

## CHAPTER 4

### **AGRICULTURE AND IRRIGATION**

**D**akshina Kannada district, based on the geographical conditions can be divided in to Coastal region, Central region and Western Ghat region (Western Ghats range found to the western side of the State is in the eastern border of the district and Arabian Sea is situated towards the west). The Western Ghats, which have extended in many parts, to the central and coastal region as created valleys. In the central region there are number of hillocks and valleys. This is the prime agriculture land of the district. In this region primarily Areca, Cashew, Rubber, Coconut and Paddy cultivation is undertaken and to a smaller extent fruits and vegetables are also being cultivated. The rivers which flow from the western Ghat region create flood situation during monsoon. The plants that are on the slopes of the Ghat section will be transported from one place to the other by this flood water. The cultivation of crops on either side of the river bed is uncertain during the monsoon season due to the flood situation. However the organic matter that accumulated due to the flood increases the fertility status and helps the subsequent crops. The silt and stones deposition, due to flood, in the river bed results in the shallow depth of the river and this has worsened the flood situation on

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\* This chapter also includes information on Horticulture, Animal Husbandry and Veterinary Services and Fisheries.

either side of the river bed. Deposition on silt in the plain land makes the land unsuitable for crop cultivation. During the summer season the water level in most of the rivers reduces to minimum or gets dried up. However the water found in the sub-surface level on either side of the river bed helps in providing the irrigation.

Three types of Soils are found in the Dakshina Kannada district viz 1) Coastal sand and alluvial, 2) Laterite soil and 3) Red clay soil and also coastal alkaline/ saline soil found here and there.

**Coastal Sand and Alluvial:** This soil can be found all along the Western Ghat region. Soil particles size varies from the bigger size sand to loam and clay. Water holding capacity of this soil is poor. Generally this type of soil is low in alkalinity and phosphorous.

**Laterite Soil:** This type of soils is found in the entire coastal area with the undulating topography. Alkalinity and silica are found in low level. Top soil is characterized by the presence of small gravels and big sized sand particles. Soil is acidic in nature with poor water holding capacity. The drainage capacity is more and phosphorous, potash and calcium are found in less quantity.

**Red Clay Soil:** These soils are found in moderately slope / undulated and in the foot hill region. Usually soil is red in colour. In some places red mixed yellow colour is also seen. Soil particle varies from sand to sand mixed with small stones in size. This soil is also acidic in nature with low level of phosphorous, potash and calcium.

Soils of Dakshina Kannada district can also be classified as 1) Clayey soil, 2) Coastal soil, 3) laterite soil and 4) forest black soil. In these soils Potash is found in low level, phosphorous is in medium and nitrogen is in high levels. The silt level is more in coastal region and continuous efforts have to be made to get successful crop. One of the main problem of the region is burning out of the organic matter present in the soil by the continuous exposure to the bright sun light in the most part of the years. The other problem of laterite soil is, acidic nature of the soil with higher levels of the iron and zinc leads to non-availability of plant nutrients due to fixation. As a result, though the recommended levels of fertilizers are used achieving the expected crop production will be a difficult task.

The common phenomena in the district is that the top fertile soils gets eroded and reaches the ocean by the over flowing rivers due to the incessant rain during the monsoon, resulting in lower fertility status of the soils. As a result Calcium gets drained away from the soil and soil

becomes acidic. These acidic soils are not suitable for overall development of plants. Hence, achieving better results in agriculture production in these soils by adopting the intensive agriculture practices is not possible. The erosion of top soil and fertile humus, necessitates the application/recuperation of these materials to do successful farming.

Though this region receives more rain, major portion of the annual rainfall is experienced in a particular season. Hence, cultivation of all the cultivable land in all the three seasons of the year is not possible. During rainy season also the distribution of the rain is not uniform and generally farmer's experience difficulty when there is no rain for 10 to 15 days continuously. In the absence of irrigation facilities through tanks, wells and other means of lifting water, agriculture is entirely dependant on nature which will be a problem for the farmers. In majority of the places water level in the tanks and wells starts decreasing by November and gets dried up in April-May. Hence, these means of irrigation are also not much useful. Generally, when there is no first rain by the April end or May month, sowing will be a problem in more than 75 per cent of the area. If the monsoon does not start by the first week of June, successful paddy cultivation will also be difficult. Though the rivers flowing in the district originates in Western Ghats and joins Arabian Sea the water level gets reduced to minimum after December. Hence, these are not helpful for irrigation. In contrast these rivers creates problem by submerging the thousands of hectares of area in flood water on either sides of the riverbed during the monsoon. The back water of sea enters into the rivers after January and this salt water creates problems in some of the areas.

All the three seasons' viz. rainy season, winter and summer season are diverse in nature due to varied weather conditions and all the crops can not be grown in all the seasons. Use of specific variety of a specific crop for a particular agro-climatic situation is necessary. The weather condition is not so congenial to take up economic cultivation of profitable crops. Hence, farmers are forced to cultivate only few selected crops. The special feature of the region is small size of agricultural holdings and the non availability of contiguous cultivable paddy land. More than 80 per cent of the farmers are victims of this problem and their agriculture activity becomes economically not viable. This problem of size of agricultural holding has become major hurdle in achieving the success in agricultural development. Though efforts are made to instil confidence about modern methods, due to the smaller holding size with low

confidence on the modern technologies, desired results could not be achieved. In this region, which is dominated by small sized holding coupled with problematic soil, adoption of mixed cropping system will be of more useful to do profitable cultivation economically.

Analysis of agriculture cropping system reveals that present system is more of market/price oriented, rather than by adopting specific and appropriate balanced cropping system. As a result, every year farmers are experiencing low price situation in case of the produce produced in excess due to market glut. Since, everyone producing the same crops in the same season, supply of the agriculture produce in excess of demand during particular months of the year leads to the extremely low price scenario. In coastal region people tend to move to other places for their livelihood. As a result, labour shortage will be there during cultivation and harvesting season. Thus timely operation could not be taken up which will affect the crop production negatively. With all these problems, presence of good transport system and educated growers in the district, there is scope for agriculture development. As it is recorded in the imperial gazetteer "In South Canara agricultural practices and related information like selection of seedlings, rotation, decision on soil quality, seed selection, fertilizer dosage, water distribution system is not dependent on any written document/literature. The experiences and traditions followed over decades are adoptable for all types of the lands".

District, naturally with low fertile soils is having many hurdles in cultivating the crops. Ground water situation is not promising. The possibilities of Implementation of major irrigation schemes are also remote. Hence, with in the limited facilities, suitable crops have to be grown and by establishing the complimentary industries full employment needs to be ensured to the people of the district.

The private land property ownership concept/system was deep rooted in the minds of the people of the district in the pre- British period itself. During Tippu's period also this private property system was not destroyed. As part of this system tenant system was also presence in the district. During 14<sup>th</sup> century the cultivators were classified as '*Basic owners*', '*Basic tenants and temporary tenants*,. The correspondence that took place between Kanara District Collectors and Revenue Board of the Madras province gives details about the problems of the tenancy system existed earlier. As per the 1921 census, over the years the cultivators' numbers had reduced and the tenant's number had increased.

Prior to the implementation of the land reforms act in 1974, Brahmanas, Bunts, and Jains were the major communities who had the land ownership. Among Brahmanas, *Havyakas*, *Sarasvathas*, *Gowdasarasvathas*, *Shivalli*, *Kota* and *Chitthapavana* Brahmanas were practicing the agriculture. Majority of the *Havyakas* were interested in Areca cultivation and their families can be found in some villages of Putturu taluk and also few villages of sulya taluk, even today. They were getting their paddy field cultivated either by the tenants or from the agriculture labours. In Mangalore taluk villages, the Paddy field owner's i.e. *Sarasvathas*, *Gowdasarasvathas* used to live in towns and were not interested in agriculture and they were considered as absentee land owners. *Shivalli*, *Kota* Brahmanas used to work in temples either as administrators / priests and were influential in the villages, they used to give their land on '*temporary tenant*' basis. *Chitthapavana* Brahmanas were having small land holdings and were cultivating their land on their own, hence, the land reforms act has not affected them much. Bunts who were influential as land owners in majority villages of all the talukas of the district were reported as main land owners by Mr. Sturrock in 1894. He also reported that Jains, who were the land owners in Belthangadi taluk, are not important in terms of numbers when compared to the other communities. Socially backward classes like *Billavas*, *Devadigas*, *Mogaveeras*, *Kulalas*, *Ganigas*, Muslims were working as tenants. Scheduled caste people were working as landless agriculture labours.

The important tenancy systems that were existing in the different parts of the district are Basic/permanent tenancy, Temporary tenancy, Time limit tenancy, and debt tenancy. Out of these Basic tenancy was predominant in areca gardens. In Basic tenancy once the terms and conditions were prescribed in writing owners were not able to change the conditions. In case of paddy cultivation generally *temporary tenancy* was in practice. In reality this was like annual tenancy system. In many cases tenants were not having the tenancy agreement with them. In case of *temporary tenancy system* security for the tenants used to be a mirage. While fixing the tenancy amount fertility of the soil, demand for tenancy, social relationship between would be tenant and the land owner and the condition of the field were used to be taken into consideration. In case of fertile land the rent was amounting to 6 to 12 '*mudis*' (each *mudi* weighing about little over 50 Kg) of rice per acre or equivalent quantity of paddy. In case of less fertile land it was between one to three '*mudis*' of rice per acre. The District collector had reported in 1895 itself to the Madras provincial government about gradual increase in rent to be paid

by the tenant under temporary tenancy system, in highly populated villages of Mangalore taluk. Apart from this the tenants had to work, with out wages, in the fields of the land owners, used to till the lands free of cost and offering the vegetables free of cost on annual basis. This had to be followed with out any deviation and fail. Hence, during 19<sup>th</sup> century and first half of the 20<sup>th</sup> century the economic condition of the temporary tenants were deteriorating and they were not interested to invest and improve the land. The burden of land rent and debt made their position no better than the land less agricultural labours.

As per the study conducted by Chandrashekara Damle on effect of land reforms on agriculture system in the district, the land reforms act of 1961, which had taken momentum in the State from 1957 itself, was implemented on 2<sup>nd</sup> October 1965. Protection of tenant's right, disciplinary action against forceful eviction and sealing on individual land holding were the main things brought into force. In 1974 the act was implemented with revolutionary changes. 1974 act which had come with a slogan "*Tiller is the Owner*" was considered as revolutionary act. In that act opportunity was provided to give ownership of the land to all the tenants. Land owners were restricted not to take back the land which was given on tenancy. This was the brave step taken to eradicate existing feudal system in rural areas by fixing the land ceiling only for 10 units. This act provided an opportunity to establish a judicial board of land reforms in order to give land owner ship to the tenant by considering the cultivation practices being done on the field, even in the absence of the records like tenant receipt, etc..

As per the 1974 amendments after 01.03.1974 entire tenancy land had come under the control of government. No body was allowed, except soldiers and navigators, to practice tenancy farming. Hence, transfer of land ownership in a bigger way could be done in the district. 1974 amendments had provided the support to the tenants' wish to become the land owners of the land which they were cultivating for so many years in the district. As per the amendments, the last date 31.12.1974 prescribed for submission of applications to Tribunal of land reforms was extended up to 30.06.1979 for the benefit of the tenants. They were allowed to submit the application even without stamps. The Tribunal of land reforms was bestowed with powers to accept application by the tenants even if they did not mention the survey number, area etc. and to take action against the land owners using the force to avoid forceful eviction and to fix the compensation. The tenant who obtained the right

of ownership was denied the rights to sell the land at least for next 15 years.

