

CHAPTER 4

AGRICULTURE AND IRRIGATION*

In Bijapur district, as per 1991 census, 37.92 per cent of population is grouped under main workers. Out of the total main workers, 31.52 per cent are cultivators and 43.15 per cent are agriculture labourers. Total number of cultivators living in the rural areas is 3,28,331 and that of agriculture labourers is 4,52,743. A total of 20,663 cultivators and a total of 26,297 agriculture labourers live in the urban area. Among the main workers, 7,52,625 are men and 3,57,613 are women. Majority of the main workers are found in Bijapur, Indi, Jamkhandi, Sindgi and Basavana Bagevadi taluks, Cultivators are more in Bijapur, Jamkhandi, Sindgi, Mudhol, Basavana Bagevadi and Badami taluks while agriculture labourers are more in Bijapur, Indi, Sindgi, Basavana Bagevadi, Badami, Jamkhandi and Mudhol taluks. Table 4.1 'A' and 4.1 'AA' gives talukwise details of agricultural labourers in the district.

* This Chapter also includes Horticulture, Animal Husbandry and Veterinary Services and Fisheries.

Table - 4.2 'A': Land use Statistics from 1980-81 to 1996-97 in Bajapur District (in hectares).

Year	Geographical area	Forest Land	Land- not available for cultivation		Land put to non agricultural use	% to		Other un-cultivated land			Total
			Geographical area	Barren and uncultivable land		total area	Geographical area	cultivable waste	permanent pastures	Trees & groves	
1980-81	17,12,348	83,103	4.85	51,344	44,887	96,231	5.62	8135	17099	1601	26835
1983-84	17,12,348	83,103	4.85	55,117	46,949	102,066	5.96	8135	12466	1605	22206
1984-85	17,12,348	83,103	4.85	55,117	46,949	102,066	5.96	8135	12466	1605	22206
1985-86	17,12,348	83,103	4.85	50,534	54,186	104,720	6.12	8135	13452	1653	23240
1986-87	17,12,348	83,103	4.85	50,534	54,187	104,721	6.12	8135	13452	1661	23248
1987-88	17,12,348	83,103	4.85	50,534	58,292	108,826	6.36	7537	13452	1531	22520
1988-89	17,12,348	83,103	4.85	50,534	29,292	79,826	4.66	7537	13452	1518	22507
1989-90	17,12,348	83,103	4.85	50,534	59,292	109,826	6.41	7537	13452	1518	22507
1990-91	17,12,348	83,103	4.85	50,534	59,292	109,826	6.41	7537	13452	1518	22507
1991-92	17,12,348	83,103	4.85	53,869	56,759	110,628	6.46	7537	13004	1518	22059
1992-93	17,12,348	83,103	4.85	53,869	56,759	110,628	6.46	7537	13004	1518	22059
1993-94	17,12,348	83,103	4.85	53,869	56,755	110,624	6.46	7537	3588	1518	22059
1994-95	17,12,348	83,103	4.85	53,869	56,755	110,624	6.46	7537	13004	1518	22059
1995-96	17,12,348	83,103	4.85	57,014	53,869	110,883	6.48	7537	13004	1518	22059
1996-97	17,12,348	83,103	4.85	57,033	53,869	110,902	6.48	7537	13004	1518	22509

Contd...

Agriculture and Irrigation

247

Year	Fallow Land			Area Sown in hectares			Net Area sown to total area	Cropping intensity Geog area		
	% of Geographical area	Current fallows	Other fallow land	Total fallow land	% of Geographical area	Net area sown			Area sown more than once	Total cropped area
1980-81	1.57	312748	25398	338146	19.75	1168033	24033	1192066	68.21%	102.06%
1981-82	1.30	90371	17496	107867	6.30	1398324	47916	1446240	81.66%	103.43%
1982-83	1.30	112614	18825	131439	7.68	1373534	56429	1429963	80.21%	104.11%
1983-84	1.30	66840	15420	82260	4.80	1422713	71400	1494113	83.09%	105.02%
1984-85	1.30	155169	19867	175036	10.22	1329937	59041	1388978	77.67%	104.44%
1985-86	1.36	219412	20010	239422	13.98	1261863	39632	1301495	73.69%	103.14%
1986-87	1.36	142767	16677	159444	9.91	1341832	54247	1396079	78.36%	104.04%
1987-88	1.32	68744	14201	82945	4.84	1414954	111841	1526795	82.63%	107.90%
1988-89	1.31	152733	15730	168463	9.84	1329449	94850	1424299	77.64%	107.13%
1989-90	1.31	105482	14666	120148	7.02	1377764	103244	1481008	80.46%	107.49%
1990-91	1.31	127378	14829	142207	8.30	1355705	123219	1478924	79.17%	109.09%
1991-92	1.29	95462	15790	111252	6.50	1385306	167956	1553262	80.90%	112.12%
1992-93	1.29	131884	16418	148302	8.66	1348256	120766	1469022	78.74%	108.96%
1993-94	0.74	137779	16287	154066	9.00	1351908	145485	1497393	78.95%	110.76%
1994-95	1.29	221788	16559	238347	13.92	1258241	125597	1383838	73.48%	109.98%
1995-96	1.29	166062	17824	183886	10.74	1312417	118097	1430514	76.64%	109.00%
1996-97	1.29	113484	13159	126643	7.39	1369641	184338	1553979	79.99%	113.46%

