,112 ha. and vegetables in the remaining area. Paddy occupies an area of 44,298 hectares with a production of 1,10,169 tonnes, ragi in 2,483 hectares with a production of 238 tonnes and maize in 1,038 hectares with a production of 2,658 tonnes. Oil seeds occupy 556 hectares of which ground nut alone occupies 525 hectares. In the table that follows (Table No 8), the area under important agricultural crops and their production figures are provided for selected years from 1955-56 to 1988-89, including taluk wise figures for 1988-89. In 1990-91, food crops were grown on 73,000 hectares of which paddy was on 45,269 hectares, ragi on 1,369 hectares and pulses (bengal gram, black gram, horse gram and cow pea) on 966 hectares.

Paddy

Paddy is an important crop grown on an extensive area in Kodagu district. In 1980-81 and 1989-90, the district got eighth position in paddy production among all the districts in Karnataka. The crop is being grown in areas receiving heavy rain fall and valley plain areas. Since a long time in the past, paddy was grown to meet both the local needs as well as for export to the coastal parts. According to I.M.Muthanna, there were times in Kodagu district when paddy crop was being thrown unutilized, due to lack of transport and market facilities, when farmers could not winnow and store the paddy. Each family had paddy lands and an associated patch of *soppina betta* forest up lands. One can find this pattern at some places even to this day. While paddy lands had land tax, the slopy lands by the side of the wet lands were exempted from tax as they were providing grass, fuel wood and (used for raising) green manure crops for paddy. In the areas surrounding wet lands, banana, sugarcane, arecanut and vegetables were grown, but paddy crop was the main crop of interest for the farmers. Hence improved methods of cultivation were followed very quickly, with a systematic transplanting of paddy seedlings. In addition to the green manure and humus from the near by forest lands, farm yard manure and green manure were applied boosting the paddy yields above the average yields of some neighbouring districts. In south Kodagu, there are extensive paddy lands in the valleys. In areas around Virajpet some of the paddy lands are wider and even a few kilometres long. In narrow slopy valleys, paddy lands under bench terrace cultivation are more fertile than the paddy lands in other areas. The extensive paddy lands in the lower reaches intercepted by small rivulets are called plain wet lands. The paddy lands which are located on the valley slopes dependent on rainfall are called *makki* wet lands.

Paddy crop was grown on 15,212 ha in 1834, 26,750 ha in 1870, 39,142 ha in 1913, and 34,000 ha in 1937-38. In 1937-38, the paddy area formed 52 percent of the area under all crops producing 53,000 tonnes of which 21,000 tonnes were available for export. Though there were opportunities for extension of area under paddy, inadequate rainfall, constraints in extending area under irrigation, migration of rural people due to malaria and other diseases and increasing

Table No 8

Area and production of principal agricultural crops (1955-56 to 89-90) in Kodagu district

A- Area (hectares) P-Production (tonnes)

Sl. No.	Name of crops	1955-56	1960-61	1976-77	1985-86	1987-88	1988-89	1988-89			1989-90	
								Madikeri taluk	Somvarpet taluk	Virajpet taluk		
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Paddy	A	38,612	44,681	47,851	43,107	35,339	44,298	10,061	11,845	22,392	45,565	
	P	61,950	1,00,162	88,463	1,00,606	60,673	73,489	-	NA	-	98,217	
2. Maize	A	-	-	402	694	975	1,038	-	1,030	8	999	
	P	-	-	1,059	1,913	570	2,658	-	NA	-	3,727	
3. Ragi	A	2,043	2,454	4,865	2,280	2,059	2,483	-	2,479	4	1,210	
	P	2,078	502	3,821	2,487	1,964	2,289	-	NA	-	1,426	
4. Total cereals	A	40,655	47,035	53,405	46,531	38,375	47,819	10,061	15,354	22,404	47,756	
	P	64,028	1,00,664	94,710	1,05,006	63,208	78,085	-	NA	-	1,03,570	
5. Bengal Gram.	A	654	495	46	90	124	-	-	-	-	4	
	P	204	81	10	48	49	-	-	NA	-	2	
6. Other pulses	A	-	-	3,958	2,024	2,433	746	-	727	19	693	
	P	-	-	718	526	629	132	-	NA	-	97	
7. Total pulses	A	654	494	4,004	2,114	2,457	746	-	727	19	693	
	P	204	81	728	464	678	132	-	NA	-	99	
8. Total food crops	A	41,309	47,529	57,409	50,181	40,876	48,565	10,061	16,081	22,423	48,453	
	P	64,232	1,00,745	95,438	99,332	60,886	78,217	-	NA	-	1,03,669	

Agriculture and Irrigation

1	2	3	4	5	6	7	8	9	10	11	12	13
9. Groundnut	A	2	-	-	448	1,112	915	525	-	525	-	97
	P	1	-	-	326	1,574	22,117	1,056	-	NA	-	176
10. Other oil seeds	A	-	-	-	33	127	623	31	-	31	-	78
	P	-	-	-	12	-	199	21	-	NA	-	176
11. Total oil seeds	A	2	-	-	481	1,239	1,538	556	-	556	-	175
	P	1	-	-	338	3,603	2,316	1,077	-	NA	-	914
12. Tobacco	A	1	2	-	20	257	190	55	-	55	-	-
	P	-	-	-	15	2	68	30	-	NA	-	-
13. Sugarcane	A	-	-	-	15	2	4	8	-	8	-	8
	P	-	-	-	1,055	205	-	-	-	NA	-	859
14. Cotton	A	1	2	-	207	-	-	14	-	14	-	12
	P	-	1	-	307	-	-	26	-	NA	-	27

Source : District Statistical office, Kodagu, year ending June 30th

NA - Not available

emphasis on the commercial crop coffee were responsible for its non expansion. In 1990-91 paddy was grown on 45,269 hectares.

Kodagu had fewer paddy varieties compared with other areas. The 'bolya' variety was commonly grown. There were three sub varieties called 'kiri bolya', 'kiggat bolya' and 'mumbolya'. These paddy varieties had medium yellow colour yielding white coloured rice. Though the paddy earheads were heavy, the crop used to be erect with very good yields. The average yield per acre up to 20 quintals are documented. In addition to these varieties, there were other local varieties in the Sampaje hobli which were suitable to lower irrigation requirements and uplands. Varieties like 'irige sambar', GEB 24 and 'Coimbatore Sanna' were also being cultivated. In the recent years the varieties recommended by the University of Agricultural Sciences like *Intan, Jaya, Vani, Sona, Madhu, Mangala, Pushpa* and *IR8* are popular. The south-west monsoon provides a good rainfall for the rain-fed paddy and is complimented by the water flows from the hilly areas. Paddy is hence mainly grown as a rain-fed crop. The area under irrigated paddy is not significant. In 1935, about 1,600 hectares had irrigation facility which increased to 4,000 hectares in 1989.

In the past due to adequate production of paddy, many farmers used to raise only one crop per year and in the remaining season the land was used as a grass land. The land is plown 6-7 times. The ploughs used in paddy lands are of different types. In the recent years however improved ploughs are being used. After 7-10 days of ploughing and levelling, the land is prepared for transplanting by applying farm yard manure. The green manure which is used in the cattle shed as cattle bed is mixed with cowdung and is applied to the paddy land. The green manure leaves are spread and mixed with the soil and levelled. The use of inorganic manure is in vogue since many years in this area. In the decade of 1930, about 22 tonnes of inorganic fertilizers were distributed for application to wet lands. In the recent years, about 14,000 tonnes of fertilizers were annually applied.

Transplanting paddy is a common method of paddy cultivation. Towards this endeavor, 20 to 25-days old seedlings from the nursery beds are taken for transplanting in the wet lands in rows. In some areas of Shanivarasante hobli, paddy is even sown by seed drills. The amount of fertilizers to be applied depends upon the soil test to know the inherent nutrients in the soil. Irrigation is a crucial and vital input in paddy cultivation. Farmers see that the crop does not suffer from want of irrigation water. During periods of heavy and excessive rainfall, drains are provided for letting out excess water. Paddy in Kodagu is exposed to a great number of pests and diseases. The important pests are the paddy bug, paddy hopper, black hopper, paddy stem borer, leaf miner, and thorn chip insect. The important diseases are paddy blast, bacterial blight and sheath blight. Seed treatment before sowing and application of plant protection chemicals are recommended whenever there is an outbreak of diseases. The threshing of paddy is done with the help of cattle.

In Sampaje area, two crops of paddy are taken. The first crop is grown, and harvested by the end of September. The second crop is taken usually on upland hilly areas and yields about 2/3rds of the yield of the first crop. When rainfall is scanty, irrigation is provided using the water from the small tanks and rivulets. It can be noted that though the river Cauvery takes birth in Kodagu district, there are very few opportunities to use the Cauvery water for irrigation in the district.

Ragi

Ragi is an important dry land food crop. In 1935, ragi was being grown on 1,500 hectares and by 1989, the area increased marginally to 2,483 hectares. The deficit in requirements of ragi was being met by imports from the neighbouring Mysore district. In addition to cultivating ragi on the dry lands, it was also being grown on forest lands prepared to raise teak plantation by the Forest Department. The yields on such lands were good. Even though the crop is more suited to dry land conditions, it adjusts itself even under heavy rainfall conditions. Earlier local varieties of ragi were commonly grown. In the recent years, improved varieties such as *Shakthi*, *Purna*, *P.R. 202*, *Indaf-1*, *Indaf-3*, *Indaf-8* and *E.S.11* are grown. In the uplands, where paddy cannot be taken up due to water deficiency, ragi is being profitably grown.

Other Crops

In Kodagu district, very recently maize is being cultivated. It is reported that other than Somvarpet taluk, no other taluk is suitable for cultivating ragi and maize profitably. The area under maize is around 1,000 hectares. The popular varieties are *Deccan* and *Deccan 101*. Attempts to grow white jowar or rabi jowar on black soils of the district has been fruitful.

In the small belt of the district on the eastern side neighbouring the Mysore district, tobacco and other dry land crops like ragi, horsegram, niger, pulses, coriander and fodder jowar are being grown. Here chewing tobacco varieties are grown. Some farmers also cultivate the Virginia flue cured tobacco. Chillies occupy a very small area. Groundnut is also being cultivated in recent years and *Spanish improved*, *T.M.V. 2* and *S.B. 11* varieties are popular. In parts of Somvarpet cotton and sugarcane crops are also taken up.

Special Paddy Production Programme

The assistance from the Central Government in 1988-89 was to the tune of Rs. 22,63,165 for the special paddy cultivation programme. The amount unspent in one year can be carried forward to the ensuing year. The details of the programme during 1988-89 is given in Table No. 9

The Central Government has a programme to provide a subsidy of 33.3 percent and 25 percent to marginal and small farmers respectively to construct farm ponds. This support is entirely borne by the Central Government which made a provision of Rs. 18.75 lakhs in 1989-90, of which a total of Rs. 8,38,244 were spent for providing subsidy.

High - Yielding Varieties Programme

The High-yielding Varieties Programme (H.Y.V.P.) was initiated in the year 1966-67 to ensure the timely supply of seed material, fertilizers and plant protection chemicals. In addition, arranging demonstrations, field days, crop production competitions and providing information on improved practices are the other activities. Due to H.Y.V.P. the area under high-yielding varieties in the district is gradually increasing. The details of H.Y.V.P. are given in Table No 10.

Utilization of Organic and Inorganic Manures

In Kodagu, both organic and inorganic manures are being used since many years. It is to be noted that the use of organic manures like farm yard manure, compost, green leaf manure, deoiled cakes, fish manure, litter, bone meal and sewage have always been higher than that of inorganic manures. In 1988-89, under the Rural Compost Production Programme, 3,98,000 tonnes of compost were produced and 3,162 tonnes of compost were produced in the Urban Compost Production Programme. Since the inorganic fertilizers are not as bulky in size when compared to the organic manures, they are called dense fertilizers to which fertilizers like urea, ammonium sulphate, calcium ammonium nitrate, super phosphate, rock phosphate, sulphate of potash and muriate of potash belong.

In 1960-61, about 3,000 tonnes of ammonium sulphate, 1,400 tonnes of super phosphate and 600 tonnes of bonemeal manures were distributed to agriculturists. In 1962-63 about 1,636 tonnes of ammonium sulphate, 90 tonnes of urea, 617 tonnes of ammonium sulphate nitrate, 297 tonnes of calcium ammonium nitrate, 376 tonnes of phosphorous and 85 tonnes of potash were distributed through co-operatives. The percentage change in the use of inorganic fertilizers over years is given in table No 11 and 12.

In the recent years, increasing emphasis is being laid on the production of organic manures and their utilization. Providing information to farmers on the scientific method of producing compost is an important component of the programme. The programme covers all the parts of the district. The inorganic fertilizers manufactured by private companies are distributed through fertilizer dealers. In 1985, there were 172 fertilizer selling outlets of which 100 outlets were in the co-operative sector. According to the Fertilizer Control Law of 1957, the Central Government has standardized the quality and the samples are sent out to the testing centre at Bangalore. In 1988-89, 58 fertilizer samples were analyzed. In order to provide timely supply of fertilizers to farmers, there is a subsidy of Rs. 1,200 provided for every selling outlet opened through the Karnataka Agro Industries Corporation. In 1988-89, four new fertilizer outlets were opened. Under the bio-gas Development Programme, in 1988-89, 56 units were commissioned. The major objective of this programme is to promote the use of compost to generate the biogas for use in cooking and the resulting decomposed organic manure for agriculture. The beneficiaries receive subsidy under this programme.

Soil Health Centre, Kudige

The Kudige Soil Health Centre in Somvarpet taluk helps in analyzing the soil samples and advises farmers in applying the right amount of nutrients to their soils depending upon the inherent fertility status of soils. Under the purview of this centre, farmers from the three taluks of the Kodagu district and the Periyapattana taluk of Mysore district bring their samples for analysis. Every year, on an average about 10,000 samples could be analyzed in this centre.

Table No. 9
Details of Special Paddy Cultivation Programme

Sl. No.	Details	Madikeri	Somvarpet	Virajpet	Total
1.	Land area (ha)	9,750	11,073	22,361	43,184
2.	Certified seeds : Quantity (quintals)	170	493	405	1,068
	Area (hectares)	300	820	675	1,795
3.	Beneficiaries (No's)	358	986	810	3,154
4.	Soil Treatment : Rock Phosphate (tonnes)	316	300	674	1,290
	Area (hectares)	620	602	1,348	2,582
	Beneficiaries (No's)	620	602	1,348	2,582
5.	Weedicides : Quantity (tonnes)	0.2	2.3	1.2	3.7
	Area (hectares)	10	113	63	185
	Beneficiaries (No's)	10	113	62	185
6.	Zinc-sulphate : Quantity (tonnes)	0.4	11.7	2.7	14.08
	Area (hectares)	20	584	131	735
	Beneficiaries (No's)	20	584	131	735

Table No. 10
Area under High-yielding Varieties crops (ha) in the District

Crops	1966-67	1983-84	1988-89	1989-90
Paddy	1,267	26,071	24,077	25,145
Maize	29	310	1,060	1,026
Ragi	331	3,297	2,481	1,057

Table No. 11

Percentage change in the use of fertilizers in the district

Year	Nitrogen	Phosphorous	Potash	Total
72-73	+ 68.2	+ 10.5	- 4.9	+ 31.3
73-74	+ 13.3	+ 32.9	+ 43.6	+ 25.6
74-75	- 51.5	- 78.4	- 67.5	- 63.6
75-76	+ 2.7	+ 94.8	+ 47.6	+ 29.2
76-77	+ 72.4	+ 69.1	+ 35.2	+ 61.8
77-78	+ 36.3	+ 42.8	+ 28.6	+ 36.4
78-79	+ 64.2	+ 87.8	+ 115.8	+ 81.7
79-80	+ 43.3	+ 35.0	+ 25.1	+ 36.4
80-81	- 8.3	- 3.3	- 0.3	- 5.0
81-82	- 31.3	- 21.0	+ 18.7	- 16.3

TABLE No. 12

Total Fertiliser use in the District (tonnes)

Year	Nitrogen	Phosphorous	Potash	Total
84-85	4,838	3,726	2,992	11,556
85-86	6,835	4,809	4,124	15,268
86-87	6,445	4,696	4,051	15,192
87-88	7,236	4,316	3,823	15,375
88-89	5,633	4,779	4,100	14,512
89-90	7,800	5,200	6,800	19,800
90-91	9,200	4,600	9,400	23,200

The soil samples are analyzed for their pH, organic carbon, phosphorous, nitrogen and potash. In addition, the electrical conductivity of soils is also measured which helps in knowing the acidity of soils. This in turn will help in knowing the acidity of soils. This in turn will help in estimating the required soil reclamation chemicals like gypsum, salt or lime. Using the results of the soil analysis, fertilizer and nutrient status of soils have been broadly determined and mapped for both irrigated and rainfed regions of the district indicating the suitable crops and crop combinations and their yield levels. In 1988-89, 10,322 soil samples were analyzed and farmers were accordingly advised to follow the recommendations. In the year 1989-90, 10,420 soil samples were analyzed.