Last date for submission of declaration about cultivation by the tenant expired by 30<sup>th</sup> June 1979. The details of tenants in the erstwhile, undivided, Dakshina Kannada district is provided here:

* Tenants numbers in 1957	4,90,571
* Tenants numbers in 1971 census	70,591
* Total declaration submitted	1,76,235
* Applications disposed by the end of Aug. 1987	1,36,880

### Agricultural Labourers

According to the 2001 Agricultural census, there were 8,41,509 main workers and 1,04,881 marginal workers and remaining 9,51,340 non workers in the district. Main workers are more in Mangalore taluk. In main workers 49,684 are cultivators, 42,566 members are agricultural labourers. In cultivators category 35,310 are males and 14,374 are females. In Agriculture labourers 28,046 are males and 14,520 are females. Cultivators and Agricultural labourers are more in Mangalore taluk. Taluk-wise details of Cultivators and Agricultural labourers are given in Table 4.1

**Table 4.1 : Taluk wise Cultivators and Agricultural labourers**

Taluk	Total	Total Cultivators			Total Agricultural labourers		
		Total	Males	Females	Total	Males	Females
<b>Mangalore</b>	Total	16,774	11,835	4,939	15,936	9,748	6,188
<b>Bantval</b>	Total	12,916	9,246	3,670	11,785	8,221	3,564
<b>Belthangadi</b>	Total	13,920	10,472	3,448	12,015	8,489	3,526
<b>Putturu</b>	Total	5,348	3,321	2,027	2,349	1,356	993
<b>Sullia</b>	Total	726	436	290	481	232	249
<b>Dakshina Kannada</b>	Total	49,684	35,310	14,374	42,566	28,046	14,520

Source: District at a Glance, Dakshina Kannada District, 2003-2004, Mangalore.

### Agricultural Land Holdings

As per the Agricultural census conducted in Dakshina Kannada district, land holdings of different social categories in the district are given in Table 4.2. The average size of the holdings has come down from one census to another. In 1970-71 it was 1.55 ha and reduced to 0.99

ha in 2000-01. The average land holdings size of Scheduled Caste has reduced from 0.81 ha to 0.5 ha, like that the average land holdings size of Scheduled Tribe has reduced from 1.17 ha to 0.75 ha. In general category area has reduced from 1.55 ha to 1.03 ha.

**Table 4.2 : Social Category wise Average land holding size in the District (Area in ha)**

Details	1970-71	1980-81	1990-91	1995-96	2000-01
<b>Total</b>	1.55	1.50	1.17	1.05	0.99
<b>Scheduled Caste</b>	0.81	0.59	0.53	0.50	0.50
<b>Scheduled Tribe</b>	1.12	1.04	0.92	0.82	0.75
<b>General</b>	1.55	1.33	1.21	1.09	1.03

Source: Agriculture census reports, Directorate of Economics and Statistics, Bangalore

In table 4.3, Category wise Average land holding size (Area in ha) in the district in different Agriculture Census are given here. It is found that Marginal holdings average area has reduced from 0.45 ha to 0.39 ha, small holdings average area has reduced from 1.41 ha to 1.40 ha Semi-medium holdings average area has reduced from 2.74 ha to 2.79 ha and large holdings average area has reduced from 24.34 ha to 17.46 ha. There is no change in size in case of medium category holdings.

**Table 4.3 : Category wise Average size of land holdings ( Area in ha) in the District as per Agricultural Censuses.**

Details	1980-81	1985-86	1990-91	1995-96	2000-01
<b>Marginal farmers</b>	0.45	0.40	0.37	0.37	0.39
<b>Small farmer</b>	1.14	1.42	1.42	1.41	1.40
<b>Semi-Medium</b>	2.74	2.74	2.74	2.73	2.70
<b>Medium</b>	5.69	5.74	5.76	5.70	5.69
<b>Large farmer</b>	24.34	17.33	20.26	20.39	17.46

Source: Agriculture census reports, Directorate of Economics and Statistics, Bangalore

Taluk-wise details of the agricultural census of 1995-96 and 2000-01 are given in table 4.4 and 4.5. When we compare the details of 1995-96 and 2000-01 censuses, the total land holdings has increased from 1,35,199 to 1,72,607. Marginal land holdings number has increased from 89,299 to 1,19,330. In small holdings category there is an increase of 5,662 numbers. Almost for last four decades the number of small and



marginal farmers is considerable. The special feature of the region is small sized holdings and the non availability of contiguous cultivable paddy land. More than 80 per cent of the farmers are victims of this problem and their agriculture activity becomes economically not viable. In the district which is having considerable numbers of small farmers, the problem is that the small pieces these holdings are located in different places. This has become an obstacle in adopting modern technologies by making necessary investments.

It is observed that the majority of the small and marginal farmers can not sustain their livelihood purely on their agricultural income. Providing full employment for all the family members of the small and marginal farmers, who are in considerable number in the district, is a problem. The objective of the Comprehensive agriculture development programme is to increase the income by encouraging the subsidiary occupation which is complementary to the agriculture. The consolidation act of 1966 is in force in the district land. The objective of this act is to avoid the fragmentation of agriculture land and to consolidate the very small and economically non viable holdings. As per the Act fixed size of the holding is prescribed for different Agricultural holdings. Provision is also there to consolidate small holdings. Though several years have passed, still progress has to be made in this direction.

**Table 4.4: Talukwise Agricultural land holding details 1995-96 (Area in ha)**

	Details	Bantval	Belthan-gadi	Manga-lore	Puttur	Sulya	Total
<b>Less than 1 ha</b>	Nos.	23,228	13,903	22,461	18,789	10,918	89,299
	Area	8,610	6,963	7,264	8,201	4,565	35,603
<b>1-2 ha</b>	Nos.	6,791	6,625	4,344	5,944	3,613	27,317
	Area	9,510	9,447	6,119	8,331	5,129	38,536
<b>2-4 ha</b>	Nos.	3,358	3,157	2,573	2,270	1,659	13,017
	Area	9,173	8,549	7,031	6,094	4,552	35,399
<b>4-10 ha</b>	Nos.	1,302	1,116	1,058	716	774	4,966
	Area	7,433	6,298	5,967	4,028	4,492	28,218
<b>More than 10 h</b>	Nos.	150	151	128	71	100	600
	Area	2,109	8,080	1,932	1,040	1,531	14,692
<b>Total</b>	Nos.	34,829	24,952	30,564	27,790	17,064	1,35,199
	Area	36,835	39,337	28,313	27,694	20,269	1,52,448

Source: Agriculture Census Report, Directorate of Economics and Statistics, Bangalore

**Table 4.5 : Taluk wise Agriculture land holding Details 2000-01  
(Area in ha)**

Sl.No.	Details	Bantval	Belthan- gadi	Manga- lore	Puttur	Sulya	Total
1.	<i>Margtnal holdings ( Less than 01 ha)</i>						
	Nos.	25,151	19,038	35,849	25,366	13,926	1,19,330
	Area	9,682	8,810	11,806	10,840	6,032	47,140
2.	<i>Small holdings (01 - 02 ha)</i>						
	Nos.	6,744	7,263	7,321	7,246	4,465	33,039
	Area	9,519	10,087	10,316	10,069	6,339	46,330
3.	<i>Semi- Medium holdings (02 - 04 ha)</i>						
	Nos.	3,151	3,026	4,195	2,311	1,788	14,471
	Area	8,490	8,176	11,416	6,160	4,865	39,107
4.	<i>Medium holdings (04 - 10 ha)</i>						
	Nos.	1,130	989	1,617	689	743	5,168
	Area	6,386	5,636	9,310	3,789	4,260	29,381
5.	<i>Large holdings (More than 10 ha)</i>						
	Nos.	143	131	170	53	101	598
	Area	1,927	3,703	2,624	773	1,430	10,457
6.	<i>Total number of holdings</i>						
	Nos.	36,319	30,447	49,153	35,665	21,023	1,72,607
	Area	36,004	36,412	45,472	31,631	22,926	1,72,445

Source: Agriculture Census Report, Directorate of Economics and Statistics, Bangalore

**Table 4.6 : Land use pattern in the District 1999-2000 to 2000- 2002**

Sl. No.	Details / Pattern	1999-00	2000-01	2001-02
1	<b>Total Geographical area</b>			
	<b>a. As per Surveyors Inspection</b>	4,77,149	4,77,149	4,77,149
	<b>b. As per Village Records</b>	4,77,149	4,77,149	4,77,149
2.	<b>Forest</b>	1,28,643	1,28,476	1,28,476
3.	<b>Area not available for cultivation</b>	1,15,643	1,16,146	1,18,889
	<b>a. Area under non-agriculture purpose</b>	34,933	34,006	32,791
	<b>b. Barren/Un-culturable land</b>	19,384	19,350	19,350

Sl. No.	Details / Pattern	1999-00	2000-01	2001-02
4.	<b>Other Culturable land (Excluding Fallow land)</b>	87,233	86,256	84,544
	a. Culturable fallow land	34,933	34,006	32,791
	b. Permanent Pastures and Grazing land	19,384	19,350	19,350
	c. Land under misc. trees and groves	32,916	32,900	32,403
5.	<b>Fallow Land</b>			
	a. Current Fallow	12,795	12,587	11,542
	b. Other fallow land	7,398	7,294	6,451
6.	<b>Net Area sown</b>	1,33,002	1,33,684	1,33,698
7.	<b>Gross Area sown</b>	1,61,120	1,64,190	1,62,238
8.	<b>Area Sown more than once</b>	28,118	27,506	28,540

Source: Directorate of Economics and Statistics, Bangalore.