Source: Brochure on irrigation statistics in Karnataka, 1980-81 to 1994-95, Directorate of Economics and Statistics, Bangalore -- 560001, DES No. 4195

1	2	3	4	5	6	7	8
Bilgi	Total	52,935	44.48	18,616	35.17	26,373	49.82
	Rural	52,935	44.48	18,616	35.17	26,373	49.82
	Urban	-	-	0	-	0	-
Hungund	Total	93,921	38.29	28,318	30.15	34,110	36.32
	Rural	77,274	40.71	26,569	34.38	32,009	41.42
	Urban	16,647	30.00	1,749	10.51	2,101	12.62
Indi	Total	122,171	40.30	43,617	35.70	61,494	50.33
	Rural	115,083	41.39	42,022	36.51	59,435	51.65
	Urban	7,088	28.22	1,595	22.50	2,059	29.05
Jamkhandi	Total	119,973	35.35	39,211	32.68	39,660	33.06
	Rural	81,477	38.20	35,308	43.33	33,529	41.15
	Urban	38,496	30.53	3,903	10.14	6,131	15.93
Muddebihal	Total	83,480	38.08	26,113	31.28	39,842	47.73
	Rural	72,661	40.99	24,669	33.95	37,779	51.99
	Urban	10,819	25.77	1,444	13.35	2,063	19.07
Mudhol	Total	82,760	42.54	31,468	38.02	36,178	43.71
	Rural	73,219	44.79	29,398	40.15	33,836	46.21
	Urban	9,541	30.68	2,070	21.70	2,342	24.55
Sindgi	Total	135,294	38.55	36,844	27.23	56,437	41.71
	Rural	130,916	39.25	36,291	27.72	54,904	41.94
	Urban	4,378	27.05	553	12.63	1,533	35.02
Bijapur District	Total	966,994	37.92	306,083	31.65	417,111	43.13
	Rural	832,203	41.02	289,122	34.74	394,325	47.38
	Urban	134,791	27.85	16,961	12.58	22,786	16.90

Source: Bijapur district Census Handbook, 1991, Directorate of Census, Bangalore.

Land use

The geographical area of Bijapur district forms 8.99 per cent of the State's area (19, 050 thousand ha) and is at the first place among other districts. During 1994-95, geographical area of Bijapur district was 19,05,000 ha of which forest area was 83,103ha, which formed 4.85 per cent of the geographical area. 6.46 per cent of the geographical area (56,759 ha) is being used for non agricultural purpose. Fallow and Land not available for cultivation was 53,869 ha. Uncultivable and other fallow land was 22,059 ha, out of which permanent pasture land was 13,000 ha and the area under trees and orchards was 1,518 ha. About 1.29 per cent of the total geographical area of the district was fallow which forms 13.92 per cent of the total uncultivated land. During 1994-95, the net sown area and the gross sown area in the district was 12,58,241ha and 13,83,834 ha respectively. Around 73.48 per cent of the total geographical area of the district is sown. The land use statistics of the district from 1980-81 to 1996-97 and the talukwise details for 1994-95 are in Table 4.2 'A' and 4.2 'AA' respectively.

Agriculture Research Station

Agriculture Research Station, Bijapur was started in 1933. The station acquired an area of 157.8 ha of land out of which 133.8 ha is fit for cultivation. Only 3.3 ha of land is under irrigation. In this station, horticultural crops in 4.5 ha, forest in 6.5 ha, fodder crops in 4.2 ha, mulberry in 0.5 ha and food crops in 62.2 ha are grown. It is found that the yield obtained from dryland agriculture can be doubled by following modern dryfarming practices.

Agriculture Research Station, Bijapur lies in the Northern dry Zone, and has 35 taluks of 5 districts of the State. All the eleven taluks of Bijapur district come under this zone. The total geographical area of this zone is 47,86,642 ha out of which culturable area is 34,66,048 ha. Percentage net sown area under irrigation ranges from 7.39 (Bijapur district) to 20.92 (Belgaum district). Total population under this zone is 5.62 million and around 79 per cent lie in the rural area. Density per sq.km. varies from 94 to 141. Number of land holdings less than two ha is around 35 per cent.