Agriculture School, Kudige

The Kudige Agriculture School in Somvarpet taluk has a programme to teach agriculture and related subjects to about 50 students (who are the children of farmers) for three months. Since the year 1990-91, one month training programme is being organized on an experimental basis. In that year a total of 91 students obtained this benefit. To enable the students of the agriculture school to have practical training, the students were trained to grow ragi, paddy, pulses and maize crops in the 6 hectare land attached to the school. In this school for farm women there is a 10 day programme and for the farm men there is a 14 day programme under the DANIDA programme to receive training in agriculture, animal husbandry, horticulture and sericulture. The main objective of this programme is to motivate and educate the farmers regarding the scientific agriculture and impart the recent technologies and their profitability. Under this programme, in 1986-87, 260 farm women and 208 farm men got trained. In 1990-91, 143 farm women and 58 farm men were trained.

Rural Development Training Centre, Kudige

The Rural Development Training Centre at Kudige was established in 1959 as Gramsevak Training Centre. In 1971 in order to meet the requirements of the farmers, using co-ordinated training approach, this centre was renamed as Rural Development Training Centre. In this centre the trained agricultural assistants will impart technical knowledge to the farmers. In 1976 this centre was upgraded with added facilities. The activities of this centre are under the directives of the Directorate of Agriculture. The districts of Mysore, Hassan, Chikkamagalur, Dakshina Kannada and Kodagu are under the purview of this centre. The administrative head of this centre is its principal. The agricultural assistants receive inservice training and knowledge in basic sciences, new agricultural technologies, agricultural co-operation, animal husbandry, panchayat raj, social education and public health. From 1959-60 to 1987-88 a total of 790 agricultural assistants have been trained. From 1975-76 to 1988-89, 1,008 agricultural assistants have been given re-orientation training. Since 1972 a one-day mobile training workshop is being organized for the benefit of farmers and farm women with the intention to train the farmers at their door steps to help them realize higher yields.

The Workshop includes subjects such as agriculture, animal husbandry, co-operation, public health and social education. The trainees are also shown demonstration plots and film shows on modern agriculture. In 1985-86, 840 farm women and in 1986-87, 1,025 farm women got trained in the one day training programme on gobar gas installation and their management. Under the National Agricultural Extension programme the Assistant Agricultural Officers and Agricultural

Assistants are being given a month's re-orientation programme since 1986-87. In 1988-89 and 1989-90, 91 Agricultural Assistants, 20 Assistant Agricultural Officers and 186 Agricultural Assistants, 8 Assistant Agricultural Officers respectively received this re-orientation training.

Watershed Development

Due to the rain water and wind erosion in many dryland areas, the lands are losing their productivity. In addition to the colossal waste of rain water the productive top soils are also getting eroded rendering the soils as poor supporters of agriculture. The watershed development project of the Government is a major step to avert such catastrophies. Near Shanivarasanthe in the Kyathehole watershed about 13,500 hectares of land are earmarked for development under the watershed programme since 1984-85. The Departments of Agriculture, Forestry and Horticulture are co-ordinating the project to raise forest trees, fruit trees and grow *khas* grass in order to check soil and water erosion.

Under the Western Ghats Region Soil Conservation programme, contour bunds and farm ponds are constructed and wet lands are developed with a subsidy of 25 percent. By April 1980, in Somvarpet taluk 13 farm ponds and in Virajpet 12 farm ponds were constructed at a total cost of Rs. 85,000.

The Central Government's Agricultural Mini Kit programme helped a total of 2,900 small and marginal farmers to receive Mini Kits worth Rs. 1.37 lakhs in 1989-90. The kit included seeds of millet, pulses and oil seeds adequate to cultivate half an acre to help and realize higher yields and improve the economic position of small and marginal farmers.

The Special component programme enabled 108 Scheduled Caste farmers to receive high yielding paddy variety seeds, fertilizers and pesticides at the full subsidy of Rs. 500 per acre at a total expenditure of Rs. 48,356 in 1989-90. In addition, agricultural equipments and plant protection chemicals were distributed. For the benefit of farm women and of the community, television set at 75 percent subsidy and 25 percent loan were distributed to 86 groups.

The Varietal field experimental programme initiated 6 experiments of paddy, 3 experiments for greens, 2 experiments of ground nut and 2 experiments for cowpea in 1989-90 to educate farmers. The paddy mini kits were distributed to 2,000 farmers which included two kg of paddy seeds.

Farm Management Studies

The main objectives of the Farm Management Studies are to estimate the costs of cultivation and profitability separately for irrigated and rainfed paddy. Such an information is useful for the Government to help fix procurement prices and provide other marketing facilities to farmers. Farmers are also benefited as they can decide their efficient level of output. For the 1989-90 Farm Management Studies Programme, 40 farmers who had irrigation facility in the Hebbale village of Somvarpet taluk and another 40 farmers of Betoli village of Virajpet taluk were chosen.

In the District's Monthly Workshop Programme, the Agricultural officers of the district, subject matter specialists and specialists of the University of Agricultural Sciences meet together and frame the agricultural programme every month and disseminate the information to all the extension workers. In the fortnightly taluk level training programme, the agricultural extension workers will be given fortnightly training by agricultural officers. The agricultural extension officers in turn disseminate the relevant information to the contact farmers in their respective circles, who in turn disseminate the information to farmers who get guidance regarding the agricultural operations to be carried out in each fortnight.

IRRIGATION

The rivers in the Kodagu district supply substantial amounts of water even though they do not have wider or deeper flows. Since the river water flows are along steep topographies of the mountains of high altitudes, their flows are available for very limited use to agriculture in the district. The river banks are at higher elevations and the undulating lands are responsible for the very limited use of river water for irrigation. In addition, since the irrigation sources are few, agriculture is mainly dependent on rainfall. The district is backward considering the irrigation facility. In Somvarpet taluk, there are two irrigation projects namely Harangi and Chikli hole. The other important sources of irrigation are tanks and *nalas*. In 1947-48, irrigation was available to 2,400 hectares. In 1988-89, 4,730 hectares were irrigated by canals, 497 by tanks, 25 hectares by wells and 476 hectares by other means totalling 5,728 hectares. In that year, 1,51,077 hectares were sown and the area irrigated formed 3.8 percent of the gross sown area. The proportion of irrigated area was 3.59 percent of the net sown area of 1,48,160 hectares. Out of the net irrigated area, paddy was grown under 3,947 hectares and ragi occupied 444 hectares. According to the annual season and crop reports the source wise area under irrigation from 1955-56 to 1989-90 is provided in the following table. (Table No. 13)

In Somvarpet taluk, to a great extent paddy is being irrigated. In addition, after the completion of Harangi Project, in Somvarpet taluk 2,954 hectares of area would be irrigated. An additional 2,752 hectares would also be irrigated from Chikli hole project.

Harangi Reservoir Project

Harangi river is a tributary to the Cauvery and a dam is constructed at Hudgur village in Somvarpet taluk to benefit about 54,590 hectares in Kodagu, Hassan and Mysore districts.

Project Details

1. Project Site: Near Hudgur village, Somvarpet taluk
2. Name of the river: Harangi
3. Reservoir location: Latitude 12° 29'30" North, Longitude 74° 54' 20" East
4. Purpose : Irrigation
5. Catchment area : 420 Square kilo metres (162 Square Miles)
6. Average Yield : 1,118 million cubic metres (39.30 tmc) Average
7. Dam type : Complex

TABLE No. 13

Net area under irrigation (ha) over years under different sources in the district

Year	Canals	Tanks	Wells	Other Sources	Total	Net area irrigated as a % of net sown area
1955-56	1,322	813	-	1,106	3,240	-
1984-85	1,747	1,505	414	940	1,606	3.16
1985-86	1,743	979	300	956	3,978	2.63
1986-87	2,738	1,087	185	437	4,447	2.97
1987-88	3,323	413	-	489	5,325	3.78
1988-89	2,667	206	25	1,198	4,096	2.76
1989-90	2,353	194	3	1,464	4,014	2.76
1988-89 Talukwise						
Madikeri	-	130	-	260	390	0.96
Somvarpet	2,667	41	22	935	3,665	8.37
Virajpet	-	35	3	3	41	0.10

Table No. 14

Details of Canals under Harangi Project

Sl No.	Details	Left Bank	Right Bank	Periyapatna Lift irrigation	Somvarpet Lift irrigation
A.	Length (km)	153	160	50	10
B.	Command area (ha)	11,927	28,863	12,141	607
C.	Talukwise:				
	Somvarpet (Kodagu)	2,347	-	-	607
	Arakalgud (Hassan)	4,403	3,247	-	-
	Hunsur (Mysore)	-	16,680	4,856	-
	Krishnarajanagar (Mysore)	5,177	5,570	-	-
	Periyapatna (Mysore)	-	3,366	7,285	-

By 31st March 1989, 2,002 hectares were irrigated in Somvarpet taluk.

8. Length of the Dam : 846 metres (2,775 feet)
9. Height of the Dam from the river bed level : 49.94 metres (154 feet)
10. Maximum water level : 871.42 metres (2,859 feet)
11. Gross storage capacity : 241 million Cubic Metres (8.5 tmc)
12. Dead Storage (below cill level) : 12 million cubic Metres (0.43 tmc)
13. Live storage capacity : 216 million cubic metres
14. Area submerged: 1,909 hectares belonging to 11 villages
15. Utilisation (including evaporation and other losses) : 509 Million cubic metres (18tmc)
16. Details of the Canal (see Table No.14)
17. Expenditure: 1) Sanctioned amount: Rs. 1,100 Lakhs (according to 1964-65 estimates);
2) Revised estimates: Rs. 12,200 Lakhs; (1985-86 level of rates)
3) Total expenditure from the inception to 31.3.1991: Rs. 11,917.65 Lakhs

The right bank canal of Harangi reservoir crosses the Cauvery river through aqueduct in the Somvarpet taluk at Ramaswamy Valley. This upper canal is built across the cauvery river in Kanive village about 8 kilometres from Kushalnagar. Till 1991 March, the work pertaining to the left bank canal had almost been completed. The water is let out in the channels up to 125 kilo metres. The work on right bank canal is over up to 122.5 kilometres. Water is let out up to 120 kilometres in the right bank canal, up to 16th Kilometre in the Koppa branch canal and up to 55th kilometre in the Krishnaraja Nagar Branch canal. The remaining work is under progress in different stages. Up to 31st March 1991, about 36,620 hectares have received irrigation facility. In Somvarpet taluk, up to 31st March 1989, 2,002 hectares belonging to 8 villages have received irrigation facility. Due to the Harangi project, the villages Anjanageri - Bettageri, Garganduru, Hadre, Harangi, Heruru, Horahole, Igoor, Jamboor, Mehur, Nalkuru-Shirangala and Yedavani of Somvarpet taluk occupying 1,909 hectares have been submerged. The rehabilitation of the 700 villagers is being done in four colonies. After completion of this project, 2,954 hectares in 21 villages of Somvarpet taluk are benefited. The extent of silt accumulation in the Harangi reservoir is being monitored with the help of a satellite according to newspaper reports. Under the lift irrigation scheme, at the 10th kilometre canal, 607 hectares of land in Somvarpet taluk will be benefited from irrigation. The cost of providing irrigation from the Harangi reservoir is estimated at Rs. 17,734 per hectare.

Chikli Hole Reservoir Project

Chikli hole is the tributary the Cauvery river. Chikli hole takes birth in the reserved forests of Madikeri taluk at about 1,219 metres altitude from the mean sea level. It travels about 35 kilo metres in the taluk and joins the Cauvery river. Under this project, near Rangasamudra village of Somvarpet taluk, an earthen dam is constructed to supply irrigation through lift and flow irrigation to 2,752 hectares (6,800 acres) of the taluk. From the State Government an administrative sanction of Rs. 340 lakhs was given in 1977. The revised estimate of the plan is Rs. 998 Lakhs. This project was initiated in the year 1978-79.

Project Details

1. Project site: Near Rangasamudra village of Somvarpet taluk
2. Name of the river: Chiklihole
3. The cost of the project: Rs. 340 lakhs (at 1976-77 rates), revised cost Rs. 700 lakhs (at 1984-85 rates).
4. The current approximate expenditure: Rs. 998 lakhs (1990-91 estimates)
5. Reservoir location: Latitude - 12° 24'00" North, Longitude - 75° 52'30" East
6. Purpose: Irrigation
7. Catchment area: 54 square kilometres (21 square miles)
8. Gross storage: 5.94 million cubic metres (0.21 tmc)
9. Live storage: 5.21 million cubic metres
10. Dead storage: 0.40 million cubic metres
11. Reservoir type: Earthen dam
12. Length of the dam: 440 metres (1,443 feet)
13. Height of the dam from the river bed level: 22.25 metres (73 feet)
14. Maximum water level: 875.54 metres (2,872.52 feet)
15. Full Reservoir Level: 872.64 metres (2,863 feet)
16. Submersed area: 107 hectares (265 acres)
17. Canal details: See Table No. 15
18. Utilisation (including evaporation and other losses): 31.42 million cubic metres
19. The cost of providing irrigation to one hectare of land: Rs. 53,670

From this project irrigation is being made available to 436 hectares in the achkat area belonging to 8 villages of Somvarpet taluk. The work on this reservoir proper is now complete. Survey of 36.4 kilometres on the left bank canal and the survey of the left bank canal lift irrigation project are also complete. Since 1990-91, work is under progress at different stages and irrigation is being provided to the aforesaid 436 hectares of land for the Kharif crop. In this year, Rs. 55.63 lakhs have been spent on the project and till 31st March 1991, a sum of Rs. 672.33 Lakhs has been the total expenditure.

Minor Irrigation Projects

In Kodagu district, very small tanks are called "Kattes". In 1910, 2,383 tanks having 746 hectares (of water spread area) were mainly providing the drinking water for the people. Gradually the number of tanks have reduced. The Honnammana Kere in Somvarpet taluk (16.2 acres) and Halagote Kere (34.28 acres) are the big tanks in the district. In 1965, 481 tanks provided irrigation to 2,800 hectares. Near Madalapura of Somvarpet taluk, a dam is built across a stream providing irrigation to 400 hectares of land. Such small dams could be seen in Nyayadahalla, Shanthaveri halla and Sathi halla. The Balaji dam (200 hectares) near Ponnampet and Honnikuppa and Devanur dams provide irrigation facility. For the South - eastern part of Virajpet, water facility is available from the Ramathirtha and the Lakshmanathirtha rivers where reservoirs have been built. Even

though the river Barapole flows amidst forests, it still provides irrigation to the lands on both the banks of the river flow. By 31st March 1969, each of the 338 tanks in Kodagu district, had up to four hectares of achkat area, totalling 758 hectares. The talukwise details of the minor irrigation sources are provided in the following Table No. 16.