**Table 4.7 : Taluk wise Land use pattern 2002-03 (In ha)**

Sl. No.	Details	Bantval	Belthan-gadi	Manga-lore	Puttur	Sulya	Total
1.	<b>Geographical area</b>	71,758	1,37,510	85,153	99,697	83,031	4,77,149
2.	<b>Forest</b>	5,069	49,837	2,902	27,386	43,282	1,28,476
3.	<b>Land not available for cultivation</b>						
	Land put to Non-agricultural purpose	10,157	22,985	19,366	5,924	2,652	61,084
	Barren and uncultivable land	12,833	6,198	11,380	24,837	3,815	59,063
	<b>Total</b>	<b>22,990</b>	<b>29,183</b>	<b>30,746</b>	<b>30,761</b>	<b>6,467</b>	<b>1,20,147</b>
4.	<b>Un-cultivated land other than current fallows.</b>						
	Cultivable waste land	9,926	5,660	8,950	2,923	3,517	30,976
	Permanent Pastures and other grass lands.	2,072	4,653	2,020	4,973	5,602	19,320

Sl. No.	Details	Bantval	Belthangadi	Mangalore	Puttur	Sulya	Total
	Trees and groves not included in net area sown	2,903	9,079	8,533	9,118	2,302	31,935
	<b>Total</b>	<b>14,901</b>	<b>19,392</b>	<b>19,503</b>	<b>17,014</b>	<b>11,421</b>	<b>82,231</b>
5.	<b>Fallow land</b>						
	Current	2,220	531	3,043	1,218	3	7,015
	Others	583	519	2,643	1,285	4	5,034
	<b>Total</b>	<b>2,803</b>	<b>1,050</b>	<b>5,686</b>	<b>2,503</b>	<b>7</b>	<b>12,049</b>
6.	<b>Sown area</b>						
	Net sown area	25,995	38,048	26,316	22,033	21,854	1,34,246
	Area sown more than once	7,440	8,343	8,614	2,831	294	27,531
	<b>Gross sown area</b>	<b>33,435</b>	<b>46,391</b>	<b>34,957</b>	<b>24,846</b>	<b>22,148</b>	<b>1,61,777</b>

Source: Directorate of Economics and Statistics, Bangalore

### Soil Health Centre

The soil health centre (Soil testing laboratory) located in the district head quarter conducts soil sample analysis. The soil analysis is a systematic scientific method through which one can ascertain the soil fertility status and the available nutrients in the soils. This helps in avoiding the indiscriminate use of the fertilizer. This also plays an important role in getting the better crop yield by applying the balanced nutrients. The soil samples collected by the farmers and agriculture extension personnel are analysed and suitable recommendation on use of chemical fertilizer will be provided. The mobile soil testing units are analysing the soil samples on the spot and providing the recommendation on balanced fertilizer usage. The water samples collected by the growers are also analysed to know the suitability of water for irrigation and required information on suitable usage will be recommended. Samples of Calcium and Gypsum salts are also being analysed here. This centre is having a capacity to analyse up to 30,000 samples per year.

In this centre, the parameters that are analysed from the soil samples are pH, Organic carbon, phosphorous, potash, nitrogen and the electrical conductivity of the soil. This helps in understanding the component responsible for alkalinity. Cropping system to be followed is compared with these parameters and decision on quantity of suitable soil

amendments like Gypsum salt and lime is provided. This will also help in deciding on the quantity of chemical fertilizer required for each crops to be grown in such soils. Suitable corrective measures are suggested for the soil where alkalinity is more. According to the procedure, which is in force since 1970-71, it is prescribed to provide the soil test result only in a particular format. The objectives of this are as follows: 1) To regulate the procedures to be followed while soil testing, 2) To provide support to help the testing centre to work efficiently and 3) To give training on soil testing procedures to be followed every year.

### **Plant Protection**

Importance of plant protection is increasing as the advancement in crop production technologies occurs. While cultivating commercially important crops like paddy, areca, cashew, coconut, vegetables and seed production, farmers are giving more importance to the plant protection measures. Agriculture department personnel are providing advisory on plant protection. In this direction, input supply agencies, co-operative institutions and other public institutions are giving required advisory. The State Agriculture department personnel, in consultation with the scientists of Agriculture University, has prepared a list of pest and diseases, that are endemic in some parts of the State. The pest and diseases of paddy are watched regularly by the department personnel and suitable advisory is rendered. The agriculture department, in collaboration with the agriculture university, organises week long programmes in endemic area and create awareness among farmers.

Plant protection measure is restricted to the field only in recent years. However this has to be taken up in other areas also. Seed treatment is one of the important practices to prevent seed borne diseases. It is also important to protect the produce from pest and diseases after harvest and during storage. It is necessary to give importance to post harvest technologies. The other important programme is to create awareness and to provide suitable suggestions in advance about the important pest and diseases that appears in many places of the State. Farmer's fields are visited and suitable advisory is rendered. In pesticides and fungicides testing labs system of issuing quality recommendation certificate, after testing the pesticides and fungicides, is in practice. The use of weedicides is another measure of plant protection which is getting importance in recent years. Generally weeds are removed by hand or by using inter cultivating implements. The modern system is the application of weedicides. To control weeds in different crops specific weedicides are available. Usage of weedicides is yet to get momentum.

## Crops

In the low-lying area of the coastal region paddy is cultivated in all the three seasons of the year. In this condition paddy is cultivated under rain-fed condition during monsoon/*kharif* season and during *rabi* and summer crops are growing under irrigated/semi irrigated condition by utilizing the external water resources from rivers and tanks. In the areas where water availability is limited, one or two crops of paddy is grown and pulses, oilseed or vegetable crops are grown as third crop. In the fertile soils, sugarcane is cultivated. The important pulse crops grown in this region are green gram, black gram and cowpea. In oilseeds groundnut and sesame (*Sesamum indicum*) are important. Lady's Finger, brinjal, chillies, watermelon, cucumber, radish, etc. are the vegetables cultivated in *rabi* and summer season. In the valleys of the eastern region, paddy is cultivated during monsoon. In addition areca, banana, pepper, cocoa, and other horticulture crops are also seen. In the northern region cashew cultivation is in practice. Mango, Jackfruit, Sapota, guava, pineapple, rubber are the horticultural crops of the region.

**Paddy:** Paddy is the principal food crop of the region. Based on the facilities of water availability, this crop can be cultivated in all three seasons of the year. Paddy is being cultivated in about 60,000 ha area in the district.

### Varieties and Season

	Season	Variety	Sowing season/time	Duration in days	Rice/grain quality
1.	<b>Kharif</b>				
	<b>Bettu-Makki (upland)</b>	Mahavira	May to June 1st week	110-115	Bold
	<b>Majalu- aremakki (Terraces)</b>	Shakthi	— do —	120-125	Bold
	<b>Bailu-Honda (low laying land)</b>	Phalguna	— do —	135-140	Small
		KKP - 6	— do —	135-140	Bold
	<b>Ghazani-khar</b>	Getu	— do —	130-140	Bold
2.	<b>Rabi</b>				
	<b>Eda suggi (Early Rabi)</b>	Phalguna	Aug. - Sept.	135-140	Small

	Season	Variety	Sowing season/time	Duration in days	Rice/grain quality
	<b>Suggi (Rabi)</b>	Jaya	October	120-145	Bold
		Jyothi	— do —	140-105	small
		Shakthi	— do —	120-125	Bold
3.	<b>Summer</b>				
	<b>Early Summer</b>	Phalguna	Nov. last week to Dec. 1 <sup>st</sup> week	135-140	small
		Shakthi	— do —	120-125	Bold
		IR - 20	— do —	120-125	Medium
	<b>Summer</b>	Jaya	January	120-125	Bold
		Shakthi	— do —	120-125	Bold

**Important Pests:** 1. Gall midge, 2. Mealy bug, 3. Green plant hopper, 4. tem borer, 5. Leaf roller, 6. Hispa, 7. Case worm, 8. Grass hopper, 9. Hairy caterpillar, 10. Brown plant hopper.

**Diseases :** 1. Blast, 2. Brown leaf spot, 3. Udubatta disease, 4. False smut, 5. Bacterial leaf blight

#### Paddy productivity during different season/under different conditions

Season	Occasion	Productivity (Quintals/ha)
<b>Kharif</b>	<i>Bettu- Makki</i> (upland)	30-37
	<i>Majalu- aremakki</i> (Terraces)	50-62
	<i>Bailu-Honda</i> (lowlying land)	45-55
<b>Rabi</b>	<i>Edasuggi</i> (Early Rabi)	45-55
	<i>Suggi</i> (Rabi)	37-50
<b>Summer</b>	Early Summer	50-62
	Summer	50-62

#### Crop Rotation System

The crop rotation system that can be followed in this region depends on the topographical condition and availability of water facilities. The important crop rotation systems suitable for different conditions are given here :

	<b>Kharif</b>	<b>Rabi</b>	<b>Summer</b>
1.	<b>Low lying area</b>		
	<b>Paddy</b>	Paddy	Paddy
	<b>Paddy</b>	Paddy	Pulse/ Ground nut
	<b>Paddy</b>	Pulse/ Ground nut	
	<b>Paddy</b>	Vegetable crops	
2.	<b>Majalu-Moderately up land (Terraced)</b>		
	<b>Paddy</b>	Paddy	
	<b>Paddy</b>	Ground nut/sesamam	
	<b>Paddy</b>	Vegetable crops	
3.	<b>Upland ( hilly area)</b>		
	<b>Paddy</b>	Green manure crop	
	<b>Paddy</b>	Horsegram	

### **Green gram**

Green gram is the main pulse crop grown in this region. This crop is grown after the harvest of the paddy crop by making use of the residual moisture. This, being a pulse crop, increases the soil fertility status. *P.S.-16* and *Pusabaisaki* varieties, which come to harvest in 65-70 days are being cultivated. From this crop five to seven and half quintals of yield per ha can be obtained.

### **Blackgram**

Black gram is another pulse crop suited for summer cultivation after paddy harvest. This increases the soil fertility status and hence, it is good alternate for crop rotation system. The varieties, *Kargoa -3* and *T-9* which comes to harvest in 75- 90 days duration, are being grown. From this crop five to eight quintals of yield per ha can be obtained.

During the year 2001-02, out of Gross sown area of 1,62,238 ha in the district, 1,33,392 ha area is under food crops and in 28, 846 ha area non food crops are grown. Out of which, 61, 888 ha area is under cereals (Paddy), 3,395 ha area under pulses and 454 ha area is under oilseeds are grown. Paddy is cultivated in more areas of Mangalore, Bantval, and Belthangadi taluks. The details of cereals and pulses grown in the district are presented in the table 4.8 and the details of food and non food crops from 1999-2000 to 2001-02 is given in the table 4.9.



**Table 4.8 : Area under Cereals and pulses in the district - 2001-2002 (area in hectares)**

Details	Bantval	Belthangadi	Mangalore	Puttur	Sulya	Total
<b>Paddy</b>	15,868	15,068	21,814	6,040	761	59,551
<b>Total Cereals and minor millets</b>	15,868	15,068	21,814	6,040	761	59,551
<b>Pulses crops</b>						
<b>Other pulses</b>	246	707	2,132	133	16	3,234
<b>Total pulses</b>	<b>246</b>	<b>707</b>	<b>2,132</b>	<b>133</b>	<b>16</b>	<b>3,234</b>
<b>Total food grains</b>	<b>16,114</b>	<b>15,775</b>	<b>23,946</b>	<b>6,173</b>	<b>737</b>	<b>62,745</b>
<b>Areca</b>	5,196	7,001	1,390	5,358	8,125	27,070
<b>Cashew</b>	5,584	6,252	3,523	6,111	4,912	29,382
<b>Coconut</b>	3,010	4,957	3,180	2,335	2,126	15,608
<b>Banana</b>	629	856	340	852	377	3,054
<b>Total fruit crops</b>	<b>7,109</b>	<b>10,590</b>	<b>4,897</b>	<b>7,601</b>	<b>5,427</b>	<b>35,669</b>
<b>Total vegetables</b>	<b>799</b>	<b>1,362</b>	<b>565</b>	<b>1,063</b>	<b>30</b>	<b>3,819</b>
<b>Sugarcane</b>	58	0	139	-	-	197
<b>Other non-food crops</b>						
<b>Cocoa</b>	113	236	25	282	179	853
<b>Rubber</b>	217	3,710	183	735	5,131	9,976
<b>Total Non-food crops</b>	<b>3,515</b>	<b>9,810</b>	<b>3,544</b>	<b>4,090</b>	<b>7,452</b>	<b>8,411</b>