Table - 4.1 'A' : Details of Talukwise Agricultural Labourers as per
1991 Census in Bijapur District
(Details for Men, Women and Total Workers are given separately)

Taluk		Main Workers	% to total Workers	Cultivators	% to main workers	Agricultural Labourers	% to main workers
1	2	3	4	5	6	7	8
Badami	Total	99,656	38.83	30,591	30.70	39,908	40.05
	Male	66,259	51.53	24,851	37.51	17,768	26.82
	Female	33,397	26.09	5,740	17.19	22,140	66.29
Bagalkot	Total	75,064	35.91	18,314	24.40	30,420	40.53
	Male	50,784	47.82	14,650	28.85	13,327	26.24
	Female	24,280	23.61	3,664	15.09	17,093	70.40
Basavana Bagevadi	Total	101,740	39.57	60,369	59.34	52,699	51.80
	Male	65,842	50.39	32,991	50.11	24,716	37.54
	Female	35,898	28.39	27,378	76.27	27,983	77.95
Bijapur	Total	161,192	34.08	42,814	26.56	60,550	37.56
	Male	118,386	48.30	35,083	29.63	31,870	26.92
	Female	42,806	18.78	7,731	18.06	28,680	67.00
Bilgi	Total	52,935	44.48	18,615	35.17	26,373	49.82
	Male	32,014	53.81	13,750	42.95	11,734	36.65
	Female	20,921	35.16	4,865	23.25	14,639	69.97
Hungund	Total	93,921	38.29	32,933	35.06	34,120	36.33
	Male	61,907	50.46	26,529	42.85	14,092	22.76
	Female	32,014	26.11	6,404	20.00	20,028	62.56
Indi	Total	122,170	40.30	43,427	35.55	61,494	50.33
	Male	79,850	50.93	34,637	43.38	30,467	38.16
	Female	42,320	28.92	8,790	20.77	31,027	73.32
Jamkhandi	Total	119,973	35.35	39,211	32.68	39,660	33.06
	Male	90,704	52.49	32,635	35.98	22,915	25.26
	Female	29,269	17.57	6,576	22.47	16,745	57.21
Muddebihal	Total	83,480	38.08	26,113	31.28	39,789	47.66
	Male	54,116	49.05	21,324	39.40	17,684	32.68
	Female	29,364	26.96	4,789	16.31	22,105	75.28

Contd...

1	2	3	4	5	6	7	8
Mudhol	Total	83,248	42.54	31,468	37.80	36,594	43.96
	Male	53,624	54.40	23,163	43.20	17,797	33.19
	Female	29,624	30.66	8,305	28.03	18,797	63.45
Sindgi	Total	108,294	38.55	36,844	34.02	56,437	52.11
	Male	71,680	49.65	31,027	43.29	27,480	38.34
	Female	36,614	26.82	5,817	15.89	28,957	79.09
Bijapur District	Total	1,101,673	37.92	380,699	34.56	478,044	43.39
	Male	745,166	50.48	290,640	39.00	229,850	30.85
	Female	356,507	24.89	90,059	25.26	248,194	69.62

Source : Bijapur district Census Report, 1991, Directorate of Census, Bangalore.

Table - 4.1 'A A' : Details of Taluk-wise Agricultural Labourers as per 1991 Census in Bijapur District.

(Details for Rural, Urban and Total Area are given separately)

Taluk		Main Workers	% to total Workers	Cultivators	% to main workers	Agricultural Labourers	% to main workers
1	2	3	4	5	6	7	8
Badami	Total	99,656	38.83	30,591	30.70	39,908	40.05
	Rural	78,328	41.77	28,359	36.21	36,813	47.00
	Urban	21,328	30.88	2,232	10.47	3,095	14.51
Bagalkot	Total	75,064	35.91	18,314	24.40	30,420	40.53
	Rural	55,848	42.27	17,132	30.68	29,475	52.78
	Urban	19,216	24.99	1,182	6.15	945	4.92
Basavana	Total	101,740	39.57	32,991	32.43	52,689	51.79
Bagevadi	Rural	94,462	40.25	30,758	32.56	50,172	53.11
	Urban	7,278	31.61	2,233	30.68	2,517	34.58

Contd...