By the end of March 1981, 1,337 hectares in Madikeri taluk, 6,495 hectares in Virajpet taluk and 8,190 hectares in Somvarpet taluk and by the end of March 1986, 1,640 hectares in Madikeri taluk, 8,463 hectares in Somvarpet taluk and 6,687 hectares in Virajpet taluk were irrigated under minor irrigation totalling 16,790 hectares. According to the 1986-87 minor irrigation census, in Kodagu district, there were 413 wells of which 11 were not used. These wells were irrigating 1,662 hectares. In 1986-87, 1,651 hectares were irrigated by wells. There are 7 shallow wells irrigating 83 hectares. Out of total of 21 deep tube wells, 18 wells were not functioning. By 31st March 1988, in the Kodagu district, the minor irrigation sources irrigated 16,848 hectares of which 10,310 hectares were irrigated by 712 tanks, 4,592 hectares were irrigated by 133 reservoirs, 1,356 hectares were irrigated by lift irrigation schemes and 590 hectares were irrigated by other sources.

Sources of Minor Irrigation and Allotment and Expenditure in Minor Irrigation Projects in 1988-89 and 1989-90 are given in Table No.17 and Table No.18 respectively.

HORTICULTURE

The Kodagu kings gave special interest to the development of Horticulture. Kings themselves owned mango and orange orchards. According to the 11th *hukumnama* of the King Lingarajendra, there is a statement encouraging farmers to grow vegetables in their kitchen garden: "Farmers should grow brinjal, bittergourd, cucumber, pumpkin, gourds, *dolichos*, ashgourd, coriander, sweet potato *etc* in their kitchen gardens." This was written by the king Lingaraja in a letter to the *Parupattegars* to instruct village *patels* in this regard. But in the kings' rule coffee cultivation was not very popular.

At present, plantation development is an important profession in Kodagu. Coffee and Cardamom are so important crops that these crops are used as a parallel name to 'Kodagu'. In addition, orange and black pepper are also the commercial crops. More than one third of the cultivated area is under plantation crops. Considering the area and economic importance, coffee occupies the first position. In Kodagu district, the first systematic attempt towards coffee plantation establishment was begun by Fowler in 1854. By 1857, the area under coffee expanded to 28,000 hectares. In 1868, 32,280 hectares of land were leased out for cardamom plantation (During the times of Kings of this period, the wild cardamom collected from forests were purchased by the palace or Government itself). The British Government imposed the condition to sell the cardamom only to the Government. In 1903, the cardamom was grown only on 19,080 hectares. Due to the concentration of coffee plantations the area under coffee increased while that under cardamom got reduced. In 1914 rubber trees were grown on 500 hectares. Tea cultivation began in 1913 and the first tea plantation was established at Hudikeri. Black pepper has been an intercrop in coffee plantations from the very beginning. Even though orange has been famous in Kodagu for its taste and quality, orange orchards have been few and orange is sparsely grown in coffee orchards. In

Table No. 15

Canal details of Chiklihole Irrigation Project

Sl. No.	Details	Left Bank Canal	Right Bank Canal	Lift Irrigation	
				Left Bank Canal	Right Bank Canal
A.	Length (km)	42	4.5	38.6	11
B.	Command area (ha)	1,457	243	850	202

Table No. 16

Details of minor irrigation sources as in 1969

Taluk	Tanks						Other Sources	
	4-20 ha		20-40 ha		40-200 ha		Number	Command area (ha)
	Number	Command area (ha)	Number	Command area (ha)	Number	Command area (ha)		
Madikeri	14	120	-	-	-	-	24	351
Somvarpet	303	3,116	36	975	7	443	2	18
Virajpet	143	1,434	17	412	2	121	8	1,210
Total	460	4,670	53	1,387	9	564	34	1,579

TABLE No. 17

Sources of Minor Irrigation (from 1984-85 to 1988-89) in the district.

Year	Tanks (Number)		Irrigation Wells (number)	Drinking water Wells per household use(no.)	Canals	
	Below 40 ha of command area	More than 40 ha of command area			Number	Length (km)
1	2	3	4	5	6	7
1984-85	1,213	18	122	7,601	3	60
1985-86	1,219	18	122	7,657	3	60

1	2	3	4	5	6	7
1986-87	1,316	23	123	7,697	3	60
1987-88	1,322	23	123	7,721	3	60
1988-89	1,322	23	123	7,754	3	60
1988-89: Taluk-wise						
Madikeri	166	-	-	2,228	-	-
Somvarpet	467	11	99	996	3	60
Virajpet	689	12	24	4,530	-	-

Table No. 18

Allotment and expenditure in Minor Irrigation Projects in 1988-89 and 1989-90

Sl. No.	Name of the Project	Allotment (Rs. Lakhs)		Expenditure (Rs. Lakhs)	
		1988-89	1989-90	1988-89	1989-90
1.	Minor Irrigation (Plan)	21.2	12.00	23.08	13.47
2.	Minor Irrigation (Non-Plan)	13.9	13.85	16.36	17.20
3.	Western Ghats Development Project	14.7	21.00	17.38	25.19
4.	National Rural Employment Programme	3.2	1.60	2.22	1.27

Table No. 19

Area and production of principal horticultural crops since 1984-85

Year	Arecanut	Coconut	Cashewnut	Red Chillies	Cardamom	Rubber	Coffee	Tea
1984-85 Area (ha)	818	571	1,446	256	13,823	1,627	70,006	383
Production (tonnes)	5,564*	2,752*	860*	69	871	-	-	-
1985-86 Area (ha)	843	593	1,579	275	15,207	1,768	71,432	383
Production (tonnes)	5,734	2,864	1,172	75	958	-	-	-
1986-87 Area (ha)	848	641	1,589	279	14,115	1,904	73,630	383
Production (tonnes)	5,768	3,093	1,589	76	889	-	-	-
1987-88 Area (ha)	848	648	2,219	163	14,155	1,909	73,652	383
Production (tonnes)	5,768	3,127	1,318	44	892	-	-	-
1988-89 Area (ha)	858	658	2,375	171	14,100	1,920	73,737	383
Production (tonnes)	5,809	3,175	1,375	46	888	-	-	-
1988-89 Talukwise Area (ha)								
Madikeri	813	320	1,531	48	9,290	1,313	15,715	-
Somvarpet	3	112	-	155	3,700	-	23,392	-
Virajpet	38	226	844	8	1,110	607	34,630	383

Source : District Statistical Office.

* The production of Arecanut and Cashewnut is in terms of processed nuts. The production of Coconut is in 000s.

and quality, orange orchards have been few and orange is sparsely grown in coffee orchards. In 1903-04, cardamom was grown on 19,080 hectares, arecanut on 110 hectares, orange on 440 hectares, and coffee on 24,890 hectares. Area and production of principal horticultural crops since 1984-85 is given Table No.19.

In 1936-37, coffee was grown on 16,304 hectares, banana on 380 hectares, tea on 165 hectares, orange on 2,856 hectares, cardamom on 1,200 hectares, black pepper on 400 hectares, coriander on 100 hectares and in small proportions the different types of vegetables were grown. In 1946, coffee area was 35,433 hectares, cardamom 30,637 hectares, orange 5,460 hectares, black pepper 410 hectares, tea 480 hectares, rubber 1,280 hectares, banana 405 hectares and areca 170 hectares. In 1962-63, coffee was on 34,710 hectares, orange 11,261 hectares, cardamom 6,098 hectares, arecanut 311 hectares, blackpepper 358 hectares, coconut 85 hectares, tea 489 hectares and rubber 1,203 hectares, cashew 480 hectares, cocoa 32 hectares, black pepper 2,467 hectares, cardamom 3,267 hectares, mango 409 hectares, banana 5,128 hectares, citrus fruits 19,622 hectares, guava 308 hectares, sapota 381 hectares, pineapple 198 hectares, jackfruit 212 hectares and papaya 260 hectares.

In 1988-89, different types of fruit crops existed on 8,010 hectares of which orange being an important fruit crop occupied 5,112 hectares. There has been a gradual reduction in the area under orange due to the disease attack. Out of 1,51,007 hectares of net sown area, the non-food crops like coffee, cardamom, black pepper and other crops are grown on 77,437 hectares forming 51.3 percent of the total area. Out of the total non-food crops area of 77,487 hectares, coffee is grown on 73,737 hectares forming 95.16 percent.

The 1989-90 area and production of horticultural crops in the district is provided in the following table No.20.

Table No.20

Talukwise area and total production of horticultural crops for 1989-90 in Kodagu District.

Sl. No.	Details	Madikeri tq (ha)	Somvarpet tq (ha)	Virajpet tq(ha)	Total prod. (MT)
1	2	3	4	5	6
I. Fruits:					
1.	Mango	92	204	393	3,651
2.	Banana : Cavendish	162	177	51	3,627
	Others	735	470	268	11,784
3.	Orange.	898	6,295	10,298	67,455
4.	Lime	275	219	481	7,402
5.	Sweet Orange	112	64	73	818
6.	Guava	86	74	122	1,415
7.	Sapota	193	124	181	2,988
8.	Pineapple	8	10	6	223
9.	Jack fruit	9	75	12	237

1	2	3	4	5
10. Custard apple	3	3	4	40
11. Papaya	19	23	47	623
12. Ramaphal	3	4	3	37
13. Bread fruit	3	4	2	45
14. Others	12	11	12	140
II. Flowers				
1. Chrysanthemum	1	1	1	-
2. Jasmine	3	1	3	-
III. Vegetables				
1. Tomato	15	15	15	297
2. Cauliflower	6	5	5	153
3. Brinjal	5	6	12	184
4. Cabbage	10	8	18	273
5. Knol-khol	8	6	13	162
6. Lady's finger	3	4	5	96
7. Sweet potato	10	10	2	190
8. Tapioca	8	25	8	490
9. Greens	6	8	10	192
10. Others	5	12	15	160
IV. Plantation Crops:				
1. Cocoa	39	4	14	34
2. Cardamom	4,940	6,400	1,437	900
3. Black pepper	918	545	1,146	1,305
4. Ginger	8	8	10	86
5. Turmeric	5	12	5	61
6. Tamarind	-	9	5	70
7. Clove	3	4	2	2.4
8. Cinnamon	1	3	1	-
9. Arecanut	813	3	38	-
10. Coconut	320	112	226	-
11. Cashew	1,531	-	774	-

Source : Kodagu Jilla Parishat, Annual Administration Report, 1989-90

The district is divided into four different horticultural divisions based on the different horticultural crops grown.

A) *High temperature, low level and high rainfall region:* This includes Sampaje, Peraje, Chembu, Karike, Mukutta and the District's Western Ghat areas. Horticultural crops like coconut,

arecanut, pulses, pepper and cashew are profitably grown here. In addition, spices like ginger, turmeric, clove, nutmeg, cinnamon and cocoa are the potentially profitable crops in future.

B) *Medium temperature, high level and high rainfall region*: This excludes the areas of Marenadu, Hudikeri, Srimangala, Ponnampet's western portion, Ammatti's western portion, eastern parts of Madikeri taluk, and includes all other areas. It also includes western parts of Somvarpet taluk's Garvale, Surlabbi and Shantalli. Cardamom crop here is highly profitable and tea, rubber, orange and coffee are also grown. In the recent years due to the prevalence of 'Katte' disease of cardamom, cardamom crop is being replaced by coffee. In future, spices like ginger and pepper will be remunerative.

C) *Medium temperature, low level and medium rainfall region*: This region consists of eastern parts of Virajpet and Somvarpet and parts of Madikeri taluk. It includes Kutta, Kanuru, Balele, Titimathi, Pollibetta, Siddhapura, Chettalli, Suntikoppa, Madapura, and Shanivarasanthe. Here coffee, orange, cardamom and other vegetables could be grown.

D) *Low temperature, low altitude and low rainfall region*: This region includes the eastern parts of the district such as Kushalnagar hobli, Somvarpet, Shanivarasanthe and Ponnampet. Coconut, mango, sapota, guava and vegetable crops are being grown here. Possibilities of growing coconut, banana, pineapple, sapota and vegetables exist.

COFFEE

Coffee is one of the important plantation crops of the State and is a good foreign exchange earner. In Karnataka, coffee plantations are established in Western Ghat region and is an important commercial crop of Kodagu district. Two types of coffee namely Arabica (*Coffea arabica*) and Robusta (*Coffea canifora*) are grown. The Arabica coffee comes up well in high altitudes (900-1200 metres) while Robusta comes up in low altitudes (150 metres). Arabica needs greater amount of shade than Robusta coffee.

It is believed that Arabica is originally from Kafa province of Ethiopia, while Robusta is from Central Africa. There is a story tracing how coffee entered India. Around 1670 a Muslim saint by name Bababudan brought seven seeds of *Coffea arabica* from Yemen, and planted them near Chikkamagalur in his hermitage at the 'Inam Dattatreya Peetha'. This hillock is also known as 'Bababudan Giri'. Gradually people from the surrounding village namely Attigundi and other villages began growing coffee in their kitchen gardens. From here this cultivation spread to Nalknadu area of Kodagu District. From very this place the coffee seedlings spread to other parts of South India. Even then till the enterprising British people in the 19th Century invested in the Western Ghats to grow coffee, the coffee cultivation was not popular. Later in 40 years coffee cultivation expanded at a rapid pace. From Attigundi to Nalkadu of Kodagu, a few Muslims in the regime of the kings of Kodagu, expanded the area under coffee. In 1854 Fowler at Madikeri and Fennel at Ulugali systematically began coffee cultivation. Similarly in 1855, H. Mann and Stewart, in Sampaje range, an Indian Christian Reverend Koundinya in Suntikoppa Belikadu and Yemmegundi (1860), Mangles in 1863 at Alikutti and Haleri began coffee cultivation. In this manner by 1856 the coffee area in Kodagu rose to 11,200 hectares. In addition to private individuals, companies also began cultivating coffee. Perhaps the Karnataka Coffee

Company(1870) was the first institution to start coffee cultivation (1,200 hectares). In this century, in Somvarpet taluk a lady by name Sakamma became famous by cultivating coffee. In the Brahma Giri range also many coffee estates came up. As Richter has mentioned the Glen Coorg Estate (1870) of Stewart was 1,205 hectares large. According to I.M.Muttanna the coffee estate at Pollibetta being managed by Mahon had 3,120 hectare area.

The prominent type of coffee around 1860 was the Arabica type (old chicks). It is in this period the coffee cultivation reached its peak. But in the same time, the crop was attacked by fungus, pests and other diseases. Among the several pests and diseases attacking coffee were the white stem borer pest (*Xylotrechus quadripes*), the green bug (*Caccus viridis*), and leaf rust disease (*Hemileia vastatrix*) which were predominant. Due to these the coffee cultivation began to decline. The small and marginal estates were completely devastated. From 1883 the coffee crop began declining and near the hills by 1898, coffee was virtually wiped out. In the same time the Brazilian coffee began competing in the international coffee market. Several steps were taken to prevent the total devastation of coffee. Trees like silver oak, *haluvana* and other trees were planted in the coffee estates to provide shade and to prevent leaf rust disease and stem borer pest attack. At the same time, efforts to raise disease resistant coffee varieties were also stepped up. In 1892, the United Planters Association of Southern India (UPASI) was established to solve the several problems facing the coffee industry. In Balehonnur (Chikkmagalur district) the Coffee Experimental Station was established in 1926. The Coffee Board upgraded this station to Central Coffee Research Centre in 1946, with the objective of protecting coffee, and developing improved varieties. In 1947 the Coffee research sub-centre began in Chettalli, (Kodagu) to experiment the results of the Balehonnur station in a larger capacity.

In 1843 the Abolition of Slavery Act was enforced. This helped the Scheduled Castes and Scheduled Tribes of Kodagu to liberate from the clutches of *Jamma* (bonded) labour. But their real liberation came with the expansion of coffee estates. With this expansion, the poor and the landless and also agristic slaves from Dakshina Kannada, Hassan and Mysore districts and from Kerala came to plantations for work. The Tulu, Malayalam, and Tamil speaking labourers and the Scheduled Tribes of Kodagu have been working in the plantations. In the big plantations, hundreds of these labourers are also provided the housing facility. Many labourers migrate to Kodagu whenever there is a work season and return to their native places.