**Table 4.9 : Food grains and non-food grains crops in the district**

	Particulars	1999-2000	2000-2001	2001-2002
	<b>Food grains</b>			
1	Area ( In ha)	1,34,040	1,33,215	1,33,392
2	Per cent to the total sown area in the District	83.2	82.64	82.22
3	Per cent to the total food grains in the State	1.5	1.48	1.58
	<b>Non- food grain crops</b>			
1	Area ( In ha)	27,080	27,975	28,846
2	Per cent to the total sown area in the District	16.8	17.36	17.78

	Particulars	1999-2000	2000-2001	2001-2002
3	Per cent to the total Non - food grains in the State	0.8	0.85	0.81
	Total Sown Area in the District	1,61,120	1,61,190	1,62,238
	<b>Cereals</b>			
1	Area ( In ha)	66,203	62,979	61,888
2	Production in Tons	1,36,157	1,28,193	1,34,694
3	Productivity (Kg/ha)	2,195	2,143	2,291
	<b>Pulses</b>			
1	Area ( In ha)	4,134	3,701	3,395
2	Production in Tons	1,272	1,180	861
3	Productivity (Kg/ha)	324	336	267
	<b>Food grains</b>			
1	Area ( In ha)	70,337	66,680	65,283
2	Production in Tons	1,37,429	1,29,373	1,35,555
3	Productivity (Kg/ha)	2,057	2,042	2,186
	<b>Oil seed crops</b>			
1	Area ( In ha)	387	438	454
2	Production in Tons	189	180	468
3	Productivity (Kg/ha)	514	433	390

**Table. 4.10: Distribution of Chemical and Fertilizer 2003-04  
(in metric tons)**

Details	Bantval	Belthan- gadi	Manga- lore	Puttur	Sulya	Total
1. Nitrogen	1,035	922	947	634	837	4,075
2. Phosphorous	623	604	586	464	417	2,694
3. Potash	927	898	896	679	610	4,010
. Total	2,585	2424	2,429	1,777	1864	10,779

**Raitha Samparka Kendras** (Farmer Liaison Centres): The new *Raitha Mithra Yojane* was implemented in the year 2001-02 to transfer technologies uninterruptedly with an aim to achieve development in the field of agriculture in turn to develop the farming community by encouraging them to adopt improved technologies in the field. Under this programme *Raitha Samparka Kendras* (Farmer Liaison Centres) are established in each *hobli* (Revenue blocks) head quarters. The main

objective of this centre is to constantly transfer the improved technologies in a systematic and effective way. The main activities of these centre is identification of problems faced by the farmers while adopting technologies in the field and to provide corrective measures and to convince them to adopt these corrective measures in the field. Locally, basic technical support services viz. seed, germination test, testing of physical characteristics of the chemical fertilizers and providing suggestions, etc. are also provided to the farming community. *Raitha Samparka Kendras* are working hard to fulfil following objectives viz 1) To work as a primary unit to implement the crop husbandry programmes of the department and to identify the field problems and to suggest corrective measures, 2) To fulfil the requirement of extension services in agriculture and related production activities, specially in horticulture crops production, 3) To work as a centre to identify the problems faced by the farmers, farm women and rural youth and as an information and discussion centre, 4) To fulfil the agricultural inputs requirement locally, and 5) To provide experimental training to the agriculture graduates.

#### IRRIGATION

The sources of irrigation can be classified into a) canals, b) Tanks, 3) Wells, 4) other sources. In Dakshina Kannada district there are no canal irrigation facilities. Tanks, wells, lift irrigation and through other means, irrigation facilities are provided. The details of irrigation means are provided in the next table.

**Table 4.11 : Sources of Irrigation in the district**

Particulars	1960-61	1970-71	1980-81	1990-91	2000-01
<b>No. of tanks</b>	NA	4,069	1,671	1,603	911
<b>No. of weeks</b> (including borewells)	NA	10,379	17,757	26,162	29,783
<b>Other Sources</b>	NA	NA	4	522	504

The area irrigated from the tank had decreased from 7,168 ha in 1960-61 to 1,603 ha during 1990-91. During the same period well irrigated area increased from 2,928 ha to 29,783 ha The details of area irrigated from different means during the last three years is provided in the next table.

**Table 4.12 : Details of Irrigated area from 1999 to 2001-02  
in the district (Area in ha)**

Sl. No.	Particulars		1999-00	2000-01	2001-02
1	Canals	Total	—	—	—
		Net	—	—	—
2	Irrigation Tanks	Total	1,582 (2.2)	1,201 (1.6)	1,201 (1.6)
		Net	1,551 (2.3)	1,183 (1.7)	1,183 (1.6)
3	Wells	Total	26,339 (36.6)	26,468 (35.7)	27,234 (35.6)
		Net	24,904	25,142	25,772
4	Bore wells	Total	2,534 (4.9)	3,898 (5.3)	4,046 (5.5)
		Net	3,490 (5.1)	3,854 (5.4)	4,006 (5.3)
5	Lift Irrigation	Total	1,163 (1.6)	822 (1.1)	849 (1.1)
		Net	1,039 (1.5)	783 (1.1)	810 (1.1)
6	Other Sources	Total	39,394 (54.7)	41,721 (56.3)	42,892 (56.1)
		Net	37,689 (54.9)	39,887 (56.3)	40,546 (56.3)
<b>Total from all sources</b>		<b>Total</b>	<b>72,012</b>	<b>74,110</b>	<b>76,222</b>
		Net	68,673	70,849	72,317

Figures in the bracket indicates the percentage to the total irrigated area

During the year 2001-02 out of the net sown area of 1,33,698 ha, in the district 72,317 ha area was irrigated. 54.09% area of the net sown area is irrigated. Out of the 27 districts of the state, Dakshina Kannada stands second next only to Shimoga ( 57.96 %) district. Which is double the state percentage ( 25.57 %) area Irrigated. Out of the gross sown area 46.98% i.e 76, 222 ha area is irrigated. In this regard, Dakshina Kannada district stands in third position When compared to the other districts in the States. This is higher than the states percentage ( 26.47 %) . In the next table taluk wise irrigated area is provided.

**Table 4.13 : Taluk wise net irrigated area ( Area in Ha)**

Sl. No.	Details	Bantval	Belthan-gadi	Manga-lore	Puttur	Sulya	Total
1	Canals	—	—	—	—	—	—
2	Tanks	—	—	—	—	—	—
3	Wells	7,643	17,674	5,175	7,518	6,494	44,504
4	Bore wells	3,673	1,172	533	2,430	1,158	8,966

Sl. No.	Details	Bantval	Belthangadi	Mangalore	Puttur	Sulya	Total
5	Lift Irrigation	372	51	135	930	957	2,44
6	Other Sources	4,183	1,326	8,024	972	2,658	17,163
	<b>Total</b>	<b>15,871</b>	<b>20,223</b>	<b>13,867</b>	<b>11,850</b>	<b>11,267</b>	<b>73,078</b>

### HORTICULTURE

The status of horticulture in the ancient times can be learnt from the references of the available inscriptions, literary sources and the writings/stories of travellers. There are evidences in the inscriptions about the floral gardens especially of the gardens related to temples and towns. Fruit gardens were also maintained for which references are also available. The travellers who visited the capital of the Vijayanagar had mentioned about the fruits garden that was existed, not only in the outskirts of the capital but also on either side of the highway that was connecting the capital and the west coast. One such traveller Mr. Domingo paes, who travelled in one such highway, had mentioned that "There are tree gardens in between two or three highways in which you travel. In the outskirts of the Cities, towns and villages, there are Mango, jackfruit, tamarind and other bigger tree's gardens. They are the protective shelter for the businessman to stay along with their merchandise". In the gardens areca, coconut and beetle vines were growing. The inscriptions and the literatures will provide the details about the areca gardens. The traveller from Italy Scissor Fredrik told "There is no tree, other than coconut, that is profitable and most beneficial". Ibn Bathuta mentioned that there were sugarcane gardens all along the west coast.

Vegetables were grown in the back yard garden and paddy fields. Ibn Bathuta mentioned that each and every house of the west coast region was maintaining and cultivating the vegetables. In the coastal region important spices like cardamom and black pepper were grown in huge quantity. The Portuguese had mentioned that the Kanara coastal pepper is superior than the Malabar pepper. Horticulture crops occupied a important place in the Dakshina Kannada district. The Deputy Director of Horticulture office is functioning in the district. The Horticulture department personnel are providing the technical advise to the farmers on the horticultural crops production and plant protection measures at the taluk(block) level. The seeds and seedlings of the horticultural crops like fruits, spices, vegetables, that are suited to the different agro-climatic

conditions of the different taluks of the district, are produced and distributed to the farmers in accordance with requirement. Horticulture exhibition, field day, and seminars are organized at the district and taluk level. Seedlings, seeds, fertilizer and plant protection chemicals are distributed from the taluk level offices. The horticulture farms, nurseries and parks are maintained. The schemes implemented by the department are as follows.

*State level schemes/programmes* :1) Maintenance and development of horticulture farms, nurseries, 2) Coconut development board supported Integrated Pest Management, 3) Integrated vegetable crops development scheme, 4) Cocoa development scheme, 5) Integrated cashew development scheme, 6)Integrated pest and disease control scheme, 7) Training and extension and 8)Horticulture parks scheme.

*Central Sponsored scheme/Programme*: 1) Novel scheme on mode; vegetable development programme, 2) Model Cocoa development programme, 3) Model medicinal and dye plants development programme, 4) Model farm and nursery development programme, 5)Integrated

*Zilla panchayath Scheme/Programmes*: 1) Central zone drip irrigation programme, 2) Publicity and literature programme, 3) Horticulture farms maintenance, 4) Horticulture buildings and 5) Coconut seed collection and nursery management.

During the year 2004-05, out of the net sown area (1,34,246 ha) in the district 97,720 ha is covered with horticulture crops. In the horticulture crops, 15,652 ha area with coconut, 27,092 ha area with areca and 29,382 ha area with cashew crops. 85 per cent of the area under horticulture crops is covered with plantation crops and remaining 15 per cent area is with fruits, vegetables and spices crops. The details of the horticulture crops in the district are presented in the table 4.14

**Table 4.14 : Horticulture Crops Area (ha) and Production (Tons)  
(1997-98 to 1999-2000)**

Particulars	1997-98		1998-99		1999-2000	
	Area	Production	Area	Production	Area	Production
Fruit crops	17,620	2,98,469	9,656	1,60,682	7,709	1,83,167
Vegetables	10,441	1,45,681	6,976	1,00,108	5,650	77,826
Spices	6,720	22,855	4,079	19,609	3,174	14,404
Plantation crops	1,08,781	73,808	71,128	58,855	66,484	77,146
Commercial crops	683	7074	427	1591	375	1565
<b>Total</b>	<b>1,44,245</b>	<b>5,43,887</b>	<b>92,266</b>	<b>3,40,845</b>	<b>83,392</b>	<b>3,54,108</b>

Source : Department of Horticulture, Bangalore

**Table 4.15 : Crop wise particulars of Horticulture crops  
Area in ha, Production in Tons, Productivity in Tons/ha  
and amount in Lakh Rupees.**