The land use statistics of Bijapur district during the year 1996-97 are as below:

1) Geographical area-17,12,348 ha; 2) Forest area - 83,103 ha; 3) land unfit for cultivation-1,10,902 ha; 4) land used for other activities other than agriculture - 57,033 ha; 5) Fallow land-53,869 ha; 6) Other fallow land not used for cultivation - 22,059 ha; 7) Fallow land fit for cultivation - 7,537 ha; 8) Permanent pastures - 13,004 ha; 9) Trees and orchard land -1,518 ha; 10) Existing fallow land -1,13,484 ha; 11) other fallow land - 13,159 ha; 12) Total fallow land-1,26,643 ha; 13) Sown area - 15,53,979 ha; 14) Sown area more than once - 1,84,338 ha; 15) net sown area - 13,69,641 ha; and total net irrigated area - 2,89,747 ha.

Table 4.2 'AA' : Talukwise Land use statistics for 1996-97 (in Hectares)

Taluk	Geographical Area	Forest	Other uncultivated land including fallow land				Land not available for cultivation		
			Cultivable waste	Permanent pastures	Trees & groves	Total	Barren & uncultivable land	Land put to non agricultural use	Total area
Basavana									
Bagewadi	1,97,865	1,143	155	1,268	0	1,423	3,521	6,078	9,599
Bijapur	2,65,769	834	3,627	4,145	316	8,088	9,975	9,616	19,591
Indi	2,22,492	0	834	1,637	22	2,493	3,773	10,067	13,840
Muddebihal	1,49,744	0	623	1,016	450	2,089	6,064	2,079	8,143
Sindhagi	2,17,601	0	263	1,509	518	2,290	5,726	3,441	9,167
Bijapur									
District Total	10,53,471	1,977	5,502	9,575	1,306	16,383	29,059	31,281	60,340
Badami	1,39,420	31,263	421	986	0	1,407	8,523	4,688	13,211
Bagalkot	93,627	11,611	192	55	3	250	2,732	3,420	6,152
Bilagi	78,169	11,761	45	107	2	154	4,517	4,308	8,825
Hungund	1,35,358	9,792	316	839	14	1,169	2,541	6,236	8,777
Jamakhandi	1,16,853	11,410	1,061	578	193	1,832	3,162	3,945	7,107
Mudhol	95,450	5,289	0	864	0	864	3,162	3,133	6,295
Bagalkot									
District Total	6,58,877	81,126	2,035	3,429	212	5,676	24,637	25,730	50,367
Grand total:	17,12,348	83,103	7,537	13,004	1,518	22,059	53,696	57,011	1,10,707

Contd....

Fallow land			Sown area			Net irrigated area
Current	Others	Total	Net	More than once	Total	
27,031	1,567	28,598	1,57,102	3,825	1,60,927	5,660
47,934	7,541	5,54,75	1,81,778	12,489	1,94,267	21,199
4,957	1,522	6,479	1,99,680	17,602	2,17,282	32,858
16,400	1,284	17,684	1,21,828	6,916	1,28,744	7,899
17,516	0	17,516	1,88,628	10,909	1,99,537	22,259
1,13,838	11,914	1,25,752	8,49,016	51,741	9,00,757	99,875
17,306	1,866	19,172	74,367	6,204	80,571	21,060
624	310	934	74,680	14,675	89,355	15,641
6,684	826	7,510	49,919	4,895	54,814	23,524
6,264	233	6,497	1,09,123	6,971	1,16,094	8,632
13,478	1,877	15,355	81,149	12,880	94,029	54,875
7,868	798	8,666	74,163	20,731	94,894	57,980
52,224	5,910	58,134	4,63,401	66,356	5,29,757	1,81,712
1,66,062	17,824	1,83,886	13,12,417	1,18,097	14,30,514	2,81,587

Soils

District has several basic rock types such as granite, gneiss, deccan trap, Dharwad schist, sandy stone, lime stone and soils derived from them. The soils derived from them can be classified into five types viz., deep black soil, medium black soil and shallow black soil, red clayey soil and red sandy soil.

Black soils

These soils are derived from different rock types. In the northern part (Basavana Bagevadi, Bijapur, Indi, Sindgi, Hungund and Jamkhadi taluks) of the district for black soils, deccan trap or basalt are the basin rock types. The black soils in Mudhol, Bilgi, Bagalkot and Muddebihal taluks lime stone and slate are the rock types. Depending upon the depth of the soil and loamy content the black soils are classified into 3 types.

1. Deep black soils: with more than 60 cms deep soils
2. Medium black soils: 30 to 60 cms deep soils
3. Shallow black soils: soils below 30 cms deep.