For coffee cultivation, the heavy rainfall receiving hill areas which have cool climate are highly suitable. The soil have good drainage and be slopy to enable easy flow of water. Shade is vital for coffee since it does not have the ability to withstand direct sunlight. During the growing period, when the plants are small, *haluvana* (*Erythrina sp*) trees are grown for shade. Later as the crop grows, bigger trees are grown for shade and the *haluvana* trees are removed. Among the big trees, the Silver Oak, Jack, Honne, *Nili*, Rosewood, *nerale*, *kalbagi*, *hottebagi*, *bilibasari*, *atti*, *nittle* etc., are the important ones. The coffee plant cannot withstand severe cold. It can grow in any soil type. Deep red loamy soils are the best suited. Irrespective of the soil type the soil should be deep, have good aeration, drainage, with substantial plant originated organic materials. Coffee is cultivated in black loamy and clay soils also. Even though coffee cultivating soils have higher acidity, due to higher organic content of the soils coffee can grow well.

Method of Cultivation

Since most coffee cultivating areas are forest areas, the first step is to clear the forests for cultivation. In some areas, even though there is a practice to retain the shade providing trees, it is better to clear the whole forest. The coffee seeds are sown in nurseries and the seedlings are planted in the gardens. The seeds are treated before sowing in the nursery. The seeds are collected from the plants specially cultivated for seed purpose. The seeds are chosen from selected fruits and the chosen seeds are mixed with ash and dried in shade. Then they are spread uniformly and dried in shade for five days. The excess ash is removed after drying and the seeds are treated with seed protection chemicals, and later sown in nurseries between January and March for germination. The seeds are sown in seed beds and a thin layer of soil is spread. Everyday the seeds are watered. The germination takes about 45 days. Later the seedlings are planted in a secondary nursery or small bamboo baskets or polythene bags. In these containers, it is a common practice to mix inorganic fertilizers, sand and forest soil before seedlings are planted. In order to protect young seedlings from pests and fungal diseases, pesticides and fungicides have to be sprayed periodically.

The pits should be dug even before the seedlings are ready. The seedlings are planted from July to September. The pits are dug in April-May. The dimension of pit is 1.5' long, 1.5' wide and 2' deep. The top soil of the pits should be kept separately for future use. The spacing depends upon the type of coffee. The *Coffea arabica* is planted 6' X 6', while the tall and wide growing *liberia* and *robusta* species are planted 9' X 9' or 10' X 10'. The top soil is mixed with leaf litter and other organic fertilizers and applied in the pit. In the centre of the pit the coffee seedling is planted. While planting the seedlings from the baskets in the nursery, the bottom of the basket is removed. In order to prevent the break of plantings due to winds they are supported with stakes. They are watered everyday till they sprout. A small pendal is erected for each plant to protect it from sun, hailstorm and heavy rain. Many a times the plants are damaged due to landslides. Such plants have to be replanted after levelling. In coffee estates there is a practice to cultivate black pepper, orange, cardamom and arecanut as mixed crops. After two years of planting, fertilizers are applied before and after the rainy season. Application of artificial fertilizers depends upon the age of the plants and yield bearing age. If the soils have higher acidity they are amended once in a year by applying slaked lime.

Good coffee planters practice interculture every year. This prevents growth of weeds and helps in proper rooting. The new branches have capacity to bear more berries. In a two-year old plant there will be six to seven branches. Nipping the growing tips of these branches will promote profuse branching and higher yields. If the plant is not trimmed or trained it grows to be a small tree. After harvesting, the coffee berries, the branches are to be trimmed and the plant be fertilized. The plant begins to bear the yield three years after planting. But the flowers in the third year are nipped to enable the plant to grow well and yield well. Planters usually take the crop from the fourth or the fifth year. The life of coffee plant is about 30 to 50 years. It flowers during March-April and comes to harvest in October-November. As and when the berries ripen, they need to be harvested. The fallen fruits are commonly picked up. The yield depends upon the variety, age of the orchard and soil fertility.

The coffee berries thus harvested cannot be used without processing. The outer layer of the berries has to be removed by drying to get the parchment coffee. Smaller orchards remove the outer layer of the berries with the help of water. Those planters who do not have water facilities, often dry the berries in sun to remove the outer layer. The berries after harvesting are spread on cleaned concrete platform and dried in sun for two to three weeks. The outer layer loses moisture due to sun drying and turns black. Later the outer layer is removed using a wooden stick or with the help of granite stones. These seeds are then machine processed. In the process of removing outer layer using water, the heavy seeds which sink in water are selected and passed through the processing machine. The seeds with their outer layer removed have to be washed in running water and are classified into different sizes using sieves.

Coffee is attacked by many diseases. Of these, the fungal disease spread by *Hemileia vastatrix* is very important. After this fungus attacks coffee, one can see yellow patches in the lower portion of the leaves, and the leaves wither later. Gradually the plant is weakened and the berry yield is greatly reduced. The spores of *Colletotrichum coffeanum* spread dieback and blight diseases. The spores of *curtium* spread the *cole* disease. The *Cercospora coffecola* spread the brown eye spot disease to leaves and fruits. Because of this disease, the berries become black and drop down. The female nematodes of Melayidogaiseae species enter the *Coffea arabica* roots and form knots, resulting in dropping of leaves. Other species of nematodes also spoil the coffee crop. The mite *Breviperis abvatus* attack the leaves and turn the leaves to ash or reddish black colour. Because of this the leaves fall and this reduces the ability to bear fruits/berries. The young beetles primarily infest on the young shoots and petioles of *Coffea robusta* and these leaves fall and affect the growth of berries. In summer, these pests multiply profusely and devastate the coffee crop. The green bug *Cacus virridis* sucks the sap from young plants. Later the stems and leaves are infested, affecting the growth of the plant.

PLANT PROTECTION

The control of coffee leaf rust is possible by spraying 0.5 percent Bordeaux mixture three times-before flowering, before monsoon rains and after monsoon rains. The *Colletotrichum coffeanum* spores infested branches have to be culled and removed and for preventing further spread, 0.5 percent Bordeaux mixture is sprayed. The plant should be provided the right amount of shade. The same spores also cause the blight disease which also requires adequate shade and use of 0.5 percent Bordeaux mixture. In order to control the *cole* disease, the infected parts have to be separated and burnt. In addition, one percent Bordeaux has to be sprayed after the south west monsoon when necessary. In June and August, one percent Bordeaux mixture is sprayed to control brown leaf spot disease. The Robusta-Arabica grafted plants are planted to control the infestation by nematodes. The control of mealy bugs and green bugs attacking the stem and roots, is achieved through dusting 1.5 percent Ekalux or 5 percent Malathion dust on coffee plant. It is to be remembered that Bordeaux mixture and malathion should not be mixed together and sprayed. The attack by thrips can be controlled by spraying the same chemicals as detailed above and by spraying Ekalux 25 E.C. or Thiodan 35 E.C. pesticides. These pests can also be controlled using the cheaper device-the light traps.

By 1862, in South India, Kodagu and in Kerala, the Wynad region, became the leading coffee growing centres. The area under coffee in Kodagu in hectares was, 14,012 in 1873; 19,892 in 1883, 27,812 in 1903, 18,654 in 1908, 17,325 in 1911, 16,364 in 1921, 16,138 in 1932, 19,960 in 1952, 29,953 in 1961, 42,320 in 1972-75 and 44,444 in 1978. Even though the competition from Brazil in 1883 and the great depression of 1929 affected the coffee market, the coffee consumption within India expanded supporting the coffee industry. In the Second World War period, the hotel industry vastly expanded giving a fillip to coffee industry.

The export of coffee seeds was 579 tonnes in 1857 and grew to 3,000 tonnes in 1867 and to 4,880 tonnes in 1876. In this period, the coffee growers had to withstand the stem borer and plant bug attack, which reduced the area under coffee in 1870 by 2000 hectares. Later till 1883, the coffee area expanded and from 1883, the area started shrinking. Due to high production of coffee in Brazil, the demand for coffee was reduced and in 1884, the area under coffee also reduced by 40 percent. By 1898, all the shadeless coffee orchards near the hilly lands became vulnerable and disappeared. Even after the first world war, due to fall in coffee prices, many coffee estates were liquidated. The area under coffee reduced from 17,325 hectares in 1911, to 16,000 hectares in 1932. After the First World War, the area under coffee which began to recede, gradually started expanding as mentioned above, after the great depression of 1929, the industry started looking up by the Second World War.

According to the 1972-75 census of the coffee orchards in India, Karnataka occupied the first place as it had the largest number of coffee orchards. Kodagu district also had the largest number of coffee orchards producing 1/3rd of the country's production. In 1977-78, the area under coffee in Kodagu district was 44,444 hectares (out of 2,40,600 hectares in India); in 1979-80, the area increased to 56,643 hectares, while in 1980-81, it increased to 60,289 hectares. In 1988-89, the area under coffee was 73,737 hectares.

Census of Coffee Orchards

The Kodagu district had a total of 16,880 coffee estates (11,879 registered and 2,704 unregistered with 2,297 applications submitted for registration) according to the 1972-75 census. Kodagu district has the largest area under coffee (42,320 hectares) and the largest number of coffee estates (16,880) among all the districts of Karnataka. The area under *arabica* variety was 21,653 hectares while the area under *robusta* variety was 20,667 hectares. In the following table (Table No 21) the total area under coffee and the area under bearing plants in different land holding sizes are provided.

The area under coffee in Kodagu district forms 42.1 percent of the total area under coffee in Karnataka and Chikkamagalur district gets the second position in this regard. The age-wise distribution of coffee orchards in Kodagu district according to the 1972-73 coffee census is given in table No. 22.

An area of 28,182 hectares of land is available for extending the cultivation of coffee in Karnataka, of which 66.1 percent (18,641 ha) is in Kodagu district.

Table No. 21

Planted and bearing area of Coffee Estates in the district - Size wise (1972-75 census)

Holding size (ha)	Area planted under Coffee (ha)			Coffee area under bearing (ha)		
	Arabica	Robusta	Total	Arabica	Robusta	Total
0 - 5	2,602	5,921	8,523	1,769	3,469	5,238
5 - 10	2,498	4,179	6,677	1,880	2,607	4,487
10 - 15	1,948	2,073	4,021	1,509	1,416	2,925
15 - 20	1,444	1,540	2,984	1,186	1,162	2,348
20 - 25	1,409	1,332	2,741	1,199	1,057	2,256
25 - 50	2,086	1,099	3,185	1,755	855	2,610
50 - 100	1,724	566	2,290	1,452	503	1,955
100 - 150	1,307	574	1,881	1,180	571	1,751
150 - 200	1,621	484	2,105	1,417	460	1,877
200 - 250	692	270	962	620	192	812
More than 250	4,322	2,627	6,948	3,595	2,224	5,819
Total	21,653	20,665	42,318	17,562	14,516	32,078

Table No. 22
Age of Plants as per 1972-75 census

Age of the Coffee orchard		Arabica	Percentage	Robusta	Percentage
5 years	A	4,093	18.9	5,114	24.7
	B	10,515	17.6	7,821	27.4
5 - 10 years	A	4,482	20.7	910	4.4
	B	11,376	19.0	1,152	4.2
10 - 25 years	A	6,839	31.6	8,250	39.9
	B	18,236	30.5	10,314	37.6
25 - 50 years	A	4,066	18.8	4,884	23.7
	B	12,471	20.9	6,472	23.6
50 years	A	2,173	10.0	470	2.3
	B	7,203	12.0	5,940	2.1
Total	A	21,654	100.0	20,667	100.0
	B	59,800	100.0	27,457	100.0

A - Area in hectares B - Number of plants in '000s

Coffee Board

The Coffee Board was established in 1942 and owes its existence to the Coffee Marketing and Extension Act of the Government of India. Earlier to this Act, the 1940 Coffee Marketing Extension Act was in existence. The prime responsibility of the Board is to control the coffee procurement and distribution. The central office is located in Bangalore. Wherever coffee is grown, the crop has to be submitted to the Coffee Board pool. The Board distributes the coffee through open auction and through co-operative societies. The Board issues permits for coffee exports. It also provides assistance for developing coffee orchards, and coffee extension information.

The then Mysore Government established Coffee Experimental Station in Balehonnur taluk of Chikkamagalur district in 1926. In 1946, this Station was taken over by the Coffee Board. Developing improved varieties, protection of coffee and its promotion are its prime objectives. In 1947, the Board established a Coffee Research sub-station at Chettalli in Kodagu district in order to implement the results of the Balehonnur station on a bigger scale. It is about 16 kilometres from Madikeri, located on the Madikeri-Tellicherry Road. This sub-station has an area of 121 hectares and has an additional area of 12 hectares for future expansion. The station is at an altitude of 1,034 metres from the mean sea level. The annual rainfall is between 1,500 and 2,000 millimetres and the average temperature is 25°C (maximum temperature is 36°C and the minimum temperature is 17°C). The soils are lateritic, red to blackish in colour. After a series of experiments, this station released new Arabica varieties namely S.795 in 1949 and S. 1934 in 1964. Recently another Arabica variety by name Cauvery is also developed. In Robusta coffee, the varieties S.274, B.R. 9 and Congensis X Robusta crosses are believed to yield good results.

The Plant Protection Unit of the Station has mobile pest and disease prevention unit and meets the demand from the coffee planters regarding plant protection throughout the year. This unit has successfully been responsible for controlling several pests and diseases and preventing their further spread. The station has recommended to cut and burn the infested stems and plant parts infested by the pot hole borer. It has also devised a three stage spray schedule to control the mealy bug pest.

ORANGE

The Orange crop is the District's third important commercial crop. In the past, the orange orchards were developed during the rule of the Kings. Later, growing orange as a mixed crop in coffee estates became a regular practice. In 1903-04, the area under orange was 440 hectares. The producers obtained high profits from orange during the Second World War, which motivated them to expand the area under oranges. The area under orange increased from 3,600 hectares in 1931-32 to 11,200 hectares in 1960-61. Due to attack by pests and diseases, the area was reduced to 5,112 hectares in 1988-89. The Kodagu oranges are famous for their appearance, colour and taste. They have a desirable mixture of acid and sucrose contents. The district offers the right temperature, climate, and rainfall to the crop. The orange belongs to family Rutaceae, genus *Citrus*, species *reticulata* and is referred to as Mandarin orange or Mandarin.

Cool temperature is best suited for orange cultivation. In Kodagu, orange is being grown in regions where rainfall ranges from 75 centimetres to 375 centimetres and where the altitude ranges from 600 to 1200 metres. Orange grows well in alluvial and lateritic soils. Black loamy soils with

good drainage are also desirable for this crop. The soils should be deep with good drainage and should not crack in summer. Since, orange is a cross pollinated crop, there is scope for varietal improvement. The seeds are first germinated in seed beds and the seedlings are transplanted. Before preparing the nursery, the soil is dug 2-3 times to remove the weeds and to loosen it. Later nursery beds of 20 feet long, 3 feet wide and 9 inches height are prepared. On such raised beds, the seeds sown in 1 foot X 1 foot spacing. Though the vegetative propagation methods of air layering and grafting are available. Propagation using buds is easier and yields desirable results. Improved orange varieties often become susceptible for diseases or may not adapt to the soil conditions. In those conditions, using the low-yielding but disease-resistant variety as root stock and budding with the improved variety will result in a high-yielding and disease resistant plant type. In the Gonikoppal and Chettalli research stations, using the above technique, improved varieties of orange and lime have been developed. Seeds from such varieties are collected and mixed with ash before sowing them in nursery beds. The seeds germinate in 20 days of sowing. These seedlings are retained for one year in the nursery bed and then transplanted to a secondary nursery, where the seedlings are given timely watering.