Details		Puttur	Belthan- gadi	Manga- lore	Bantval	Sulya	Total
<b>Mango</b>	Area	459	213	486	392	107	1,657
	Prod.	918	2,530	4,860	3,084	1,070	12,462
	Yield	2	11.8	10	7.9	10	7.5
	value	18.36	98.8	486	154	21	778.76
<b>Banana</b>	Area	891	900	313	642	379	3125
	Prod.	17,820	9,000	9,390	15,408	7,540	59,158
	Yield	20	10	30	24	19.89	18.93
	value	356.4	360	939	770.8	150.8	2577
<b>Lime</b>	Area	4	2	-	2	-	8
	Prod.	75	20	-	17	-	112
	Yield	18.75	10	-	8.5	-	14
	value	1.5	4	-	1.7	-	7.2
<b>Total Citrus fruits</b>	Area	4	4	-	2	-	10
	Prod.	75	40	-	17	-	132
	Yield	18.75	10	-	8.5	-	13.2
	value	1.5	4	-	1.7	-	7.2
<b>Guava</b>	Area	30	14	4	18	-	66
	Prod.	150	186	8	168	-	512
	Yield	5	13.3	2	9.3	-	7.7
	value	30	3	20	8.4	-	61.48
<b>Sapota</b>	Area	32	75	14	33	-	154
	Prod.	240	645	140	229	-	1254
	Yield	7.5	8.6	10	6.94	-	8.14
	value	4.48	129	7	11.45	-	151.93
<b>Pine apple</b>	Area	22	60	200	80	7	369
	Prod.	660	1,500	12,200	3,206	455	18,021
	Yield	30	25	61	40	65	48.84
	value	13.2	75	366	111	9.1	574.3
<b>Jack</b>	Area	128	162	304	358	69	1021

Details	Puttur	Belthan- gadi	Manga- lore	Bantval	Sulya	Total
Prod.	3,840	4,860	12,160	1,769	31	33,660
Yield	30	30	40	35.67	0.45	32.97
value	38.4	243	121.6	255	31	689
<b>Papaya</b> Area	23	—	5	58	—	86
Prod.	1150	—	380	1885	—	3415
Yield	50	—	76	32.5	—	39.71
value	11.5	—	3.8	56.5	—	71.8
<b>Total Fruits Crops</b> Area	1,616	1,428	1,326	1,583	562	6,515
Prod.	24,988	18,761	39,138	36,766	9,096	1,28,749
Yield	15.46	13.14	29.52	23.23	16.19	19.76
value	476.5	912.8	1,943.4	1,369.1	212.4	4,914.2
<b>Vegetable Crops</b>						
<b>Brinjal</b> Area	14	164	30	16	—	224
Prod.	280	2181	750	303	—	3514
Yield	20	13.3	25	18.9	—	15.69
value	5.6	109	15	15	—	144.78
<b>Green Chillies</b> Area	51	113	193	43	3	403
Prod.	357	904	1351	50.6	21	2,683.6
Yield	7	8	7	1.18	7	6.6
value	7.14	90.4	40.5	2.5	1.05	141.65
<b>Tapioca</b> Area	399	175	5	117	7	703
Prod.	3,990	1,505	50	11,069	104	6,718
Yield	10	8.6	10	9.14	14.8	9.56
value	36.9	120.4	0.5	10.98	1.04	172.5
<b>Sweet Potato</b> Area	235	142	116	82	2	577
Prod.	2,350	852	1,160	847.3	26	5,235.31
Yield	10	6	10	10.3	13	9.07
value	23.5	42.6	23.2	16.94	0.39	106.63
<b>Okra (Ladies Finger)</b> Area	30	187	—	18	—	235
Prod.	210	617	—	100	—	927



Details	Puttur	Belthangadi	Mangalore	Bantval	Sulya	Total
Yield	7	3.3	—	5.56	—	3.94
value	4.2	61.7	—	5	—	70.9
<b>Total green leafy Veg.crops</b>						
Area	84	190	57	285	17	633
Prod.	997	1,900	328	2,026	80	5,331
Yield	11.87	10	5.75	7.11	4.71	8.42
value	10.51	190	9.12	60.6	4	274.23
<b>Total Pumpkin and Squash</b>						
Area	255	427	327	200	—	1,209
Prod.	3,928	3,740	6,034	2,080	—	15,782
Yield	15.4	8.76	18.45	10.4	—	13.05
value	60.86	230.5	92.65	82.26	—	466.27
<b>Total Vegetable crops</b>						
Area	1126	1486	734	826	29	4201
Prod.	12,522	12,168	10,033	6,843.9	231	41,797.9
Yield	11.12	8.19	13.67	8.29	7.97	9.95
value	159.13	892	199	211.56	6.48	1468.17
<b>3. Spices</b>						
<b>Pepper</b>						
Area	283	1248	51	218	173	1973
Prod.	46.6	312	12.75	61.2	43.25	475.8
Yield	0.16	0.25	0.25	0.28	0.25	0.24
value	37	187.2	7.65	36.2	31.14	299.19
<b>Cardamom</b>						
Area	18	153	—	—	2	173
Prod.	0.9	12.2	—	—	0.2	13.3
Yield	0.05	0.08	—	—	0.1	0.08
value	37	73.2	—	—	0.2	110.4
<b>Tamarind</b>						
Area	18	63	115	118	8	322
Prod.	—	504	575	499	40	1,618
Yield	—	8	5	4.2	5	-
value	—	151	115	149	6	421
<b>Ginger</b>						
Area	15	146	64	6	70	301
Prod.	120	1,168	640	50	700	2,678

Details	Puttur	Belthangadi	Mangalore	Bantval	Sulya	Total
Yield	8	8	10	8.3	10	8.9
value	12	292	192	10	140	646
<b>Turmeric</b> Area	22	34	4	3	8	71
Prod.	88	292.4	20	16.4	80	496.8
Yield	4	8.6	5	5.47	10	7
value	8.8	80.8	12	1.65	9.6	112.85
<b>Cloves</b> Area	2	26	—	22	—	50
Prod.	2	9.8	—	12	—	28.8
Yield	1	0.38	—	0.55	—	0.48
value	1.2	29.4	—	7.0	—	37.6
<b>Nutmeg (Nos. in lakh)</b> Area	2	23	3	13	—	41
Prod.	2	8.74	3	4.1	—	17.84
Yield	1	0.38	1	0.3	—	0.44
value	0.5	61.1	6	4	—	71.6
<b>Cinnamon</b> Area	1	4	—	1	—	6
Prod.	0.1	0.56	—	0.04	—	0.7
Yield	0.1	0.14	—	0.04	—	0.12
value	—	0.62	—	0.04	—	0.66
<b>Vanilla</b> Area	127	50	20	44	18	259
Prod.	10	10	4	11.75	3.6	39.35
Yield	0.08	0.2	0.2	0.27	0.2	0.15
value	15	300	8	11.75	7.2	341.95
<b>Total Spices</b> Area	505	1747	257	425	279	3213
Prod.	268.6	2308.96	1251.75	650.39	867.05	5346.75
Yield	0.53	1.32	4.87	1.53	3.11	1.66
value	112.86	1175.52	340.65	219.64	194.14	2042.81
<b>Plantation crops</b>						
<b>Coconut (nos. in Lakh nuts)</b> Area	2,346	4,960	3,182	3,038	2,126	15,652
Prod.	215	595	350	340	234	1734
Yield	0.09	0.12	0.11	0.11	0.11	0.11
value	215.20	2,976	2,800	2,722	1,871	10,584.2

Details		Puttur	Belthangadi	Mangalore	Bantval	Sulya	Total
<b>Areca</b>	Area	5,372	7,005	1,392	5,218	8,105	27,092
	Prod.	6,256	10,227	2,088	6,904	12,157	37,632
	Yield	1.16	1.46	1.5	1.32	1.5	1.39
	value	2,052	5,625	1,148	3,452	6,078	18,355
<b>Beetle Leaves (Leaf nos. in Lakhs)</b>	Area	61	160	22	68	7	318
	Prod.	915	1600	550	1065	140	4270
	Yield	15	10	25	15	20	13
<b>Mango</b>	Area	459	213	486	392	107	1657
	value	9.15	80	55	5.3	6.0	155.45
<b>Cocoa</b>	Area	284	225	20	122	471	822
	Prod.	1,410	4,500	12	740	103	6,765
	Yield	4.96	20	0.6	6.07	0.6	8.23
	value	282	1260	3	148	20.5	1713.5
<b>Cashew</b>	Area	6,111	9,252	3,523	5,584	4,912	29,382
	Prod.	5,789	6,568	2,818	4,746	3,929.6	23,850.6
	Yield	0.95	0.71	0.8	0.85	0.8	0.8
	value	1,157.8	1,642	845.5	1,423.9	1,178.8	6,248
<b>Total Plantation crops</b>	Area	14,935	25,508	8,319	14,251	20,454	83,467
	Prod.	13,820	21,295	4,918	12,390	16,189	68,612
	Yield	0.93	0.83	0.59	0.87	0.79	0.82
	value	3,716	11,583	4,852	7,751	9,154	37,056
<b>Total Commercial flowers</b>	Area	26.5	-	3	33	-	62.5
	Prod.	50.25	-	3	52	-	105.25
	Yield	1.9	-	1	1.58	-	1.68
	value	11.13	-	25	37	-	73.13
<b>Total Medicinal Plants</b>	Area	3	64	-	-	-	67
	Prod.	0.75	28.35	-	-	-	29.1
	Yield	0.25	0.44	-	-	-	0.43
	value	0.22	9.62	-	-	-	9.84

Details	Puttur	Belthangadi	Mangalore	Bantval	Sulya	Total
<b>Total Horticulture Crops</b>						
Area	18,242.5	30,397	10,639	17,118	21,324	97,720.5
Prod.	51915	54584	55344	56702	26383	244928
Yield	2.85	1.8	5.2	3.31	1.24	2.51
value	4,485	1,45,778	7,369	9,588	9,567	45,578

Source : Department of Horticulture, Mangalore

### FISHERIES

Fisheries in Karnataka is being practiced since ancient times. This is evident from the copper inscriptions obtained during archaeological survey done in Brahmagiri. It is well known that Sri Galada Kannappa, a poet contemporary of Sri. Basaveshwara was living in the district. 'Gala' in kannada means fishing hook. *Besthas*, *Mogaveeras*, *Kharvis*, and other communities are the fisherman community found in the State. These communities are practicing fishing activities since, the time immemorial. It is mentioned in the '*Manasollasa*' a literature available, fishing event was also one of the sports event conducted by then royal families. The king who authored this book mentioned that the fibre thread of '*Murva*' plant which was in use to tie the ends of a bow, was being used to weave the fishing nets. Various types of fishing hooks were also explained. It was also reported that Bamboo and '*mada*' trees were in use to prepare rod of the fishing hook. Kuppuswamy, by studying the Raghavanka's '*Harishchandrakavya*' listed various types of fishing nets that were in use. They are *Thadike vale* (*Vale/Bale* in Kannada means net), *Thattivale* (Basket net), *Hasuvale*, *Beesuvale*, *Ballivale*, *Thodakuvale*, *Kannivale* and other types of nets like *Kodathivale*, *Koduvale*, *Thallivale*, *Ballivale*, *Marivale*, *Jaruvale*, *Thoruvale*, *Thottivale*, *Kaluvale*, *Sidivale*, and *gotuvale*. Raghavanka described two types of Bestha (fisherman) community they are '*meenugara bestha*' and '*jalagara bestha*'.