The surface of the soil has small limestones with clay content of below 40%. Deep black soils are mainly found in Bagalkot, Bilgi, Hungund Muddebihal and Mudhol taluks. In these soils since the clay content is around 60%, the water percolation is low. These soils belong to land

capability II. In these soils the water holding capacity is 6 cms for 30 cms depth. In medium black soils of Basavana Bagevadi, Bijapur, Sindgi and Jamkhandi taluks the clay content is around 50% with medium water percolation. These soils belong to land capability II and III. They have water holding capacity of 5cms for very 30 cms depth. Shallow and degraded black soils are commonly found in Indi, Sindgi and Bijapur taluks and to some extent in Basavana Bagevadi and Muddebihal taluks. These have 40% clay content with medium water percolation. They belong to land capability class III and IV and have a water holding capacity of 3 to 4 cm for every 30 cm depth.

Black soils have clay content with medium permeability. They are highly argillaceous, very fine grind and dark with high proportion of calcium and magnesium carbonates. They are very tenacious of moisture and exceedingly sticky when wet. Due to considerable contraction upon drying large and deep cracks are formed. These soils are abundant in iron, lime magnesia and alumina. Potash has a wide range. They are poor in phosphorous, nitrogen and organic matter. In all *regur* areas in general and in those derived from ferromagnesium schist, there is a layer rich in *kankar* nodules due to segregation of calcium carbonates. The soils are generally rich in montmorillonitic and beidellitic group of clay minerals. These are acidic soils with pH from 7.5 to 9 and electric conductivity from 0.2 Mmoh to 1.8Mmoh. These soils have high cation exchange capacity. They also have high calcium and magnesium in exchange form. Apart from iron these soils are deficient in all micronutrients.

Red sandy loam soils

These soils area is found along with black soils on hillsides. Considering the surface features, basic rock type and degree of weathering, the soil depth ranges from 15 to 100cms with clay content of 30%. These soils have medium to good permeability. Soils have neutral to acidic pH, deficient in nitrogen and phosphorous with medium availability of potassium. They belong to land capability class III. Such soils are found to some extent in Badami taluk. They are suitable for kharif crops. They also support two seasonal cropping pattern.

Red soils

These are formed of granite, quartz, sand stone and gneiss. Soils from granite or gneiss have 5 to 8% ferric oxide possessing deep red to gray colour. the soil depth depends on the surface conditions. Deep soils upto 2 m are also found. Their pH ranges from 6.5 to 7.5 and have good drainage and high permeability. They respond well to use of manure and irrigation. Soils are light with low water holding capacity of 3 cm for every 30 cm soil depth. The clay content ranges from 15 to 30 per cent. These soils are deficient in nitrogen, phosphorous and potassium. Usually kharif crops are grown and they are found in Badami taluk.

Saline Soils

These soils are found all along the Doni river, canal banks and low lying areas. These are found mainly in Bijapur, Basavana Bagevadi, Muddebihal and Sindgi taluks. These have deep black

soils (from 1 to 4 cms) with more than 50 per cent clay content. These soils have a pH of 8.5 to 9 with an electrical conductivity of 10 Mmoh and 12 per cent sodium absorption ratio. On these soils, main rabi crops of jowar, wheat and safflower are cultivated. On these soils, if there is high salt and acidic content, the plant growth is affected. Upon soil testing, such problems can be diagnosed. Based on soil test, the pH, the Electrical Conductivity and the Cation-exchange capacity can be found. The soil classification based on salt content is provided in the table below.

Soil type	Electrical conductivity	Percentage of sodium exchange	pH	Amount of Sodium absorption
Saline soils	4	15	7.5 - 8.5	10 - 14
Saline-Alkaline soils	4	15	7.5 - 8.5	20 - 70
Alkaline soils	4	15	8.5 - 10	14- 40

The saline soils have physical conditions favourable for crop growth. But due to absorption of salts in water, due to osmosis, the moisture content in plants reduces and the plant dies. This is called plasmolysis. In such soils removal of saline content facilitates cultivation of crops. This is done through laying drainage canals to drain off saline water. In alkaline soils due to high exchange sodium, the physical conditions will not support crop growth. Since there is no proper aeration and movement of water. Soil conservation practices to rectify alkaline soils include application of gypsum, farmyard manure or cultivation of a green manure crop like *diancha*. Incorporating fully or partially decomposed biomass in such soils is found to improve the physical and chemical properties and productivity of such soils. Mixing the plant biomass in proper proportion to soils, improves drainage and water holding capacity of such soils. In addition the availability of much needed phosphorous and manganese nutrients will increase. The important crops under irrigation such as cotton and maize, their plant residues should be incorporated after harvest by cutting them to 10 to 15 cm length. Such an incorporated biomass will facilitate availability of major and micro nutrients and improves the soil fertility. This also improves the drainage and water holding capacity in addition to soil microbial activity.