In vegetative propagation, buds should be carefully chosen to ensure better and high yielding fruit types. The buds should be mature. While transporting the buds from one place to the other, they are protected with saw dust. While severing the buds from the trees, they are removed along with the leaf stock in November-December. Root stock chosen for budding should be 1.5 Centimetres thick and the bud should be carefully inserted in a 'T' mark made with a sharp knife at a height of 15 to 22 centimetres from the soil level. After inserting the bud, the lower part of the 'T' should be tied with soaked banana fibre or with polythene. In four weeks of bud grafting, the bud should be green and if the associated leaf withers, it can be said that the bud grafting is successful. When the bud begins to regenerate all the other vegetative portions should be removed except the portion up to 20 centimetres on the main root stock stem. After the bud grows to 8 centimetres, the graft can be planted in desired places. The grafts are planted in pits of 2 ½' long, 2 ½' wide and 2 ½' deep. From one pit to the other there should be a spacing of 20 to 25 feet and are opened during May-June. While digging the pits the top and the bottom most portion of the soil should be kept separately. Later, twenty five kilograms of farmyard manure, one kilogram of bone powder and two kilograms of ash mixed and applied to the pits. The saplings are planted in the beginning of the monsoon-season. While choosing the plants, care should be taken to see that the plant has 3-5 food channelizing roots and the bud joint should be twenty centimetres above the roots. It is desirable to have 25 cms long roots in the selected plants. They are planted in the center of the pit and are staked. Wherever the rainfall is low, excepting in the rainy season, the plants have to be watered. The orange plants do not yield for 4 to 5 years. Till that period, short duration fruit crops or vegetable crops can be grown as inter crops. Timely irrigation, fertilization and adoption of improved practices will yield profitable crops. The soil has to be weeded, intercultured and kept clean.

After one year of planting, the main branches begin proliferating. Due to the intertwining of branches the yield is affected. Therefore it is desirable to remove all unwanted branches leaving 2 or 3 good branches for further growth. After five years of planting, the growth of pseudo branches results in excess leaf growth. Therefore such branches have to be removed. For the safety of the crop, it is better to adopt improved practices so that the tree yields adequately in only one season

and gets rest in other season. The budded plant begins to yield after four years of planting. On the other hand, the plants germinated from the seeds takes nine years after planting to yield. The average yield per tree per year is around 1000 fruits. The oranges have to be harvested only after proper maturity. While harvesting, care should be taken to prevent the fruits from splitting and scratching. Several pests and diseases attack orange crop. *Calidonium sinctum* is a stem borer which devastates the crop. Other pests are the sucking moth, bugs, lice and mealy bugs. In addition, the crop is attacked by single and multiple spores of many disease organisms. In the cold season the fruits are infested by brown rot. Many spores infest the stored fruits. The orange fruit comes to harvest from December to March. From June to August the tree also yields a few more fruits. The very first harvest gives the maximum yield.

The area under orange reduced from 11,200 hectares in 1960-61 to 5,112 hectares in 1988-89. This reduction is because of the disease attack every year. There are very few orchards which are exclusively orange orchards. In most cases the orange is grown as mixed crop in coffee estates, where orange is used as a shade tree.

Orange Research Station, Chettalli

In 1942, in order to develop the orange crop the agricultural research station was established in Pollibetta. But this research station didn't produce expected results. Therefore this had to be transferred to another place. In 1947 the agricultural experts chose a 40 hectare land for research in Chettalli. Here orange, lime and other varietal development works are concentrated. Around 1950, the Chettalli research station received modern equipments to carry high level research in orange. To enable this, the area under the station was increased by 80 hectares. In order to make a detailed study of 'Citrus die-back' disease, a 15 hectare plot near Gonikoppal was chosen in 1954 and a well equipped citrus laboratory was established. In 1972, both the Chettalli and Gonikoppal research stations were handed over to the Indian Council of Agricultural Research. An unique distinction of this station lies in its success in establishing a germplasm bank having different varieties of orange in the world. In the first 20 years of the station 415 different varieties of citrus were collected. Among them, *lesten lemon*, *washington naval* and *valencia late* varieties are collected and special experiments have been conducted.

In order to educate the farmers on cultivating lemon, in 1976, the ICAR'S Indian Council of Horticultural Research established a 'Krishi Vignana Kendra' at Chettalli. On 1-1-1992 this was shifted to Gonikoppal. In this center, the farmers will be informed of agricultural technology and imparted other experimental training in dairying, piggery, poultry, apiculture, olericulture, floriculture, mushroom cultivation and plant protection methods. The farmers are trained in 25 subjects. This centre which was concentrating on orange has diversified its research activities to cover other fruits and flowers also. From 1989 a germplasm of 80 different rose varieties is collected for conducting experiments. For the planter in Kodagu and Malnad, experiments are conducted using the *Phaniyuru-1* variety and other six varieties of pepper in three hectares of land. The pepper cuttings are distributed to farmers. This station has trained 17,533 individuals till now.

CARDAMOM

Cardamom is the world's most commercially important and valuable spice. Its scientific name is *Eletaria Cardamomum*. Cardamom which was commonly seen as an ordinary crop is now grown in big estates on a commercial scale. During the regime of the kings of Kodagu, there was a rule to sell the produce only to the Government. At that time the produce was offered remunerative price. The plant grows from 2 to 4 metres in height. The stem is hidden in the soil and hence not visible. The leaves are green and are narrow. Bunches of cardamom are attached to the roots. Each cardomom fruit has three parts and has about thirty seeds. The crop comes up in regions with annual rainfall ranging from 150 to 650 centimetres, at an altitude of 750 to 900 metres above the sea level, with temperatures ranging from 15°C to 35°C. The crop is easily cultivated on hilly and slopy lands where water runs off without obstacles. Like coffee, cardamom also requires shade. It requires good drainage. Cardamom is propagated by seeds or underground stems. Fertile forest soil and organic manure are applied to the land and is levelled. Beds which are 120 centimetres wide and 22 centimetres high and of convenient length are prepared. Seeds are sown in rows and are covered with thin layer of soil. For nursery beds shade is very essential. Germination takes one month after sowing seeds and the seedlings will be ready for planting in 8 months. A one percent Bordeaux mixture is sprayed from time to time to protect the sprouts from disease attack. The 8-month seedlings are replanted in a secondary nursery for 4 months before final planting in pits. Shade is necessary even in the secondary nursery.

Since cardamom is a long duration crop, application of organic manure is highly profitable. In the past planters were applying the leaves of gooseberry as farm yard manure. After three years of planting, the crop begins to bear. But profitable levels of yield begin after five years of planting. Each plant continues to yield for an average of 15 years. The plant begins to flower from April-May and takes four months to ripen. Harvesting is done from September to December. Since the fruits do not come to harvest at one time, harvesting is done for five to six times and takes forty days. After five years, the average yield per acre is between 20 and 30 kilograms of fruits. The ripened fruits are spread in sun for drying. Those fruits which are artificially dried are referred to as green cardamom. The dried cardamom are kneaded to see that good cardamom are culled out for selling in the market to fetch better prices. From one acre of well grown cardamom plants, yield up to 100 kilograms can be obtained. The crop is frequently attacked by pests and diseases. A green insect bores stem and leaves. Thrips attack leaves and flower and suck the sap, while other pests and caterpillars damage the crop. The louse infesting banana plantation (*Pentalenia nigronarvosa*) spreads the 'Katte' disease in cardamom. Some of the pest and disease attack can be controlled by using pesticides and other plant protection chemicals.

Cardamom is considered as the queen of spices, frequently referred to as 'green gold'. In Kodagu district, in 1937-38, cardamom was grown on 1,200 hectares which increased in 1962-63 to 6,100 hectares. In 1987-88, the crop occupied 9,318 hectares in Madikeri taluk, 3,713 hectares in Somvarpet taluk and 1,124 hectares in Virajpet taluk. Cardamom occupies the second place in importance when considering all the commercial crops of Kodagu district. In Karnataka the crop occupies 29,260 hectares while in India (and especially in Southern India) it occupies 99,000 hectares. This year (1990-91) the area under cardamom in Kodagu district is 14,065 hectares.

Regional Research Station

The Department of Agriculture for the first time in 1957, established the Cardamom Research Station at Mudigere (3 kilometres from Mudigere on the Mudigere-Mangalore road, Chikmagalur district) emphasizing research on cardamom to develop high-yielding varieties. Later the research efforts were extended to cover other crops like paddy, guava, mango, rubber, cashew and pepper. In 1965, this Research Station was transferred to the University of Agricultural Sciences, Bangalore. It came under the purview of the National Agricultural Research Project (NARP) from 1981 covering about 4.11 lakh hectares of cropped area spread over Kodagu, Chikkamagalur, Shimoga and Hassan districts out of a total area of 15.51 lakh hectares.

In 1984, this station released a high-yielding variety called *Mudigeri-1*. Earlier, the varieties namely *Malabar*, *Mysore* and *Valakka* which are yielding 250 kgs of cardamom per ha were released. At present experiments on the variety *D7-5* are going on and is expected to yield at least 300 kgs per ha.

Currently efforts are going on towards developing drought resistant varieties of cardamom. In this endeavour, it is found that the variety *p-6* performs well under water stress conditions. The *Katte* disease and the thrips which attack cardamom are controlled by applying suitable plant protection chemicals. It has been found that high yields in cardamom are motivated by having agriculture as a complementary enterprise. The experiments on paddy at this station began from 1982 under the NARP. Earlier, '*Intan*' was the only variety of paddy recommended for this region. Later, in 1987, I.E.T. 7191 and in 1990, K.H.P.-2 varieties were developed and released for this location. The varieties *I.E.T. 9926* and *OWR 4107* which can resist paddy blast and also give higher yield than *Intan*, were developed. Another variety by name *C.T.H.-1* which is giving higher yield on 'makki' wet lands is also being developed.

In this station, emphasis is also laid on Malnad non-traditional crops like sapota and guava, with the result that '*kalipatti*' variety of sapota and '*sardar*' variety of guava were developed. In addition, a drought-resistant, dwarf grass variety which can be harvested two to three times in a year called the '*kango signal*' is being grown in this station. This grass helps in successfully reducing the soil erosion.

Spices Board

The spices Board was established in 1989 by merging the Cardamom Board and the Spices Export Board, according to the 1986 bye law. The development and marketing of cardamom came under the purview of this Board. The central office of the Board is in Cochin, Kerala State. There is a regional office in Sakleshpur, Hassan district of Karnataka. In Kodagu district, there is a Divisional office in Madikeri, headed by an Assistant Director (Development) who has Field Officers at Madikeri, Virajpet, Bhagamandala and Somvarpet. The Board has two cardamom field stations one at Biligeri and the other at Aigooru. There is another cardamom research station at Appangala.

The cardamom crop development project trains the farmers in scientific methods of cultivating and marketing cardamom. The field stations provide cardamom seedlings to registered farmers as a

part of the cardamom crop extension programme. In 1989-90, 96 farmers and in 1990-91, 73 farmers were authorized to develop cardamom nurseries. In order to rejuvenate the uneconomical, diseased and old cardamom plants (orchards), credit institutions are providing assistance. Under this scheme, small farmers are provided an assistance of Rs. 3,750 in three years (in installments of Rs. 2000, Rs. 1000 and Rs. 750) and replanting cost of Rs. 15,191 (in three instalments of Rs. 6,409, Rs. 3,917 and Rs. 4,965). Every year about 300-350 farmers are benefited by this scheme. The Western Ghats Development Programme is providing assistance for developing cardamom crop since 1989-90, for soil conservation, purchase of irrigation equipments, and for water storage. The small farmers get a subsidy of 25 percent and the marginal farmers get a subsidy of 33 percent. The Scheduled Caste and Scheduled Tribe farmers get 50 percent subsidy. During 1988-90, about Rs.16.95 lakhs are provided as funding under this programme.

The Appangala Cardamom Research Station which began with the assistance of the Mysore Government was transferred to the Central Plantation Crops Research Institute belonging to the Indian Council of Horticultural Research in 1974. This station is located in the Eravanadu village, 8 kms away from Madikeri on the Madikeri-Bhagamandala road. In 1986, this station was elevated to the National level Spices Development Board by merging it with the Regional Research Station of Calicut of Kerala. This station is 1,000 metres above the sea level and has 17.4 hectares. Here a germplasm collection of 236 local types of cardamom and 14 associated types is maintained. Efforts are on towards developing varieties resistant to the 'Katte' disease. Improved practices required for cardamom are also being developed. In Kodagu and Hassan districts demonstration plots have been developed, producing an average yield of 778 kilograms (as a single crop) and 1,400 kilograms (as a mixed crop) of dry cardamom.

CASHEW

In 1988-89 the cashew was grown on 2,315 hectares in the district. Cashew is grown on hill slopes to reduce soil erosion. This crop was introduced by the Portuguese from the American continent. It grows under varied conditions of soil and climate, with altitudes up to 700 metres above the sea level. It grows under a rainfall range of 75 to 300 cms in the lateritic soils located on hill slopes. There is a great demand for seeds and oil of cashew. Cashew is a cross pollinated crop, usually propagated by seeds. The crop can also be grown using grafts and yields better than that propagated by seeds. It begins to yield fruits from third year onwards. By the tenth year the crop yields full sized fruits, and goes on yielding good crop till 20-25 years. The tree has two types of flowers-the male flower, and the bisexual flower. The average yield per bearing tree is estimated to be 5 kgs. From a hectare of cashew orchard, a production of at least one tonne of cashew seeds can be expected. The crop is attacked by several pests and diseases. Among them, the thrips, leaf minor and tea mosquito which attack the roots and stems and the die-back and powdery mildew diseases are important. Plant protection methods have been developed to fight against the pests and diseases. The treatment for disease resistance provides effective protection against diseases for the crop and involves spraying fungicides and pesticides. Under the Cashew Development Project, the cashew seedlings are raised and distributed to growers for planting on their fields. The Department has programmes to increase production on the existing orchards through improved methods of fertilizer application and plant protection.

RUBBER

The raw rubber is obtained from a milk like substance of the rubber tree (*Hevia brasiliensis*) called 'latex'. This milk like liquid provides 95 percent of good rubber. The latex is extracted once in every two days. The rubber trees grow to a height of 60 to 80 feet and begin to yield from 5 years after planting. But the economically viable production begins from the 12th year. The tree yields latex up to the thirtieth year. The tree has to be bored in the stem to extract the latex. From the 5th year the latex is extracted by making an incision on the stem. On the first day the incision is made at a height of 4 feet from the bottom, the second day at a lower distance and this process continues till one year. As the tree grows, the portion where incision is made gradually gets rejuvenated by the new stem and gets ready for a fresh latex extraction. The latex thus collected is purified by removing impurities and other foreign objects. When this is poured in to an aluminium vessel containing water and mixed with dilute acid, the water and latex mix very well. Before the latex mixture gets clotted, the separators are introduced. Later, layers of latex are removed from the vessel and are subjected to mechanical pressure to remove the water content. Later the rubber is cut to suitable sizes and dried. The rubber manufactured in this process will not be of good quality, as it would be rough and will not be having desirable elastic properties. Therefore, after fully processing fine rubber can be had and used to manufacture the rubber products.

In Kodagu district the rubber gardens were developed since 1914. In 1960-61, the rubber occupied 1,340 hectares, contributing 360- 400 tonnes out of a total production of 2,250 tonnes in the country. The Tamil migrants from Sri Lanka were mainly responsible for the expansion of rubber in the decade of 1990. In 1987-88, the crop occupied 1,302 hectares in Madikeri taluk and 607 hectares in Virajpet taluk. The rubber orchards can also be seen in Makutta, Sampaje, Jodupala and Kadamkallu. In 1988-89 the district had 1,920 hectares under rubber. The rubber orchards have rubber industries also where rubber sheets and foot pads for slippers are manufactured. These industries are located in the big rubber orchards at Makutta, Kadamkallu, Sampaje, Devarakolli and Karadigodu. Here dry is rubber also manufactured.