Both Raghavanka and Someshwara explained various types of fishes that are available in various water bodies like ocean, sea, river, tank, lakes etc.. They also provided the description about the fishes of river and sea. Raghavanka explained various types of fishes in his book. In Someshwara's '*Manasollasa*' various recipes of fishes are mentioned. Use of '*alle*' fish both as source of food and plant manures is also mentioned.

Out of 27 districts of the state, Dakshina Kannada, Uttara Kannada and Udupi districts are having sea coast. Out of the 300 km of the coast line in the state 42 km is in the Dakshina Kannada and 98 Km is in Udupi and remaining 160 Km is in Uttara Kannada district. In the vast area of Arabian sea, State is having 27,000 sq km continental shelf and 87,000 sq km area of exclusive economic zone. This area is available for fishing and ocean related economic activities.

Generally during the southwest monsoon season, neither the traditional boats nor mechanized boats do not venture in to the sea for fishing activities. These three months are not suitable for marine fishing. The rivers will bring in plenty of fresh water to the sea and reduces the temperature and salt concentration during monsoon season. This type of relatively cold water is having the high levels of nutrients where as they are deficient in oxygen availability. The high speed winds of the monsoon coupled with the higher tidal pressure, helps in proper mixing of cold and normal water. This helps in accumulation of food nutrients which in turn helps in development of fishes. This region attracts fishes in groups for food during almost all the seasons.

Mackerel and oil sardine that are considered as the backbone of coastal/marine fishing are available in plenty in the district. The production of Mackerel fish is very high and state's coast line is being referred as '*Mackerel coast*'. These are available in plenty, starting from the *Rathnagiri* coast of Maharashtra to *Quillon* in Kerala. Having 62 per cent of meat portion, this fish is being preferred by the most of the coastal population. Considering its importance in fishing, Government of India declared the Mackerel fish as '*National fish*'. In the coastal region of the state about 50 varieties of fishes are recognized as economically important. Apart from the Mackerel and Oil sardine the other important fish resources are prawn, other oilsardine fishes, *Anchoviella*, *Sciaenids*, *Seerfish*, *Cuttle fish*, etc..

Prawn resource, which is considered as gold mine of sea, is available in plenty in the coastal area of the State. This resource is in great and special demand in the international market. To increase the prawn production intensive prawn cultivation is in practice all along the coastal line. The unscientific method of cultivation causing the environmental pollution, deterioration of quality of water bodies and other social related problems forced the supreme court of India to pass an order to ban/to destroy all the prawn cultivation ponds with in the vicinity *i.e.* 500 m from the coast. In response to the appeal in this

regard the court has agreed to review its order and it may suggest adopting some environmental friendly measures. In Dakshina Kannada district prawn cultivation is done only in a few places.

**Table 4.16 : Marine fish production in the District  
(Quantity in Metric Tons and Value in Lakh Rupees)**

Fish Variety	2000-01		2001-02		2002-03	
	Qty.	Value	Qty.	Value	Qty.	Value
Sharks	1,255	716.96	792	720.30	978	752.5
Rays & Skates	743	302.10	437	174.92	675	290.85
Oil Sardines	3,658	405.11	3,507	444.28	4,841	508.10
White Sardines	455	142.8	91	22.75	167	39.05
Other Sardines	980	93.10	1,219	121.90	1,266	136.6
Other Clupeids	66	3.3	0	0	22	2.32
Mackerel	2,441	414.85	2,073	479.19	2,535	622.45
Seer fishes	720	453.30	501	342.45	1,706	1430.60
Tuna	2,191	258.26	689	72.76	1,003	172.05
Lactarius	714	81.10	498	49.30	525	128.00
Lady Fish	35	15.10	33	14.9	75	36.00
Mulletts	32	1050	26	11.6	44	20.32
Carangids	1,069	106.9	934	93.4	2,572	257.2
Promfrets	1,719	141	6.00	765	579.49	1468.15
Silver Bellies	902	54.67	1,037	95.65	910	85.66
Gerrus	21	7.40	19	8.3	30	13.86
Sciaenids	847	92.35	1,135	113.50	860	86.00
Ribbon Fishes	6,202	284.72	3,084	300.92	6,924	661.38
Flat Fish	74	7.40	0	0	1.00	0.10
Anchoviella	3,959	387.80	1,833	218.80	4,903	602.51
Cat fish	194	77.60	47	18.80	108	53.70
Eels	-	-	-	-	-	-
Soles	3,060	239.09	1,403	132.14	1,444	197.05
Jew Fish	1.00	0.05	0	0	14	2.00
Prawns	2,469	1907.3	2,677	1736.05	10,021	6,678.00
Crabs	839	149.03	573	55.75	785	169.06
Shell Fish	19	1.90	0	0	530	324.35

Fish Variety	2000-01		2001-02		2002-03	
	Qty.	Value	Qty.	Value	Qty.	Value
<b>Squids</b>	4,604	1443.31	2,239	813.10	2,353	1,407.10
<b>Squilla</b>	15,386	338.60	9,390	265.69	13,208	270.54
<b>Miscellaneous</b>	25,643	1609.84	12,920	923.00	22,106	1,788.19
<b>Total</b>	<b>80,298</b>	<b>11020.44</b>	<b>47,922</b>	<b>7812.00</b>	<b>82,074</b>	<b>17,851.44</b>

Table 4.17 : Details of Main Fishing centers in the District

	Particulars	Ullala	Mangalore	Kulayi
<b>I . Fish Production (Qty. - Metric Tons, Value - In Lakh Rupees)</b>				
1. 1990-2000	Quantity	744	6,4519	1871
	Value	208.04	9,951.8	293.47
2. 2000-2001	Quantity	288	79,433	577
	Value	132.4	10,715.48	172.56
3. 2001-2002	Quantity	149	47,203	560
	Value	49.2	7,499.24	259.5
4. 2002-2003	Quantity	0	81,690	384
	Value	0	17,672.24	179.2
<b>II . Motorised Boats (2002- 2003)</b>				
1. Purse Seine	9	67	15	91
2. Trawlers	297	523	58	876
3. Gill Netter	97	195	259	551
<b>III. Non- Motorised Boats (2002-03)</b>				
1. Trawlers	33	78	50	161
2. Others	155	302	175	632
3. <b>Total</b>	<b>188</b>	<b>380</b>	<b>225</b>	<b>793</b>
<b>IV. Gear Statistics</b>				
1. Dragnets	199	367	87	473
2. Gill nets	138	345	120	603
3. Trawl nets	297	523	40	860
4. Castnets	400	1200	145	1745
5. Shoreseines	15	36	13	647
6. Purseseines	9	67	8	84
7. Others	400	850	200	1450
8. Disco Nets	20	50	20	90
9. <b>Total</b>	<b>1398</b>	<b>3338</b>	<b>633</b>	<b>5369</b>

Source: Department of Fisheries, Mangalore

Marine fishing in the State is complete in all respects since so many decades. The important one in this is use of big fishing net called 'Rampani' in the fishing activity of the district. This net is having a capacity to catch bigger fishes and can also catch various other fishes in its vicinity. More importantly Mackerel, oil sardine and other shoal fishes are caught in this net. Once, these types of nets were in use a plenty and supporting thousands of fishermen of coastal region. In each net about 100 fishermen were catching fishes on co-operative basis. On introduction of purse seines boats the importance of Rampani nets has reduced. The smaller version of rampani net is called as 'hand rampani' or 'payodha'. This can be used with small boats. This can be used by very few people. Hand rampani is used occasionally during monsoon months and in places where bigger rampani can not be used.

Though the fishing using mechanized boats are banned in the state coast, traditional boats are allowed to do fishing. The traditional fishermen can do fishing activities using outboard engine during monsoon. Hence, in recent days the number of such boats is on rise and this will have a negative impact on the resource. In view of this there is a need to conduct a scientific study on impact of fishing during monsoon using hand rampani nets. This is important in view of the social and economic development of poor/down trodden fishermen. The wooden boats that are four to eleven metres in length are the commonly used traditional boats. Generally, these boats are carved out from a single piece of the wood and are called as dugout boats. These boats are run using oar or barge.

The programme of mechanization of traditional boats was started during 1980s resulting in extension of marine fishing activities. During 1976 purse seines boats were introduced for the first time in the district and have earned the name and accepted by the fishermen for their capacity to catch mackerel and oil sardine fishes. Presently each purse seines boat with advanced technology costs about 20 lakhs rupees. The number of these boats has gradually increased and because of this fishermen also earned good money. As the number of these boats increased the fishes available to each such boats have started decreasing. The length of the nets of each purse seines boat is about 500 to 800 m and the depth from which it can catch is in the range of 50 to 70 m. Naturally the fishing capacity is more. Each purse seines boat is having capacity to catch about three to seven tons of fishes everyday.



Fishing using Trawls, purse seines boats and motorized Gillnets boats and other motorized boats are prohibited during rainy season (June 1<sup>st</sup> to August 31<sup>st</sup>). Fishermen are strictly following this. This season is a breeding season for most of the fish varieties; this practice helps the fishes to complete their breeding activities and to increase their respective generations/population.

Initially all trawl boats were working as one day trawl fishing boats. This practice means, the same day all the boats used to go for fishing and to bring all the prawns caught, into the same station/ harbour. As the availability of prawns had reduced, it was difficult to cope up, even with the diesel expenditure. In order to continue the fishing with out incurring the losses, many days trawl fishing has been brought into practice. According to this, trawls used to stay in the sea itself for three - four days and sufficient quantity of ice cubes are also carried along. Due to this practice boats can go deep into the sea for fishing. Uneconomical purse seines boats are converted/changed into trawl boats and used for fishing

In recent years, importance is being given to inland fisheries also in the district. District is having 108 small tanks with facilities to take up fisheries with a total area of 34.74 ha. Fisheries department is procuring and distributing the artificially produced *Katla*, *Rohu*, *Mrughal*, and other fingerlings in order to increase the economically important fish resources in these tanks.

**Details of District inland fish production is as follows :**

Year	Fish Production in Metric Tons
1999-00	1155.18
2000-01	1112.28
2001-02	1145.28
2002-03	1086.27
2003-04	1013.00

In the district 63 ice cube factories with 862 Metric Tons capacity, 11 cold storages with 365 Metric Tons capacity, five refrigerating units with 25 Metric Tons capacity and three cold storage houses with 240 Metric Tons capacity are working satisfactorily. There are 10 fish meal producing units with a capacity of 71 metric tons.

### ANIMAL HUSBANDRY AND VETERINARY SERVICES

Providing medical treatment to livestock population, providing vaccination as a precautionary measure against spread of infectious diseases, development of high yielding crossbred livestock through artificial insemination using semen from superior/high yielding breeds, in place of local and dwarf breed of hill tract, to improve milk production and availability through increasing the milking capacity of each milch animal, Providing the encouragement and technical know-how to farmers to grow green fodder required for the livestock, cross bred piggery, supply of *Giriraja* poultry birds, increase the egg laying capacity of each bird, to provide encouragement through technical guidance and subsidy to the beneficiaries under various programmes, etc., are the main objectives of the department. Development of cattle is integral part of Agriculture. Integration of Animal Husbandry with Agriculture will help in proper utilization of by products of crop production activity, maintenance of soil fertility by which income of the rural people can be increased.