Agricultural land holdings

The district had 2.47 lakh agricultural land holdings in 1970-71, which increased to 4.0 lakh in 1990-91 registering an increase of 61.9%. The small holdings increased by 38.1%, semi medium holdings by 18.8%. Between 1985-86 and 1990-91, the marginal land holdings increased by 14%, small holdings by 38%, semi medium holdings by 20%, medium holdings by 0.5%, while the large holdings reduced by 15%. Considering the area operated, the area under medium holdings is the highest followed by large holdings, semi medium holdings and small and marginal holdings. The average area operated per holding has reduced from 5.88 ha in 1970-71 to 3.75 ha in 1990-91. The details of agricultural holdings of the district are given in the following page.

Census year	No. of land holdings (lakhs)	Percent to the State's holding	Area of land holdings (lakh ha)	Percent to the State's holding	Average size (ha)
1970-71	2.47	7.0	14.54	12.8	5.88
1976-77	2.77	7.3	14.62	12.9	5.27
1980-81	3.02	7.0	14.59	12.4	4.82
1985-86	3.46	7.1	14.75	12.4	4.25
1990-91	4.00	6.9	14.99	12.2	3.75

Details of land holdings according to different classes during 1985-86 and 1990-91.

Class	No. of land holdings		Area of land holdings		Average size (ha)	
	1985-86	1990-91	1985-86	1990-91	1985-86	1990-91
Marginal	31,662	36,007	18,151	21,397	0.57	0.59
Small	84,372	1,16,530	1,29,835	1,79,337	1.54	1.54
Semi medium	1,06,139	1,27,163	2,99,153	3,53,909	2.82	2.78
Medium	95,254	95,736	5,95,168	5,89,639	6.25	6.16
Big	29,168	24,790	4,32,346	3,54,647	14.82	14.31
Total	3,45,595	4,00,226	14,74,653	14,98,929	4.25	3.7

Among the agricultural land holdings there are 3 lakh joint holdings, 3.97 individual holdings and a few holdings are owned by organizations/institutions. The area operated by individual holdings is 14.84 lakh ha, that by joint holdings is 13 lakh ha and by organizations/institutions is 2 lakh ha. Among the agricultural land holdings 61,000 holdings have full irrigation facility, 35,000 with partial irrigation facility and 2.95 lakh holdings without any irrigation facility. The details of land holding according to social groups is as under:

Social group	No. of land holdings in thousands		Area of land holdings in thousand ha.		Average size (ha)	
	1985-86	1990-91	1985-86	1990-91	1985-86	1990-91
Scheduled caste	29	42	94	115	3.22	2.74
Scheduled tribe	5	7	20	20	3.64	3.08
Others	312	352	1,361	1,364	4.36	3.88

Out of the total agricultural land holdings, Bijapur district comes next to Mysore, Belgaum, Tumkur and Gulbarga. However, according to the area operated, Bijapur ranks first with an average of 3.75 ha.

Table - 4.3 : Land Holdings and Area (ha.) in Bijapur District as per 1990 Agricultural Census.

Taluk	Marginal (< 1ha.)		Small (1-2 ha.)		Semi medium (2-4 ha)		Medium (4-10 ha)		Large (>10 ha.)		Total		
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area			
B.Bagevadi	1,698	986	12,751	19,765	14,265	40,014	11,564	72,513	3,469	50,344	43,747	1	83,622
Bijapur	3,015	1,740	14,245	22,070	18,475	51,751	15,731	98,211	4,836	70,365	56,302	56,302	244,137
Indi	2,058	1,153	15,407	22,835	16,561	45,252	14,476	89,800	3,985	56,326	52,487	52,487	215,366
Muddebihal	1,858	1,060	9,219	14,313	11,515	31,990	8,695	53,502	2,418	35,011	33,705	33,705	135,876
Sindgi	1,709	1,057	13,162	20,780	16,377	45,480	13,603	85,398	3,784	53,996	48,635	48,635	206,711
Bijapur District Total	10,338	5,996	64,784	99,763	77,193	214,487	64,069	399,424	18,492	266,042	234,876	234,876	985,712
Badami	5,654	3,287	10,588	15,867	9,913	27,499	5,865	35,044	901	12,721	32,921	32,921	94,418
Bagalkot	2,836	1,817	7,100	10,841	7,388	20,669	3,863	23,291	799	11,757	21,986	21,986	68,375
Bilgi	3,287	2,050	5,689	8,572	5,168	14,451	3,677	21,601	1,436	9,667	19,257	19,257	56,341
Hungund	3,517	2,075	11,418	17,156	11,288	31,539	6,856	41,460	1,230	20,244	34,309	34,309	112,474
Jamkhandi	5,900	3,512	9,602	15,325	8,906	24,605	6,101	36,876	1,229	16,951	31,738	31,738	97,269
Mudhol	4,475	2,660	7,709	11,813	7,287	20,659	5,323	31,943	6,298	17,265	31,092	31,092	84,340
Bagalkot District Total	25,669	15,401	52,106	79,574	49,950	139,422	31,685	190,215	11,893	88,605	171,303	171,303	513,217
Grand Total:	36,007	21,397	116,890	179,337	127,143	353,909	95,754	589,639	30,385	354,647	406,179	406,179	1,498,929