TEA

Tea plants need warmer climate and more sunlight. They require heavy rains but the soil should have good drainage. Therefore, this crop is grown from 35 metres to 2,200 metres above the mean sea level. In Karnataka the districts of Kodagu and Chikmagalur have 1,870 hectares of private tea estates. In Kodagu, in 1915, the first tea estate was established in Hudikeri. For the preparation of tea dust/powder, young sprouts of tea are well suited. The crop yields well in the spring and the rainy season. Since the tea bushes live for a long period, there will be sprouts arising from the bush all the time. From the tender leaves, buds and sprouts and good quality tea leaves are obtained. Usually every tea garden will have the tea processing unit. The gathered tea sprouts and leaves are sieved using broad wired sieve and are spread and then steam dried. They are gently rolled in machines in which process the tea leaves begin to give good smell. Later these leaves are spread on big plates for fermentation with the help of humid air. The tea leaves absorb the oxygen in the humid air and attain copper colour. In 1915 the tea processing unit was started by a British company at Hudikeri. In 1943, this was called the Coorg Tea Company and had 170 hectares of tea orchard. In 1961-62 it manufactured 1.6 lakh kgs of tea powder. In 1984-85 the Kodagu district

had 383 hectares of tea orchards. The State Forest Development Corporation has chosen the bare area of the hillocks attached to the Galibeedu forests. On an experimental basis, the forest department in 1977 began planting trees here on 15 hectares of land. Though a good tea crop was realized, due to absence of good marketing and processing facilities, the crop was neglected, with the result, the tea plants grew like trees and were found to be not useful. Later in 1985, the Karnataka Forest Development Corporation, developed a huge plan called 'Kan Tea' (Karnataka Tea) to develop tea orchards on 1,800 hectares in Galibeedu at an investment of Rs. 21 Crores. The Forest Department transferred 2,100 hectares of 'C' and 'D' class land to the Corporation. For this plan, the Tea Board is giving a subsidy of Rs. 15,000 per hectare and NABARD is giving an assistance of Rs.8.55 crores. This project also has a tea processing unit to be developed at a cost of Rs.2 crores of which Rs. 1 crore is provided as subsidy by the Tea Board. Since the inception of the Project, till 1988, the Corporation developed 60 hectares of tea garden at a cost of Rs. 30 lakhs and about 20 lakh tea seedlings were raised. In 1989 this project was revised and it was proposed to develop new tea gardens on 800 hectares of land at a cost of Rs. 16 crores for which sanction is awaited. This new proposal will begin yielding from the year 2001. The environmentalists have expressed strong opposition to this project.

Programmes of the Department of Horticulture

In Kodagu district 12 Horticultural Farms and nurseries have been established, with the intention of providing good quality and reliable seed/plant material at reasonable prices. These nurseries are also serving as demonstration plots for farmers. In these centres new varieties in fruit and other plant species are brought from different parts of India and the world and are examined for their growth and adaptation.

The details of the area under horticulture farms are provided in the following table No.23.

Table No. 23

Details of area under Horticultural farms

Sl. No.	Name of the farm	Total area (ha)	Area developed ha	Year of establishment	Name of the plants/trees established in the farm
1	2	3	4	5	6
1.	Napoklu Madikeri taluk	25	9	1962-63	Pepper, fruit Crops, Cardamom, Citrus varieties
2.	Kudige Somvarpet taluk	12	12	1964	Mango, guava, pomogranate vegetable crops
3.	Madalapura Somvarpet taluk	100	16	1973	Citrus varieties
4.	Bilagunda Somvarpet taluk	9	9	1967	Guava, orange, mango, pepper
5.	Madapura Somvarpet taluk	247	129	1967	Mango, guava, orange, cardamom pepper, sapota

1	2	3	4	5	6
6.	Harangi Somvarpet taluk	123	69	Not available	Mango, guava, coconut, citrus, pomegranate, vegetable and ornamental plants
7.	Aravathoklu Madikeri taluk	9.6	9.6	1965	Mango, pepper
8.	Ponnampet Virajpet taluk	8.5	8.5	1965	Fruit trees, pepper
9.	Raja Seat Park & ornamental garden, Madikeri	6.6	5.6	Not available	
10.	Office nursery, Madikeri	1	1	"	-
11.	Nursery at Sudarshan Guest House, Madikeri	1.5	1.5	"	-
12.	Office of the Deputy Commissioner, Madikeri	0.75	0.75	"	-

The income and expenditure of the horticulture farms (in Rs. 000s) for the years 1986-87 to 1988-89 are provided in the following table (No 24)

In 1988-89 the number of seedlings produced are as follows: lemon-25,390, seedless pomegranate-650, black pepper-1,05,000, cardamom-10,000, mango seedlings-20,000, mango grafts-17,000, guava seedlings- 6,500, guava grafts-3,210, vegetable seeds-125 kgs, coconut-10,880 and other seedlings-22,100.

Tribal Development Project

The main purpose of this project is to train the Scheduled Tribes farmers in horticulture and improve their social and economic conditions. In 1988-89, under the Tribal Sub-Plan of the State Government, Rs. 4,86,700 are spent to develop 37 model horticulture gardens and 24 community horticulture gardens, to train 16 farmers in horticulture and develop 75 half acre plots. In the special Component Plan, the young farmers belonging to the Scheduled Tribes are trained in horticulture and are helped to establish half acre to 2 acres of fruit or coconut gardens on their lands. In addition, the gardens developed in the previous years are also being supervised. In this programme, the seeds, seedlings, manures and other inputs required are supplied free to beneficiaries. In 1988-89, under the Special Component Plan (of the Government of India) 46 old gardens were supervised at a cost of Rs. 25,000, and 24 new plots of half acre each were developed at a cost of Rs. 24,000. In addition six farmers were also trained in horticulture.

Most of the horticulture crops take many years to bear, making it difficult for the small and marginal farmers to adjust to this situation. To resolve this problem, NABARD has come forward to provide long term loans through the State Co-operative Agricultural and Rural Development Bank for coconut, grapes, cardamom, betelvine, blackpepper, lime, cashew, mango and jasmine. The details of the loans are given in the following table (Table No 25)

Table No. 24

Income and expenditure of horticultural farms in the district.

Horticultural farms	1986-87		1987-88		1988-89	
	Expenditure	Income	Expenditure	Income	Expenditure	Income
Napoklu	31.72	29.86	-	12.55	39.71	32.50
Kudige	11.78	21.03	-	11.61	50.58	0.18
Madalapura	8.77	1.54	-	-	-	-
Bilagunda	32.48	15.83	-	15.96	70.01	40.77
Madapura	209.99	96.05	-	123.87	751.02	235.11
Harangi	42.54	48.85	87.0	144.88	436.86	224.27
Aravathoklu	29.66	25.95	-	28.53	34.49	72.00
Ponnampet	34.13	10.50	-	24.46	-	28.61
Raja Seat Park and ornamental Garden, Madikeri	-	-	-	9.9	-	9.86

Table No. 25

NABARD Programme to develop horticulture

Sl. No.	Details	Coconut	Cardamom	Black pepper	Lime	
					135 plant/acre	108 plant/acre
1.	Loan per acre (Rs.)	4,800	4,100	2,430	9,000	7,500
2.	Instalments:					
	a) 1st year	2,000	1,500	1,260	2,650	2,300
	b) 2nd year	700	1,020	540	1,200	1,000
	c) 3rd year	700	1,580	630	1,450	1,150
	d) 4th year	700	-	-	1,800	1,450
	e) 5th year	-	-	-	1,900	1,600
3.	Mode of repayment	11 to 15 years in equal inst.	6 to 10 years in 4 equal inst.	4 to 6 years in equal inst.	7 to 10 year in equal instalments	

The Western Ghats Development Project provides assistance to small and marginal farmers through the State Co-operative Agricultural and Rural Development Bank for coconut, betelvine, blackpepper, cardamom, and mango. The Command Area Development Authority is supplying seeds, seedlings, agricultural implements and other materials at reasonable prices to the farmers in Kodagu district who are in the Cauvery Watershed Area. Both these projects are administered through the Department of Horticulture in the District.

ANIMAL HUSBANDRY

In 1817, according to Lt. Connor, cows, buffaloes, sheep and pigs were the important domestic animals of Kodagu district. Though cows were in large number, their development did not receive adequate attention. Hence, in most parts of a year, due to heavy rains, their development was not apparent. But they were strongly built. In ghat areas, bullocks were used to transport materials. Attempts to improve the cattle breeds of the district are very rare. According to 'The Coorg Cattle Committee' of 1927, bullocks were used as draught animals to drag carts or to drag the four wheeled big cart. But the situation in the eastern parts of the district was different. In these parts, the development of cows had improved and was similar to that in Mysore district. There were many improved breeds of cows in this region. Buffaloes had developed well in the forest areas. They used to give better quality milk than cows. He-buffaloes were used to plough and level the wet lands in the rainy season. The large patches of forests and grasslands and a plentiful supply of water helped to develop good breeds of buffaloes. Around 1900, every household in Kodagu, had cows and buffaloes serving both milk and draught purposes. Around 1930, barring the Kurchi and Kutta villages in South Kodagu, the farmers in other areas used to bring good breeds of bullocks from the neighbouring Mysore district. Farmers were very occasionally raising good milk yielding cows and buffaloes: Therefore, in a few villages, milk was not available at all. Since the milk-yielding cows belonged to the local breeds, the production was very low. A few rich farmers had improved high-yielding cows. Especially in areas like Ammathi, Virajpet and Ponnampet, the quality of local breeds was poor and they were not sturdy. In addition, the grasslands which were very productive earlier, became degraded by 1930. Due to this, the production of grass declined and resulted in the low quality of cattle and reduction in their number. The spread of contagious diseases was yet another reason for their decline.

According to a survey in 1926, the reasons for the degradation in cattle population were, the gradual break up of the joint family system, ill equipped cattlesheds, scarcity of well developed hygienic bulls for reproduction, the inadequacy of grasslands and livestock feed, cultivation of grasslands, earmarking forest lands for protected forests, scarcity of water, the weeds like lantana and other plants coming up in the grass lands, attack by contagious diseases and disinterest on the part of farmers in rearing improved breeds of cattle. In the Southern parts of Kodagu, the green or dried leaves were dumped on the dung in the very space where the cattle were also to rest. The farmers used to remove the leaves and dung from this cattleshed whenever they felt it convenient to do so. The flies which were attracted by the smell of the dung and decaying leaves then became active propagators of diseases. In some areas, even though, the cattle shed was cleaned every day, since the dung was heaped just outside the cattle shed, people living in their houses had to withstand bad smell. Sometimes, the rainwaters were stagnating in the cattle shed rendering it unfit for cattle to live. In some cases, in the summer season, the cattle were housed in temporary sheds

near the wet lands. Since the cattle were not separately housed by most of the families, and since they were left at the same time for grazing, the stronger cattle were coming in the way of weaker cattle from grazing. In the eastern parts of Kodagu, namely Kushalnagar and Shanivarasanthe hoblies, there were no accommodation exclusively for cattle due to poverty of the farmers.

It is reported that *lantana* was brought to Kodagu, by a foreigner in 1863, for the purpose of using it as a hedge plant in fencing. But, within a span of two decades, the *lantana* plant spread to most parts of Kodagu district like a weed. The clearing of forest trees for the expansion of coffee estates was responsible for this rapid multiplication and spread of *lantana*. There was no sufficient undergrowth in places where *lantana* came up and perhaps this plant was solely responsible in limiting the growth of other *flora* and thereby resulted in destruction of forests. In the decade 1980-90, the unscientifically managed coffee orchards failed to yield well and harboured the *lantana* in coffee orchards. The *lantana* plants from these coffee orchards multiplied rapidly causing degradation of natural forests. Considering all these factors, the then Government took measures to uproot *lantana*. It also gave certificates, cash awards and other awards in the form of swords and traditional head dresses to those who participated in the programme of removing *lantana* plants.

The Department purchased Amrithmahal breed of bulls in order to improve the cattle breeds. At a cost of Rs. 1,600 four bulls were purchased in 1908, four in 1909, and six in 1911 making a total of 14 bulls. In 1909, under the supervision of a Deputy Director, one veterinary assistant surgeon was appointed. The number of staff working here was increased to four in 1925. The veterinary hospitals were opened at Madikeri in 1909 and at Ammathi in 1910.

A Veterinary Assistant Surgeon was appointed in 1909 for Veterinary hospital at Madikeri, in 1912 for Veterinary hospital in Somvarpet and in 1916 for the hospital in Ammathi. In 1938, in the Department of Animal Husbandry, under the supervision of the District Officers, five Veterinary doctors and two over-time doctors were working. In 1936-37, 47,262 animals were treated in the district and 3,635 animals were given preventive vaccines. The Veterinary doctor at Ponnampet was also administering medicines to elephants belonging to the Forest Department.

Breeds of Cows

The 'Hallikar' breed of cow is considered the best for farm work and for draught purposes. This breed will have a protruded forehead and longhead with lines delineated on the forehead. The horns are attractive, originating directly from the head and tapering with a sharp edge. The cow has a long body with light legs. The colour intensity of the body ranges from light to dark. They are in use in Kushalnagar and Shanivarasanthe hoblies. Nevertheless due to negligence of this breed, it lacks vigour to drag even a small cart in South Kodagu which receives high rainfall.

The Srimangala, Kutta, Nalknad and Madikeri areas have certain types of cows which have a stunted growth and do not display specific attributes of any breed. Even though these are small in stature, they are resistant to diseases and withstand stresses and strain. Their milk production is reduced to just six to seven months in a lactation. They are raised for the purposes of milk, dung and for agriculture. These cows consume a lot of grass and withstand heavy rains. They are not suitable for plains which receive low rainfall.

In addition to the above types, several other mixed types which do not exhibit specific traits of breeds can be recognized. The Amritmahal and local breed crosses have great strength and good growth compared with local breeds.

The Livestock Census

The details of the livestock census in Kodagu (from 1896-1909) are given in the following table (Table No 26). The 1926 livestock census reported a total of 1,38,559 cattle of which 54,450 were oxen and 10,693 were he-buffaloes. In 1935, there were 1,37,187 cattle. The details of the livestock census for the years 1956-1990 are provided in the following table (Table No. 27).

The talukwise livestock resources according to the 1983 livestock census and the details of the 1990 livestock census are provided in the following tables No.28 and No.29 respectively.

The Veterinary Institutions

The district had one veterinary hospital, five veterinary dispensaries and 20 rural veterinary dispensaries in 1961. In 1989, there was one veterinary hospital at Madikeri one veterinary dispensary in Napoklu, one rural veterinary dispensary each at Murnadu, Bhagamandala, Sampaje, Chembur, Kakkabbe, Parane, Cheyyandane in Madikeri taluk; five veterinary dispensaries at Somvarpet, Suntikoppa, Shanivarasanthé, Kushalnagar and Kodlipet and five rural veterinary dispensaries at Madapura, Shantalli, Hebbale, Aiguru and Chettalli in Somvarpet taluk; and six veterinary dispensaries at Virajpet, Ponnampet, Ammatti, Siddapura, Titimathi and Pollibetta, seven rural veterinary dispensaries at Hudikeri, Srimangala, Kutta, Birunani, Kadanga, Kanuru and Balele of Virajpet taluk.

The number of livestock treated as outpatients in 1988-89 is provided in Table No 30. The number of livestock castrated in 1988-89 is provided in Table No 31. The details of the number of livestock treated by Mobile Veterinary clinics are provided in Table No. 32. The details of the number of livestock castrated by the Mobile veterinary clinics are provided in Table No.33.

Key village Scheme.

Somvarpet in Somvarpet taluk and Ammatti and Gonikoppal in Virajpet taluk, have key village scheme centres. Their sub-centres are located in Garvale, Gonimarur, Beluru, Shantalli, Gowdalli and Abburukatte of Somvarpet taluk; and Nalvathoklu, Hosuru, Bittangala, Kannangala, Siddapura, Pollibetta, Kiruguru, Ponnampet, Chikkasodluru, Mayamudi, Mugutageri and Halligattu of Virajpet taluk. The progress achieved in these sub-centres in 1989-90 is given in the following table (Table no 34).