**Livestock Census:** In the District Livestock census is conducted in every five year. The details are as follows.

Census Year	Cattle	Buffaloes	Goats	Pigs	Total
1951	4,72,872	2,37,295	19,479	16,112	7,49,848
1956	5,12,611	2,30,840	18,831	12,826	7,75,475
1961	5,50,869	2,24,022	18,581	15,251	8,08,810
1966	5,70,884	2,05,092	22,537	17,377	8,16,326
1972	6,19,558	2,02,786	23,227	14,372	8,60,172
1977	6,12,979	2,07,206	22,850	15,324	8,59,359
1983	6,55,874	2,09,203	29,628	15,997	10,35,120
1990	6,66,056	1,83,238	18,625	20,027	11,44,908

Total poultry animals in the Dakshina Kannada district are as follows (Livestock Census year is given in bracket): 7,58,201 (1951); 8,99,072(1956); 10,27,067 (1961); 9,55,706 (1966); 11,72,222 (1972); 10,81,680 (1977); 13,56,298 (1983); 17,00,833 (1990)

As per the 1997 livestock census out of 6.25 lakh livestock in the district, 63,882 crossbred livestock were there 2.92 Lakh local cattle,

57,209 buffaloes, 278 sheep, 22,584 goats, 18,430 pigs, 1,70,537 dogs, 376 horses, 223 other animals, 724 rabbits, 10.76 lakhs hens, 1,708 turkey and swans were there. As per the 2003 livestock census out of 5.99 lakh livestock in the district, 1,09,047 crossbred livestock are there. In that 2.31 Lakh indigenous cattle, 26,062 buffaloes, 420 sheep, 16,671 goats, 4,378 pigs, 2,07,251 dogs, three horses, 7,908 other animals, 576 rabbits, 8.69 lakhs hens and 1,708 turkey and swans were there.

**Table 4.18 : Taluk-wise Veterinary animals (as per 2003 Census)**

Sl. No.	Particulars	Bantval	Belthan-gadi	Manga-lore	Puttur	Sulya	Total
1.	<b>Cattle</b>						
	Indigenous	43,749	63,121	44,857	45,975	32,743	2,30,445
	Exotic	13	11	14	18	0	146
	Cross breed	21,886	21,837	19,985	30,923	14,416	1,09,047
	<b>Total</b>	<b>65,648</b>	<b>85,069</b>	<b>64,846</b>	<b>76,916</b>	<b>47,159</b>	<b>3,39,638</b>
2	<b>Buffaloes</b>	6,050	9,102	7,355	2,348	1,2072	6,062
3.	<b>Sheep</b>						
	Indigenous	75	13	326	0	0	414
	Exotic	0	0	3	0	0	3
	Cross breed	0	0	3	0	0	3
	<b>Total</b>	<b>75</b>	<b>13</b>	<b>329</b>	<b>0</b>	<b>0</b>	<b>420</b>
4.	<b>Goats</b>	3,026	2,580	3,410	5,864	1,391	16,671
5.	<b>Pigs</b>						
	Indigenous	707	517	1,076	1,357	2729	6,386
	Exotic	14	40	52	134	62	46
	Cross breed	367	46	869	342	122	1746
	<b>Total</b>	<b>1,088</b>	<b>603</b>	<b>1,997</b>	<b>1,833</b>	<b>2,857</b>	<b>8,378</b>
6.	<b>Rabbits</b>	197	138	169	51	21	576
7.	<b>Dogs</b>	38,411	41,869	58,098	41,144	27,729	20,7251
8.	<b>Others</b>	0	1	2	0	0	3
9.	<b>Total Veterinary animals</b>	<b>1,14,495</b>	<b>1,39,375</b>	<b>1,36,609</b>	<b>1,28,156</b>	<b>80,364</b>	<b>5,98,999</b>
10.	<b>Total Poultry</b>	<b>1,92,399</b>	<b>1,76,040</b>	<b>1,98,339</b>	<b>1,85,178</b>	<b>1,16,484</b>	<b>8,68,440</b>

**Table. 4.19 : Taluk-wise Veterinary Institutes details (2003-04)**

Sl. No.	Particulars	Bantval	Belthangadi	Mangalore	Puttur	Sulya	Total
1.	<b>Cattle</b>						
1.	<b>Veterinary Hospitals</b>	2	2	3	1	2	10
2.	<b>Dispensaries</b>	7	2	11	5	3	28
3.	<b>Primary Vet. centres</b>	11	12	13	10	7	53
4.	<b>Mobile units</b>	1	1	1	1	1	5
5.	<b>Artificial Insemination Centres</b>	0	0	1	0	0	1
6.	<b>Total</b>	<b>21</b>	<b>17</b>	<b>29</b>	<b>17</b>	<b>13</b>	<b>97</b>
2.	<b>Fish production in Metric tons</b>	0	0	95,227	0	0	95,227
3.	<b>Ice cubes Factories</b>						
	<b>i. Nos.</b>	-	-	51	-	-	51
	<b>ii. Capacity</b>	-	-	683	-	-	683
4	<b>Freezers</b>						
	<b>i. Nos.</b>	-	-	11	-	-	11
	<b>ii. Capacity</b>	-	-	365	-	-	365

In Dakshina Kannada District during the year 2003-04, 10 Veterinary hospitals, 28 veterinary dispensaries, 53 Primary veterinary centres, One Main Centre for Major Rural Programme, Six sub-centre of Principal Rural Programme, One artificial insemination centre, five artificial insemination sub-centres, five mobile veterinary units, One District Poultry production and training centre, One Rinder pest eradication centre. In all 111 veterinary service institutions were working. Apart from this, fodder demonstration centres exist in the campuses of the veterinary dispensaries of Belthangadi, Kalanja, Uppinangadi.

Some of the important statistics related to agriculture development in the district for selected years is given in table 4.20

**Table. 4.20: Statistics related to Agriculture in the district**

Particulars	1970-71	1980-81	1990-91	1995-96	2000-01
<b>1. Per cent to the total geographical area</b>					
a. Forest	29.00	27.62	27.15	27.23	26.93
b. Non- Agricultural use	8.74	9.98	10.27	10.97	11.96
c. Waste land and un- culturable land.	8.17	8.71	8.65	8.53	12.38
d. Permanent Pastures and grazing land.	4.02	3.97	3.81	3.77	4.05
e. Land with Misc. tree crops and groves.	11.61	11.15	10.85	10.66	6.90
f. Culturable waste land	9.5	9.81	8.46	8.96	7.13
g. Other fallow land	2.34	3.02	2.53	1.93	1.11
h. Fallow land (current)	4.20	2.67	2.00	1.64	1.53
i. Net Sown area (NSA)	22.33	23.05	26.27	26.31	28.02
<b>2. Crop Intensity</b>	144.51	136.62	136.45	133.60	120.58
<b>3. Per cent of area sown more than once out of NSA</b>	44.51	36.62	36.45	33.60	20.58
<b>4. Per cent of net area irrigated out of NSA</b>	36.50	37.00	43.10	43.02	53.00
<b>5. Per cent of gross area irrigated out of Gross Sown Area</b>	31.60	33.65	34.55	34.94	45.98
<b>6. Per cent to the Net Irrigated area</b>					
a. Canals	0	0	0	0	0
b. Tanks	13.00	8.37	3.76	3.85	1.67
c. Wells	22.00	26.00	33.00	38.98	40.93
d. Other Sources	60.00	66.00	63.00	57.17	57.40
<b>7. Out of Gross Sown Area</b>					
a. Paddy	67.00	55.84	50.99	49.27	39.07
b. Ragi	0.20	0.11	0	0	0
c. Jowar	0	0	0	0	0
d. Total Cereals	67.22	55.94	51.00	49.27	39.07
e. Total Pulses	4.06	4.68	6.57	6.38	2.30

Particulars	1970-71	1980-81	1990-91	1995-96	2000-01
f. sugar cane	0.59	0.45	1.18	0.85	0.21
g. Oil seeds	0.38	4.36	1.29	1.64	0.27
<b>8. Average Productivity (Kg/ha)</b>					
a. Paddy	1,424	1,820	1,923	1,982	2,143
b. Jowar	0	0	0	0	0
c. Ragi	0	0	0	0	0
d. Red gram	0	0	0	0	0
e. Sugar cane ( Tons/ha)	89	106	86	97	108
f. Ground nut	54	1028	1336	1710	0
<b>9. District share (per cent) in States food production</b>	4.29	4.15	4.54	3.22	1.18
<b>10. Per capita cultivable area available (ha)</b>	0.11	0.10	0.12	0.11	0.09

Source : Directorate of Economics and Statistics

### **Agriculture Research Centre, Kankanadi, Mangalore**

Agriculture Research Station located in Kankanady of Mangalore was established in 1945 by the Department of Agriculture of the erstwhile Madras presidency in the name of Paddy Research Station. This station was run by the Department of Agriculture of Mysore State after reorganization of States during 1956. This station was handed over to University Of Agricultural Sciences, Bangalore to undertake more research works. Initially more research work was done primarily on development of Paddy varieties. Later on research was also concentrated on other problems/aspects like agronomic practices, Pest and diseases. On initiation of the National Agricultural Research Unit, Regional Research Station in Brahmavara was established in 1981. Through this opportunity was provided to undertake research on various crops based on the problems faced by the farmers of the region. Subsequently this Agriculture Research Station, Kankanadi was recognized as the experimentation centre for paddy crop in cereals, Black gram, green gram and cowpea in pulses and groundnut and sesame in case of oilseed crops. Out of 16.83 ha of total area owned by the station, paddy research is being taken up in 5.70 ha.

*Location of the Research Centre:* This Research centre is located at a distance of five km from Mangalore central and Mangalore Railway station eight km from the KSRTC bus station. Sharing its eastern side

with Fisheries College and NH 17 and towards its west super *pete* (Market) exists. Even today this station is being recognized locally as Super *pete* farm. Station elevation is 30 metres above mean sea level and located at 13° N latitude and 75° E longitude.

*Weather:* This station is located in coastal region and experiences the high rainfall as a result Relative Humidity (RH) is high. This region receives major portion of its annual rainfall between June and September. The average annual rainfall amounts to 3,500 mm and much variation will not be seen in the temperature. The minimum and maximum temperature is 19°C and 26°C recorded in January and May months of the year respectively. The RH is minimum (53 per cent) in December month and maximum (95 per cent) during August months of the year. Like that the evapotranspiration recorded in the station is minimum of 1.6mm and maximum of 15.3mm recorded in June and April months of the year respectively. *Kharif* crops are being cultivated under rain fed condition and remaining seasons are good for pulses and oilseeds crops cultivation.

*Soil :* Three types of soils are found in this coastal region. Where as in this research station mainly two types of soils are found. They are Coastal alluvial soil and laterite soil. Due to the high rainfall, Calcium and magnesium in the soil get drained away and soil becomes acidic. Iron toxicity is also affecting the crop production activities. The pH value of these soils is between 4.5 and 5.9. Available organic carbon and Phosphorous is medium to high, where as the soil is deficient in available potash. The available Zinc, a micronutrient, is found in low to medium level.