Source : Bijapur Statistics 1996-97, Office of the District Statistical Officer, Bijapur, DES No. 6-98

Cropping pattern

The area under major crops (in 100 ha) is in page 261. During 1994-95, the net sown area has been 13.83 lakh ha, of which 9.99 lakh ha were under food crops forming 72.23 per cent. The area under food grains was 9.10 lakh ha (65.79 per cent). Among other food crops, groundnut was cultivated on 0.85 lakh ha, cotton on 0.38 lakh ha, sunflower on 1.8 ha, Sesbania (0.15 lakh ha) and Safflower (0.48 lakh ha). Among food crops, jowar was cultivated on 5.71 lakh ha (40.99 per cent), followed by bajra 0.85 lakh ha (6 per cent), wheat 0.62 lakh ha (4.48 per cent), maize 0.47 lakh ha (3.39 per cent), paddy 0.01 lakh ha (0.72 per cent), monycotyledons and minor millets 7.67 lakh ha (55.45 per cent), tur 0.12 lakh ha (0.79 per cent), bengal gram 0.75 lakh ha (5.35 per cent), other pulses 1.43 lakh ha and sugarcane 0.64 lakh ha (4.62 per cent) were the other crops. The area during 1996-97 is available in Table 4.4.

Table 4.4 : Details of Area under Major Crops ('00 Ha.)

Crops	1983-84	1988-89	1993-94
Food crops			
Cereals & Millets	8,191	8,203	7,073
Pulses	1,201,448	1,539	
Total cereals	9,639	9,742	8,274
Sugarcane	186	282	508
Spices and condiments	51	53	36
Fresh fruits	33	50	52
Vegetables	160	165	174
Total Food crops	10,069	10,292	9,044
Non food crops			
Oil seeds (Edible)	2,920	3,070	5,592
Oil seeds (Non Edible)	169	172	132
Fibre crops	1,754	680	177
Medicinal crops	4	12	0
Other Non food crops	22	20	29
Total non food crops	4,869	3,954	5,930
Total cropped area	14,938	14,246	14,974

There are two main sowing seasons in the district. In Kharif, crops are sown from late June to early July and are harvested during November – December. The main kharif crops are jowar, bajra, paddy, green gram, field bean, black gram, cow pea, horsegram, tur, sesamum, Setaria, sun hemp and so on. The rabi crops are sown from September to early November and harvested from late December to early April. Major rabi crops are jowar, cotton, wheat, Bengal gram, Linseed, Safflower and so on.

The major agriculture crops and their scientific names are as under:

I. Cereals and Millets: 1. Paddy – *Oryza sativa*, 2. Wheat – *Triticum sativum*, 3. Jowar – *Sorghum vulgare*, 4. Bajra – Pearl millet – *Pennisetum typhoides*, 5. Maize – *Zea mays*, 6. Italian millet – *Setaria italica*, 7. Save – *Panicum sumatrense*

II. Pulses: 1. Bengal gram – *Cicer arietinum*, 2. Green gram – *Phaseolus aureus*, 3. Tur – Red gram – *Cajanus cajan*, 4. Horse gram – *Dolichos biflorus*, 5. Field bean – *Dolichos lab lab*, 6. Cow pea – *Vigna catjung*,

III. Oil seeds: 1. Groundnut – *Arachis hypogea*, 2. Til – *Sesamum orientale*, 3. Safflower – *Carthamus tinctorius*, 4. Linseed – *Linum usitatissimum*,

IV. Other crops: 1. sugarcane – *Saccharum officinarum*, 2. Cotton – *Gossypium herbaceum*

The area under different agriculture crops is in Table 4.4A, the area under irrigated crops in Table 4.4 B, the season wise area, production and productivity under main crops in Table 4.4 C, and talukwise area under major crops during 1995-96 in Table 4.4D.