In the district, 3 Mobile Veterinary clinics are working providing clinical facilities, veterinary assistance, artificial insemination and extension of information to farmers wherever necessary. In the district, a total of 35 centres are providing facilities of artificial insemination. Among these, 21 centres are having solidified semen and 14 centres are having cold stored semen facilities. In the development of animal husbandry, there is a Tribal sub-plan meant for the benefit of the tribal people. Ponnampet has a centre of this tribal sub-plan which provides 80 percent subsidy for

Table No. 26
Livestock Census Figures (for earlier census)

Sl. No.	Details	1886-87	1898-99	1903-04	1908-09
1.	Oxen and bulls	35,280	33,385	34,629	39,594
2.	Cows	26,215	26,098	26,674	33,331
3.	He-buffaloes	12,375	12,448	11,931	12,819
4.	She-buffaloes	7,540	6,837	7,690	8,910
5.	Calves	23,215	22,067	19,096	32,836
6.	Sheep	710	772	629	230
7.	Goats	1,820	1,862	1,755	1,827
8.	Horses	663	582	401	180
9.	Donkeys	328	330	274	119
10.	Ploughs	27,425	27,501	26,979	29,546
11.	Bullock carts	1,039	767	715	662

Table No. 27
Livestock Census of Recent Decades

Census Year	Cows	Buffaloes	Sheep	Goats	Pigs	Poultry birds
1956	1,70,531	30,914	155	3,340	35,860	3,04,840
1961	1,72,342	36,754	3,053	4,587	30,651	2,84,510
1966	1,53,766	27,399	1,258	4,950	30,809	2,30,715
1972	1,84,629	37,627	537	5,643	56,849	3,07,725
1977	2,01,758	43,797	805	7,080	69,198	3,13,932
1983	1,84,689	47,101	1,568	10,024	70,785	4,06,525
1990	1,58,154	48,838	382	8,422	43,692	3,71,332

Table No. 28
Talukwise Livestock figures as in 1983

Sl. no.	Details	Live-stock and poultry 1983			Total
		Madikeri	Somvarpet	Virajpet	
1.	Cows (including Oxen)	45,605	67,163	71,921	1,84,689
2.	Buffaloes (including he-buffaloes)	9,456	11,984	25,661	47,101
3.	Total	55,061	79,147	97,582	2,31,790
4.	Sheep	252	667	649	1,568
5.	Goats	888	7,825	1,311	10,024
6.	Pigs	26,095	11,720	32,970	70,785
7.	Dogs	18,383	15,537	22,164	56,083
8.	Poultry birds	1,00,696	1,14,898	1,54,763	3,70,357
9.	Milch cows	5,692	9,850	9,952	25,404
10.	Milch buffaloes	951	2,532	2,952	6,435
11.	Oxen and he-buffaloes suitable for work	21,600	23,586	40,734	85,920

TABLE No. 29
Livestock census - 1990

Sl.No.	Details	Madikeri	Somvarpet	Virajpet	Dt. Total
1	2	3	4	5	6
1.	Cross-bred cows	2,049	7,015	7,437	16,501
2.	Local cows	39,548	52,113	49,992	1,41,653
3.	Total Cows	41,597	59,128	57,429	1,58,154
4.	Buffaloes	9,678	14,072	25,088	48,838
5.	Sheep	23	262	97	382

1	2	3	4	5	6
6.	Goats	531	7,051	840	8,422
7.	Pigs	16,454	8,193	19,045	43,692
8.	Dogs	15,961	16,292	19,529	51,782
9.	Other Livestock	31	17	30	78
10.	Total livestock	84,275	1,05,015	1,22,058	3,11,348
11.	Total poultry	99,076	1,35,489	1,36,767	3,71,332

Table No. 30

Number of Live stock treated as outpatients

Taluk	Cattle	Buffaloes	Sheep	Goats	Pigs	Total
Madikeri	14,572	3,431	193	1,255	5,367	3,624
Somvarpet	19,138	7,654	307	1,637	2,514	7,720
Virajpet	33,710	11,282	115	884	7,878	11,227
Total	67,420	22,367	615	3,776	15,759	22,571

Table No. 31

Number of livestock castrated

Taluk	Oxen	He-buffaloes	Rams	He-goats	Pigs	Others
Madikeri	293	177	13	88	317	10
Somvarpet	565	251	15	187	527	21
Virajpet	857	332	9	85	843	23
Total	1,715	760	37	340	1,687	63

TABLE No. 32**The number of livestock treated by mobile veterinary units (1988-89)**

Taluk	Cattle	Buffaloes	Sheep	Goats	Pigs	Others
Madikeri	1,269	422	13	132	331	273
Somvarpet	2,425	1,226	20	192	554	388
Virajpet	3,691	1,088	11	71	546	461
Total	7,385	2,556	44	395	1,431	1,122

Table No. 33**Number of livestock castrated (1988-89)**

Taluk	Oxen	Cocks	Rams	He-goats	Pigs	Others
Madikeri	493	374	127	97	491	372
Somvarpet	685	441	106	123	321	315
Virajpet	578	282	99	90	283	293
Total	1,756	1,097	332	310	1,095	980

buying milch animals, poultry birds, piggery and sheep rearing units. In 1988-89, the progress achieved under the Tribal sub-plan is given in the following table (Table no 35)

Special Component Plan

This plan aims at identifying and assisting Scheduled Tribes for purchasing cattle, buffalo, sheep, pig and poultry units. They receive 80 percent as subsidy and 20 percent as loans from commercial banks. The progress achieved in 1988-89 under this plan is given in table No. 36.

Comprehensive Western Ghats Development Programme

With the intention of obtaining the full benefits from nature, the Comprehensive Western Ghats Development Programme is implemented in the district. This Programme intends to develop the grasslands under private control, provide crossbred bulls free of cost and livestock feed for rearing female calves at subsidized prices. In 1988-89, Rs.1.75 lakhs were provided to build livestock sheds to rear pigs at Kudige and Rs. 75,000 were provided to equip the veterinary clinic with surgery facilities to small animals in Virajpet through the Karnataka Land Army Corporation.

In addition, under the Comprehensive Western Ghats Development Programme, in 1988-89, Rs. two lakhs were provided to build a surgery unit for small animals and for an artificial insemination unit at Somvarpet and at Titimathi through Karnataka Land Army Corporation. The Cauvery Valley Command Area Development Authority provided Rs. 5000 in 1988-89 for conducting livestock health workshops at Toreneru and Hebbale villages of Somvarpet Taluk. The special livestock breed development programme provided Rs. 2.74 lakhs to establish 147 piggery units in 1988-89.

Kudige Milk Dairy

The milk dairy at Kudige is the first milk processing unit in the State and was established in 1958 in the Kudige Agriculture School, about four kilometres from Kushalnager. The Karnataka Dairy Development Corporation (KDDC) which was established in 1975, took over this milk dairy in the same year in order to increase milk production in rural areas, develop improved breeds of cows, improve facilities for the health of cows and develop milk collection centers. The KDDC was a three-tier organization with the milk producers cooperative societies at the village level, the union of milk producers cooperative societies at the federation level and the Karnataka Dairy Development Corporation at the Apex level. The KDDC and the Unions were providing the necessary technical assistance, veterinary services and artificial insemination facilities to the village level societies. In May 1984, the Kudige Dairy merged with the Karnataka Milk Federation and later since June 1987, this dairy is under the administrative control of the Hassan cooperative milk producers union. In the beginning, the production was limited to 2,500 litres per day which has now touched 12,000 litres per day. But since April 1988, since the major milk collection routes of Bettadapura and Bhuvanahalli were merged with the Mysore Union, the collection of Kudige Dairy reduced to 5,000 litres per day. Recently, 35 societies in old Mysore and Somvarpet routes and Ponnampet cold storage unit were restarted, increasing the milk collection to 9,000 litres per

Table No. 34

Statistics on achievements of key village scheme (sub-centre) during 1989-90

Sl. no.	Details	Somvarpet	Gonikoppal	Ammathi	Total
1.	Artificial inseminations (No.)	1,748	1,135	1,074	3,957
2.	Pregnancy tests (No.)	975	796	794	2,565
3.	Number of calves born	524	320	282	1,126
4.	Treated animals (No.)	12,018	15,430	-	27,448
5.	Castrated animals (No.)	282	1,066	426	1,774
6.	Number of inoculations	50,099	45,295	15,304	1,10,698

Table No. 35

Progress achieved under Tribal sub-plan in 1988-89

Taluk	Cattle Unit				Pig Unit			
	State Plan		Central Plan		State Plan		Central Plan	
	Physical	Financial	Physical	Financial	Physical	Financial	Physical	Financial
Madikeri	3	0.34	3	0.34	8	0.42	8	0.42
Somvarpet	3	0.34	3	0.34	8	0.42	8	0.42
Virajpet	4	0.45	4	0.45	10	0.53	10	0.53
Total	10	1.13	10	1.13	26	1.37	26	1.37

Table No. 36
Progress Achieved under Special Component plan in 1989-90

Taluk	Buffaloe Unit				Pig Unit			
	State Plan		Central Plan		State Plan		Central Plan	
	Physical	Financial	Physical	Financial	Physical	Financial	Physical	Financial
Madikeri	-	-	-	-	2	0.08	3	0.12
Somvarpet	2	0.09	-	-	1	0.04	3	0.12
Virajpet	2	0.09	-	-	1	0.04	3	0.12
Total	4	0.18	-	-	4	0.16	9	0.36

TABLE NO. 37
Milk Collection of figures for the Kudige Dairy

Year	Milk Collection		Year	Milk Collection	
	Annual (lakh ltrs.)	Daily (000' ltrs)		Annual (lakh ltrs)	Daily (000' ltrs)
1975-76	6.08	2.89	1976-77	16.40	4.51
1977-78	18.17	4.97	1978-79	32.37	8.86
1979-80	36.76	10.07	1980-81	36.23	9.92
1981-82	31.88	8.76	1982-83	32.20	8.82
1984-85	43.38	9.64	1985-86	37.32	10.22
1988-89	31.46	8.62	1989-90	32.06	8.79

day on an average. In the high season, the milk collection reaches 13,500 litres per day. The details of the milk collection are given in the following table (Table no 37)

In order to meet the demand for the processed milk and milk products, foundation stone for a new dairy was laid in 1982. This was to be developed at a cost of Rs. 103 lakhs with the World Bank assistance, increasing the daily collection from 20,000 litres to 30,000 litres. Since 1986, due to increase in the milk collection intensity, the old dairy has been shifted to the newly built dairy. A cold storage unit was opened in 1984 at Ponnampet with a handling capacity of 5,000 litres at a cost of Rs. four lakhs under the Rural development project funds. A total of 17 co-operative societies were supplying milk, collecting around 40 litres of milk per day. Gradually due to uneven rainfall and other natural disasters and low collection, many milk societies were closed. Due to this the Ponnampet unit was temporarily closed.

The Kudige Dairy under its purview of the milk collection network has 111 societies from Arakalagud and Holenarasipur taluks of Hassan district and the Virajpet and Somvarpet taluks of Kodagu district. Among the 111 societies, 86 are supplying milk. The average fat content of milk here is 4.8 percent and the ratio of cow milk to buffalo milk is 60: 40. In the past, milk was supplied in cans. Since Feb 1984, the consumers are supplied milk in polythene bags. For milk distribution, 8 milk centers have been opened at Kushalnagar, Somvarpet, Madikeri, Virajpet, Gonikoppal, Kudige and Siddapura in Kodagu district and at Konanur in Hassan district. In the Kodagu district, 47 dairy milk sellers and 9 institutions are involved in distributing milk. The financial transactions of different dairies in Kodagu district in 1989-90 are given in the following table (No. 38).

Table No 38

Financial Transactions of Dairy units in 1989-90

Sl. no.	Milk Dairy	Monthly transaction (Average) (Rs. lakhs)	Daily transaction (Average) (Rs.)
1.	Madikeri	2.99	9,608
2.	Virajpet	1.90	7,094
3.	Gonikoppal	1.18	3,793
4.	Somvarpet	1.32	4,250
5.	Konanur	0.32	485
6.	Kushalnagar	1.23	3,958
7.	Kudige	0.32	830
8.	Siddapur	0.19	2,016
	Total	9.46	32,034

When the KDDC took over this dairy, the marketing capacity was limited to only 2500 litres per day. Later in 15 years, the marketing capacity was raised from 10,000 to 14,000 litres per day. In March 1990 the daily sales was 15,600 litres. The deficit in the supply is made up by procuring

from the Hassan dairy. From August 1983, the sale of sweet milk *pedhas* and from April 1986, the sale of good curds were initiated. In addition to these commodities, the milk powder with fat, non-fat milk powder and solidified milk were produced from Gejjalagere and Dharwad dairies to supply them to people in Kodagu. The details of the sales of milk products are given in the table below (Table no 39).

Table No. 39
Details of Sales of Milk Products during Recent years.

Sl. No.	Products	1983-84	1985-86	1988-89	1989-90
1.	Ghee(kg)				
	Annual	37,121	57,160	26,162	25,999
	Daily	101	133	72	71
2.	Milk Pedha(kg)				
	Annual	-	2,718	265	483
	Daily	-	8	2	2.3
3.	Non-Fat Milk Powder(kg)				
	Annual	-	7,941	5,378	3,157
	Daily	-	22	15	9
4.	Milk Powder with Fat(kg)				
	Annual	-	917	294	660
	Daily	-	3	3	2
5.	Scented Milk (litres)				
	Annual	13,982	6,140	135	-
	Daily	38	17	2.3	-
6.	Curds(litres)				
	Annual	-	10,136	45,586	56,179
	Daily	-	28	125	154

In the Kodagu dairy, the water treatment plant is constructed at a cost of six lakhs and the purified effluent water is used as manure in grasslands. Since 1987, this grassland is transferred to the Hassan milk union from the Mysore union. All types of fodder grass demonstrations are initiated in this grassland. The demand for grass from the neighbouring milk societies is also met from this grassland. At present it has 97 employees working under the administrative control of the Director, Hassan Co-operative Milk Producers Union, Hassan.

Crossbred Cattle Project

The Crossbred cattle project began in 1976 at Hessarghatta near Bangalore with a subcentre at Kudige in 1980. The purpose was to help marginal and small farmers and landless laborers with

improved cattle breeds. With a view to increase the milk production, the Jersey breed of cattle from Denmark were used. The male Jersey calves were reared for the purpose of reproduction. This centre has lands at three different places. The piece of 25 acres of land located close to the dairy is being used for growing grasses. There were 128 Jersey cows in 1986-87 which gave birth to fifty Jersey calves. In this year, under the crossbred cattle programme, 37 crossbred cattle were reared and 6 crossbred calves were born.

Poultry Development

In the recent years, there has been a growing interest in poultry enterprise. Farmers are coming forward to have poultry under mixed farming or as a sub-occupation. Commercial banks have been encouraging poultry through loans and subsidies to farmers. Since the past two decades, the district has achieved great progress in poultry development. The details of the number of poultry birds in the district is provided in the following table (Table no 40). According to 1990 census, there were 3.71 lakh poultry birds in the district.

In the recent years, rearing chicks for chicken purpose is developing as a commercial venture. The chicks for poultry meat can convert low quality plant based nitrogen to high quality nutritious meat. In addition, the poultry birds for meat can be marketed in eight weeks and thus provide quick returns to the farmer.

The poultry rearing shed should have the capacity to contain warmth. It should not be above 30 feet in width. To raise chicks, a 2 to 4 inch moistureless layer of paddy straw as bedding is provided. For the first few days old newspapers are spread on this bedding. Food and water has to be kept in this poultry shed well before the chicks are left on this bedding. Water and food have to be kept around the bedding at equal distances. The chicks have to be carefully looked after in the first few weeks. Temperature regulation is a very important component in the rearing shed. The average temperature should be 90 degree F on the raised altar about two feet from the floor level. The chicks have to be vaccinated at the proper time. Uneconomical and inviable chicks have to be culled out. Each hen on the average yields about 200 eggs per year.

In order to provide quality poultry food, the 'Poultry Feed Quality Regulation Act' was passed in the State. To enable the weaker sections of the population to take to the poultry farming, subsidies are provided in the district. There were 24 such farms in Kodagu district in 1982.

Applied Nutrition Programme

The Applied nutrition programme began in 1963-64 in Kodagu district. It was implemented in the year 1967-68 at Somvarpet and in 1968-69 at Madikeri. The objectives of this programme are :

(1) Educating on modern methods of raising poultry birds and protection of eggs. (2) Educating the pre-school age children, pregnant women, and mothers of young babies and other physically weaker people regarding the nutritional value of poultry eggs. (3) Educating the rural folk regarding raising birds for eggs and their protection and use through demonstrations to keep them physically fit, and (4) To motivate farmers and interested people in poultry farming and providing them with necessary facilities.