*Main objectives and activities of the station are* 1) Development of suitable high yielding varieties for this region, 2) Development of suitable pest and disease resistance varieties for this region, especially for gall midge and Blast, 3) Development of varieties in pulse crops like Black gram, Green gram, cowpea and in oil seed ,crops like Groundnut and Sesame, 4) Identification of rhizome resistance Ginger variety suitable for cultivation in rice fallow and development of suitable agronomic practices, 5) Identification of bacterial disease resistant variety and development of suitable agronomic practices in Tomato, 6) Detail study of coastal soils to advice suitable improvement practices, 7) Management of micronutrients in paddy and identification of suitable agronomic practices, 8) Development of paddy based cropping system, 9) Identification of suitable nutrients requirement and agronomic practices

for ground nut cultivation, 10) Production and supply of quality breeders' seed to agriculture institutions and progressive growers, 11) Providing the technical advisory/ information to Agriculture department personnel and to the farmers by participating in the various extension programmes, 12) Transfer of new/modern technologies to Agriculture department personnel and to the farmers by imparting training.

*Facilities available in the Station:* This research station is having all the required facilities to under take field experiments on different aspects. Seed production of suitable high yielding varieties of Paddy and groundnut is also being carried out in the station. This station is having facilities to take up dairy, poultry and to take up cultivation of horticulture crops. It also processes small library facility to provide technical information and equipment's to record weather parameters viz. temperature and rainfall, etc..

*Highlights of research results:* In this station initially importance was given to varietal improvement research in paddy. Gradually, research work was also done on agronomy, soil science, and entomology and pathology aspects also.

*Varietal Improvement:* Since inception efforts are being made to develop suitable high yielding varieties of paddy for coastal region. Prior to 1950 pure line selection from the predominant indigenous varieties were done. As a result seven good varieties were identified, developed and released for cultivation. The characteristics of those varieties are presented here.

No.	Variety Name	Culture No.	Local name	Year of release	Colour of the grain/ kernel	Suitable season
1.	<b>MGL - 1</b>	-	Goddu balleri	1950	White	Kahrif (Enilu)
2.	<b>MGL - 2</b>	1367	Kajekayame	1952	Red	Kahrif
3.	<b>MGL - 3</b>	1828	Hulluga	1954	Red	Kahrif
4.	<b>MGL - 4</b>	1958	Kanva	1954	White	Kahrif
5.	<b>MGL - 5</b>	3159	Maskathi	1954	White	Kahrif
6.	<b>MGL - 6</b>	2482	Athikraya	1955	Red	Rabi (Suggi)
7.	<b>MGL - 7</b>	selection		1955	White	Rabi

Source: Annual Research report 1945-50, Agriculture Research Station, Kankanadi



After 1960, varieties developed in different parts of the country are brought and conducted research to select suitable varieties for the region. Through these efforts various varieties found better than MGL series and these were selected and released for this region. Important among them are MTU-3 and MTU-20 from Martheru, A.P., PTB 9 (*thevalakanna*) and PTI-10 from Pattambi of Kerala for *kharif* (*Enilu*) season and PTB -20 and form Coimbatore CO-14 and CO-25 for Rabi season and CO- 29 for summer seasons are identified as suitable and released.

One decade after (1970), newly developed high yielding varieties were concentrated and IR -8 and Jaya varieties were identified as suitable for October - January and for January - April season respectively. These varieties have the capacity to yield more in response to the higher fertilizer usage. More research work was done after implementation of the All India Coordinated Rice Improvement project during 70's and 80's and more varieties were identified and released. The details of them are presented here.

Sl. No.	Variety Name	Strains used/ pedigree	Year of Release	Grain/Kernel colour	Season
1.	<b>Red Annapurna</b>	PTI-10/TN-1	1977	Red	Rabi
2.	<b>GMR- 17</b>	IR-8/ WU-1263	1976	White	Kharif
3.	<b>Shakthi</b>	CR -55-13/IR-8	1978	White	All three season
4.	<b>Phalguna</b>	IR-8/CO-29	1979	White	Kharif
5.	<b>Jyothi</b>	PTB-10/IR-8	1979	Red	Rabi

\* Above varieties are resistant to Gall midge and blast. Phalguna can with stand flood situation for 6-7 days.

After 1980, importance was given to develop red kernel variety resistant to most prevailing pest and disease *i.e.* Gall midge and blast. As a result of research in this direction many varieties suitable for various seasons and agronomic and climatic conditions of the region were developed and released. The details of them are given below.

Sl. No.	Variety Name	Strains used	Year of Release	Grain/Kernel colour	Season
1.	<b>Mahaveer</b>	IET-2886/Red annapurna	1985	Red	Kharif
2.	<b>Nethravathi</b>	IET-2886/Red annapurna	1990	White	Khariff

Sl. No.	Variety Name	Strains used	Year of Release	Grain/Kernel colour	Season
3.	<b>Latha</b>	Vikram/PTB-20	1994	White	Kharif
4.	<b>MO-4</b>	IR-8/PTB-20	1995	White	Kharif
5.	<b>Mukthi</b>	Sirindhamera/IR-2153-159-1-4	1993	Red	Rabi/ Summer

Note : Above varieties are resistant to gall midge and blast. Nethravati can withstand flood situation for six to seven days.

Apart from this, hybridization programme was undertaken to develop high yielding varieties with red kernel resistant to gall midge pest and blast disease suitable for various seasons and agronomic and climatic conditions. Efforts are underway to identify and to develop good varieties from them. Efforts are also made in the station to develop varieties in other crops like cotton, groundnut, sweet potato, tapioca and tomato. As a result C-43 variety in sweet potato is released. In recent years S-1010 variety is found suitable for cultivation in rice fallow by providing one or two irrigation and it is also found tolerant to borer pest. This will be released to the farmer's field after experimentation. In groundnut TMV-2, Spanish improved, DH-3-30 and DH-40 varieties, through research, found suitable to this region. In tomato efforts are being made to develop bacterial wilt disease resistant, high yielding variety. As a result of this *Shakthi*, BWR-5 and Shepard are the few varieties identified.

*Krishi Vigyan Kendra, Kankanadi, Mangalore:* Indian Council of Agricultural Research, New Delhi has initiated establishment of *Krishi Vigyan Kendras* (KVKs) with an aim to take the modern agricultural technologies to the rural areas and to increase the self employment opportunities to the rural masses. *Krishi Vigyan Kendras* have played pivotal role in increasing the nation's agricultural production and to improve the social and economic status of the farmers. During the year 2004, as an hope to the Dakshina Kannada farmers, this *Krishi Vigyan Kendra* in Kankanady was established under the aegis of University of Agricultural Sciences, Bangalore. Five talukas of Dakshina Kannada, viz. Mangalore, Bantval, Belthangadi, Sulya and puttur are coming under the jurisdiction of this KVK.

The *Krishi Vigyan Kendra*, kankanady in Dakshina Kannada district is in western coast of Karnataka. It is located at 13° N latitude and 75° E longitude in Dakshina Kannada district coming in coastal region is a

small strip of land between Western Ghats and Arabian Sea. This represents the Agriculture zone number Ten towards the western sides having places with elevations less than 300 metres from the sea level . As per the statistics of the district for the year 2003-04, area under cultivation is 16.22 lakh ha, out of which 7.23 lakh ha is having irrigation facilities. River, tank and wells are the main sources of irrigation. 12.84 lakh ha area is found under forest cover in this region.

*Weather:* The average annual rainfall of the region amounts to 3,700 mm and major portion of the rainfall occurs between June and September months of the year. In the entire year there will not be much variation in the temperature. Minimum temperature is in the range of 21° C to 26° C and the maximum temperature is in range of 28° C to 33° C. Relative humidity to the least is between 84.5 per cent to 96.5 per cent.

*Soil :* Three types of soils found in this region are Coastal sandy and alluvial soil, laterite soil and red clay soils, apart from this coastal saline/alkaline soils are found here and there.

*Principal crops of Dakshina Kannada district :* According to the annual report on seasons and Crops of Dakshina Kannada (2003-04) farmers are cultivating the following crops.

1.	Cereals and pulses	Paddy, Greengram, Blackgram, Horsegram Sesamam
2.	Horticulture crops	
	a. Plantation crops	Coconut, Areca, Cashew, Rubber, Pepper, Turmeric, Nutmeg, Clove, All spice, Vanilla
	b. Vegetable crops	Brinjal, Chillie, Raddish, Okra, Watermelon, Cucumber, Pumpkin, Littlegourd, Tapioca, etc.
	c. Fruit crops	Banana, Sapota, Pineapple, Mango, Guava, Papaya, Butter fruit, etc..
	d. Floriculture crops	Udupi Mallige (Jasmine), Orchids, Anthorium.
	e. Medicinal and aromatic plants	Citronella grass, Lemon grass, alloyi, etc.

*Agriculture related/based occupations:* Fisheries, Dairy, piggery, Sericulture, etc.. Main problems of Dakshina Kannada district are: 1. Acidic soils, 2. Shortage of agriculture labourers, 3. Crop related/specific problems.

*Mandates of Krishi Vigyan Kendra:* 1) to employ the principle of 'Learning by doing' as the main method of training and education to impart and to provide work experience, 2) to substantially increase the agriculture production by speedy transfer of modern agriculture technologies, 3) to influence the production system to achieve social justice by giving first priority to the weaker section of the society/rural area.

*Objectives of Krishi Vigyan Kendra:* 1) Organizing the on-campus and off-campus, both on short term and long term basis, skill development and production oriented training programmes on field problems for farmers, farm women and extension field functionaries, 2) To organize long term training programmes for rural youths, especially for uneducated, to equip them to adopt modern technologies in field and to take up self employment, 3) To effectively use the informal educational programmes like fair, field days, field visits, *krishi melas*, radio talks, group discussion, news papers, agriculture programmes in television to transfer the technologies to the farmers, 4) to organize agriculture science groups of youth in rural areas, to create interest and inclination towards agriculture and related fields. Utilization of facilities created in the KVK to provide work experience to the students of rural area and to impart job oriented training for youths in post matriculation level, 5) To train the rural women in profitable agriculture based and or cottage industries in order to help them in best utilization of their free time . To create awareness and to provide information about importance of balanced nutrients, health, rural sanitation, fruits and vegetable processing, grain storage, dairy and poultry, 6) Gradual development of facilities to provide work on experience training on cottage industries and traditional family profession for overall development of the rural area, 7) Development of region specific technologies by visiting and inspecting the farmers field in collaboration with the subject matter specialists, scientists from the Regional Research Station and state agriculture department personnel and 8) Organization of On farm testing trails in the farmers field to remove/over come the obstacles/difficulties in adoption of recommended technologies.

*Training Subjects:* Need based training on various aspects are imparted to the trainees. Important among them are 1. Plant propagation methods in horticulture crops 2. Integrated management practices of plantation crops, 3. Agronomic practices in fruits crops like Mango, papaya, sapota, pineapple 4. Agronomic practices of vegetable crops, 5.

Management of Udupi mallige (Jasmine), 6. Profitable cultivation of orchids and anthurium, 7. Soil and water conservation, 8. cultivation practices of medicinal plants, 9. cultivation practices of aromatic plants, 10. flower arrangement and designing, 11. Kitchen gardening and its management, 12. Management of problematic soils, 13. Grain storage methods, 14. cultivation of green leafy vegetables, 15. Integrated nutrient management, 16. dairy, 17. piggery and poultry, 18. fodder crops, 19. fruits and vegetable processing, 20. mushroom cultivation, 21. organic farming, 22. improved methods of compost preparation, 23. *vermi* composting, 24. Importance of Bio-fertilizer, 25. Agro-forestry, 26. Economical cashew processing, 27. Candle making, 28. Agarbhathi making.

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