Table No. 40
Census Year and number of poultry (in 000s)

	1956	1961	1966	1972	1977	1983
Poultry birds:						
Hens	73.5	86.3	65.5	109.8	122.3	160
Cocks	27.9	33.3	30.6	45.9	40.2	72
Chicks	199.1	161.6	131.2	149.9	140.0	173
Total Poultry Birds:	300.6	281.1	227.3	305.6	311.5	406
Ducks and Drakes:						
Ducks	1.2	0.9	0.9	1.2	1.4	0.4
Drakes	1.9	1.3	1.3	0.5	0.7	0.3
Ducklings	0.5	0.6	1.1	0.3	0.3	0.2
Total	3.6	2.8	3.3	2.0	2.4	0.8

In 1990, there were 3.71 lakh poultry birds according to the Census

Kudige Poultry Rearing Centre

The Kudige poultry farm provides the necessary assistance and technical know-how for the farmers to establish poultry farms. This was established in 1955 with a capacity to rear 100 birds. In 1964 the capacity was raised to rear 1,000 birds and was provided with four hectares of land to develop as the Regional Poultry Rearing Centre. This centre obtains the foundation breeds from Hesaraghatta farm and are multiplied in the Kudige centre. It supplies good quality chicks to farmers and also trains them in production, marketing, protection of birds from diseases, obtaining assistance from banks, and on co-operative marketing. From this centre, the varieties "MY CHICKS" and "GIRIRAJA" are supplied to the farmers. Since the centre did not profit from rearing birds for egg purpose, from 1985-86, the birds were raised for meat purpose after thorough vaccination. The income and expenditure in this center is provided in the following table (Table no 41).

Table No. 41

The Kudige Poultry Rearing Centre: Income and Expenditure for some recent years.

Year	Total poultry birds reared	Expenditure (Rs. lakhs)	Income (Rs. lakhs)
1985-86	4,490	-	-
1986-87	7,571	2.08	0.82
1987-88	6,673	2.18	0.65
1988-89	5,700	1.34	0.73
1989-90	3,311	1.20	0.77

The Poultry Rearing Extension Centre at Ponnampet, supplies young healthy chicks and provides technical guidance to farmers who want to start poultry business. In 1989-90, the center had 4,077 middle aged birds of which 3,045 birds were sold for improving the breeds and 78 birds were sold for the purpose of meat.

Piggery Development

In the recent years many farmers are coming forward to benefit from the bank finance for piggery development. The piggery development project has the following objectives:

(1) Supply of superior breed of pigs to individual farmers. (2) Motivating weaker sections of the society by supplying their requirements at low prices. (3) Supply of exotic male pig breeds to farmers to get mixed breeds of pigs. (4) Supply of pure and hygienic pork to the consumers. (5) Training individuals in piggery, and (6) Provision of piggery extension facility to those farmers involved in cross breed development.

Kodagu district does not have any single approved breed of pig. The commonly seen white or black pigs were the domesticated wild boars. Now in the villages, mixed breeds of large white (male parent) and the local breed (female parent) crosses are commonly seen. Among the

important exotic breeds are the *Large White*, *Land Rays* and *Vessecks Saddleback*. In addition the *Middle White*, *Large Black*, *Berkshire*, *Yorkshire* and *Hamshire* breeds prevalent in Europe and U.S.A. are also prominent. In piggery also different breeds are chosen for different purposes of pork and for getting mixed breeds. The diseases commonly seen in pigs are hog cholera (pig fever), foot and mouth disease, virus pneumonia, pig pox, pig disease, anthrax, contagious blood dysentery, influenza, T.B. and skin diseases. In addition, lice and fleas also damage pigs. These can be avoided by providing a hygienic environment, balanced diet and by taking prophylactic measures.

The Kudige Pig Breed Development Centre was established in 1970 with an intention of educating the farmers of Kodagu and Dakshina Kannada districts in piggery and to develop desirable breeds of pig for use. This center now has two acres of land and supplies pure and exotic litters to farmers of Hassan, Chickmagalur, Mandya and Kodagu districts. Farmers can also get training and other information on piggery from this center. The details of the progress of this center are mentioned in Table no 42.

Weaker Sections Assistance Programme

The Pig Raising Project which began in 1965-66 to assist the weaker sections of the society, helped them by supplying mixed breeds of local and exotic pigs. The male pigs were sold at a price of Rs. 10 per pig and a unit of three was sold at a reasonable price of Rs. 110. In the period 1976-79, the weaker sections were supplied 100 pigs under the Command Area Development Authority and Harangi Reservoir Project. A sub-plan for the upliftment of Scheduled Castes and Scheduled Tribes began in 1976-77. Pigs were supplied to this group of farmers. They received 25 percent of the initial investment as subsidy assistance and the remaining 75 percent was treated as loan. In addition from 1977-78 another sub-plan for the development of the Scheduled Tribes began. Here the selected farmers in the district were supplied pigs at 75 percent rebate.

The District has neither sheep nor goat rearing centres. According to the 1983 live stock census, the district had 1,568 sheep and 10,024 goats. In 1990 the sheep population reduced to 382 while that of she-goats reduced to 8,422. Many important livestock fairs in the district are arranged in different parts of the year. In the Kushalnagar Ganapathi livestock fair, about 5,000 cattle are brought (in October-November). The fair during the third week of January at Shanivarasanthe attracts more than 6,000 cattle. In the Somvarpet fair held during the second week of March, about 3,000 cattle are transacted. In the weekly shandy in Gonikoppal (Virajpet taluk) about 2,000 cattle are transacted.

FISHERIES

Fisheries do not have a great scope in Kodagu district. Many irrigation tanks of different sizes are now being constructed by the Agriculture and Minor irrigation departments. At present about 390 farmers have built their own irrigation tanks for agriculture crops, coffee and cardamom. In these tanks they have already taken up fish rearing. In Kodagu district there are 262 small tanks and two reservoirs. From all these sources about 2,600 hectares of water spread area available in the district for fisheries development. The details of water bodies available for fishery activity in the district are provided in the following table (Table no. 43)

Fish Breeds

In the sweet water tanks, the fast growing and the palatable Big Carp breed and Small Carp breed of fishes grow. They can be classified into native and exotic breeds. Among the Native breeds Katla, Rohu and Mrigal are grown in the district. Among the exotic breeds, Silver Carp, Grass Carp and Common Carp are grown in the district.

Katla is a fast growing native breed. It is whitish ash in colour with a large head, an elongated body and has a protruded tongue. In the tank it attains a weight of one to one and half kilogrammes in a year. It feeds on the micro organisms on the surface of water.

Rohu has a long body with a small sized head, and a rough lower lip. The body colour is faded red with leaf red coloured wings. These fishes feed on the algae located at the central basal portion of the tank and also feed on the decayed leaves. They grow to attain a weight of 0.75 kilogrammes to 1 kilogramme per year.

Mrigal has a long body with small-sized head with leaf red coloured wings. The body has silver-mixed ash colour, and attains a weight of 0.75 to 1 kilogramme per year.

Silver Carp is the fastest growing type. It has an elongated and wide body with a small sized head. The body has shining white coloured lines. It feeds on both micro-organisms and algae found on the top layer of water and grows one and half to two kilogrammes per year.

Grass Carp has green mix white coloured elongated body. It feeds on a variety of water plants available in the tanks and consumes the plant food equivalent to its weight everyday. It grows from one to one and half kilogrammes every year. If plants like hybrid grass and alpha are fed to this breed it attains a weight of two to four kilograms in a year.

Common Carp has a small-sized head with wide mouth. The body has big sized whitish red coloured eruptions. It feeds on all types of food material in the water and has capacity to adjust to different environments. It grows to attain a weight up to one kg per year.

Among the improved breeds of fish, *Katla*, *Rohu*, *Mrigal*, *Grass Carp*, the *Silver Carp* breeds do not lay eggs in stragnant water. It is a common practice to give pituitary injection to the Silver Carp and rear them on a scientific basis. Hence eggs of this breed are broadcast only once in a year. The *Common Carp* fish lays eggs on the water plants. This breed can be reared in effluent water tanks where the depth of water is at least four to five feet, where water is available for 8 to 9 months in a year. Nevertheless the physical and chemical properties of water will influence the growth and production of fishes.

The water for rearing fishes should neither be saline nor alkaline, but should have a neutral pH. The Western Ghat area of Kodagu district is found to have water with a pH around 6 to 7. Application of lime to water will rectify this problem. For fish culture, tanks with clayey and sandy silt are desirable. On one hectare of water spread area, about 5,000 eggs of Big Carp breed can be proliferated. If artificial feed can be provided, about 1,000 eggs can be proliferated on one hectare of water spread. Under the fish production, protection and extension project, at taluk level, fish fingerlings are reared and distributed to farmers and mandal panchayaths.

Table No. 42

The Kudige Pig Breed Development Centre : Recent Progress

Sl. no.	Details	1985-86	1986-87	1987-88	1988-89
1.	No. of Pigs in the beginning of the year	163	87	107	127
2.	No. of born litters	266	280	384	345
3.	No. of litters sold	240	233	294	287
4.	Expenditures (000 Rs.)	243.9	261.9	276	288.7
5.	Income (000 Rs.)	89.1	63.7	115.3	122.1
6.	No. of People trained	55	41	28	38

(This centre has the capacity to rear 125 pigs)

Table No. 43

Details of water bodies available for fishery activity

Sl. no.	Details	Madikeri	Somvarpet	Virajpet	Total
1.	Tanks under the control of Mandal Panchyats (no.)	48	64	150	262
2.	Waterspread area (ha)	16	166	230	412
3.	Tanks owned by farmers (no.)	80	100	210	390
4.	Waterspread area (ha)	21	17	155	247
5.	Reservoirs (ha)	nil	1) Harangi - 1,887 2) Chicklihole - 64	nil	1951
6.	Length of flowing rivers (km)	36	55	120	211

Intensive Fish Culture

'Mixed Fish Rearing' refers to rearing multiple types of fish species or rearing single fish species which feed on materials in different layers of water. The methods of preparing the water tank for fish culture by applying manures and supplying artificial food, for intense seeding of fish in order to obtain greatest profits, are referred to as "Intensive fish culture". In Kodagu district, since there are many small-sized privately-owned tanks, the intensive fish culture can be undertaken here. For every hectare of waterspread area, 6,000 to 10,000 kgs of fish can be raised. Steps are taken to develop the intensive fish culture through subsidy grants by creating new tanks for scientific fish culture. In this project, improved fish breeds brought from outside the district and are supplied to taluk-level nurseries. In addition, the Department of fisheries of the Kodagu district, provides technical information. The eligible farmers from among the Scheduled Castes and Scheduled Tribes are chosen through the Mandals and are supplied fish fingerlings and fishery equipment. Small and marginal farmers are also provided subsidy for fish culture and are provided fingerlings and fish equipment free of cost and thereby are encouraged to take up fishery.

It has been found that by having a proper combination of animal husbandry and fish culture, on the farm, the by-product of animal husbandry like the dung and the urine can be let into the fish pond and thereby more fishes can be reared. Among the animal husbandry enterprises, it is found by technical people, that pig farming goes on very well with the fish farming as a complementary enterprise. The dung and urine from the pig unit can flow to fish pond and the fishes consuming this feed are found to grow well. Because of this arrangement, the requirement of dung, manure and artificial food for fish culture is reduced to the extent of 60 to 80 percent. In one hectare of water spread area, 3,000-7,000 kg of fish can be grown in a year. In the district, since pig rearing is very extensive, fish culture can be taken in the ponds and along with fish culture, pigs, poultry birds and ducks can be developed, and this will reduce the costs of manure, artificial food and animal feed and enables fish culture to realize high profits.

Usually fishes do not catch any disease. Nevertheless every month they should be examined for their growth and hygienic status. In tanks which will have water for a long time in the year, the fishes in such tanks will grow between 0.7 kg to 1 kg. in 10 to 12 months. Before catching the fishes, the level of water in the tank can be reduced and then fished using fishing nets. Even when the water level in the tank is at higher level, the fishes can be caught by spreading nylon nets in the evening times so that they can be caught on the next morning.

The chief objective of the Department of Fisheries is to motivate all Mandal Panchayats and private fish farmers to undertake fish culture in their tanks and to educate them that fish rearing is profitable. The different activities of the Department include procuring the fingerlings from different district, rearing them and then distributing them to the tanks belonging to mandals and the tanks of private fish farmers; choosing the needy Scheduled Tribes and deputing them for training in fishery and in addition providing them the boats and other fishery equipments, providing permits to fishermen to fish in the river, distributing fishery equipment to fishermen under the scheme to buy equipments at a subsidised rates, providing subsidy to farmers who can build a half hectare tank for fish culture, and providing fishery equipment to the Scheduled Caste youth.

In 1988-89, the Department of Fishery brought a total of 9,79,455 different breeds of fish fingerlings from different districts, reared them and supplied them to the mandals. The Department

similarly supplied 5,18,275 fish fingerlings to fishery farmers. It gave permits to 121 persons and collected a fee of Rs. 1,090. The Department has also leased out a part of the Cauvery river to the Kodagu Wild Life Conservation Society at an annual fee of Rs. 250. Since the rivers in Kodagu flow with a great force in the rainy season, the fish permits are not given for the whole year. In the other seasons, fishermen from other districts come to Kodagu and do fishing by obtaining permits. In the Madikeri and Virajpet taluk, nurseries, fish fingerlings are carefully looked after. The construction of Somvarpet taluk nursery is almost over and from the years which follow, the fish fingerlings would be reared here also. In 1988-89, 44 Scheduled Tribe youth were chosen and fishery equipment worth Rs. 50,465 were distributed to them. From the Besuru mandal in Somvarpet taluk, 10 Scheduled Tribe unemployed fishermen were chosen and equipments worth Rs. 1,000 were distributed providing them 60 percent subsidy. A total of Rs. 20,000 was distributed as subsidy at the rate of Rs. 5,000 per beneficiary for having constructed half-acre water tank each for the purpose of rearing fishes.

The Department has recognized that the Mahashir breed is gradually getting extinct. Hence it has identified the Cauvery watershed area as the right region for the development of this breed. Recognizing this fact, the Department, in Somvarpet taluk, at the Hulugunda village, near Harangi reservoir, is developing the Mahashir breed on 10 hectares of land. This project is in force in eight districts of the state. A sum of Rs. 25.45 lakhs has been sanctioned to multiply the Mahashir breed of fish. From this amount Rs. 11 lakhs have been spent by the mid 1990. For the multiplication of fish, 16 big water tanks and 28 small water tanks are being constructed. When this project is completed, about 45 lakhs Mahashir fish fingerlings would be produced. In addition, about 112 lakhs fingerlings of the local breeds of *Katla*, *Mrigal*, *Rohu* and *Silver Carp* fish will also be multiplied on a scientific basis.

In the year 1989-90, 8.5 lakhs fish fingerlings have been distributed free of cost to people. The Mandal panchayats and farmers have been distributed 9.5 lakh fingerlings. From this source, an income of Rs. one lakh has been accrued.

The inland rivers, canals, lakes and small and big water tanks have been treated as common property water resources. Among them, the small water tanks are controlled by the Mandal panchayats, while the big water tanks, lakes, reservoirs, rivers and canals which are bigger water bodies, are under the control of the Government. Where the water bodies are owned by the Government, the permits are issued for fishing. In small water tanks, there is a provision to lease out the fishing rights to fishermen's cooperative societies or equivalent organizations, mandal panchayats and private individuals. In Kodagu district, the Indian Fishery Act of 1897 is in vogue. This Act prevents the usage of poisonous gases, dynamite and other dangerous practices in catching fishes.

In the district, in 1987-88, a total of 129 tonnes of fish were caught, valuing to Rs. 19.35 lakhs. In 1988-89, 270 tonnes of fish were caught (Madikeri taluk: 73 tonnes, Somvarpet taluk: 72 tonnes and Virajpet taluk: 125 tonnes), valuing to about Rs. 40 lakhs. In 1989-90, 453 tonnes of fish were caught (Madikeri: 71 tonnes, Somvarpet taluk: 272 tonnes; and Virajpet taluk: 110 tonnes). In the district there were a total of 750 fishermen, and in 1983, there were only 65 people who were completely dependent on fishery for their livelihood.