Table-4.4 AA : Area of Principal Crops in Bijapur district from 1980-81 to 1996-97

Year	Paddy		Jowar			Total	Bajra	Maize	Wheat	Sare
	Kharif	Total	Kharif	Rabi	Total					
1	2	3	4	5	6	7	8	9	10	
1980-81	2,801	2,801	55,505	361,851	417,356	164,361	24,330	77,202	593	
1981-82	3,418	3,418	79,364	395,256	474,620	211,153	23,117	93,865	988	
1982-83	2,746	2,746	78,419	410,827	489,246	177,297	26,483	93,969	682	
1983-84	2,718	2,718	74,620	422,194	496,814	190,072	30,580	92,706	889	
1984-85	2,068	2,068	40,419	505,761	546,180	93,287	29,939	83,589	330	
1985-86	1,847	1,847	37,225	464,808	502,033	130,588	30,677	64,957	545	
1986-87	2,060	2,060	70,543	521,371	591,914	131,671	35,065	55,149	568	
1987-88	1,847	1,847	50,648	518,734	569,382	141,184	28,990	59,029	699	
1988-89	1,776	1,776	38,583	511,937	550,520	151,163	46,424	64,910	520	
1989-90	1,826	1,826	38,074	514,455	552,529	172,538	44,863	58,011	542	
1990-91	1,890	1,890	43,319	423,447	466,766	137,750	50,112	46,398	434	
1991-92	1,774	1,774	39,296	409,622	448,918	135,849	51,469	40,951	328	
1992-93	1,373	1,373	31,999	498,282	530,281	128,035	49,452	52,662	271	
1993-94	829	829	28,386	492,908	521,294	74,795	50,524	58,171	187	
1994-95	758	758	18,506	552,692	571,198	84,998	47,047	62,350	139	
1995-96	528	528	25,986	520,384	546,370	137,797	51,069	53,475	60	
1996-97	467	467	18,809	502,178	520,987	157,097	51,069	60,979	75	

Contd....

Year	Total cereals & millets										Sugarcane
	Navane	Gram	Tur	Horse gram	Green gram	Field beans	Total pulses	Total food grains			
1	11	12	13	14	15	16	17	18	19	20	
1980-81	3,857	690,500	22,543	19,759	37,050	11,794	2,487	1,11,515	8,02,120	11,549	
1981-82	6,593	813,754	25,483	27,827	38,074	22,051	2,487	1,42,042	9,55,915	13,870	
1982-83	4,754	795,177	25,157	26,366	40,410	16,266	2,669	1,34,872	9,30,318	19,888	
1983-84	5,029	818,808	26,781	25,002	37,621	29,543	2,218	1,44,803	9,63,870	18,643	
1984-85	7,393	762,786	32,054	20,429	47,567	16,687	6,248	1,46,052	9,09,099	16,177	
1985-86	4,135	734,782	25,321	23,010	38,757	16,527	2,017	1,27,047	8,62,041	17,743	
1986-87	4,415	820,842	29,876	23,468	35,221	23,939	3,334	1,38,773	9,59,694	18,250	
1987-88	5,072	806,203	37,750	24,777	33,370	28,038	3,963	1,50,382	9,56,717	21,928	
1988-89	4,646	819,959	34,304	33,266	32,205	25,343	2,835	1,53,619	9,73,828	28,248	
1989-90	3,799	834,108	40,829	27,995	38,161	24,141	2,362	1,69,266	10,03,581	33,125	
1990-91	3,253	706,603	37,148	33,975	28,643	44,742	1,815	1,68,144	8,74,806	34,688	
1991-92	2,680	681,969	33,317	39,565	33,748	62,101	889	1,94,927	8,77,039	36,061	
1992-93	1,863	763,937	46,714	27,200	34,778	31,998	569	1,65,389	9,29,335	33,797	
1993-94	1,514	707,314	42,201	14,903	30,678	14,492	763	1,20,097	8,27,423	50,766	
1994-95	1,046	767,536	74,909	12,017	25,653	17,422	761	1,43,388	9,10,999	64,475	
1995-96	1,286	790,585	50,630	17,807	29,267	31,977	845	1,30,068	9,20,653	49,604	
1996-97	1,427	792,101	64,615	24,798	29,065	47,880	810	1,88,141	9,80,266	52,221	

Contd....

Bijapur District

Year	Saf flower	Sun flower	Lin seed	Total oil seeds crops	Cotton	Mesta	Total Fodder	Total food crops	Ground nut	Sesamum nut
1	21	22	23	24	25	26	27	28	29	30
1980-81	46,843	7,600	16,296	1,55,190	2,03,197	552	756	8,31,999	81,691	1,994
1981-82	45,346	39,045	19,972	2,27,054	2,18,128	800	1,734	9,98,142	1,17,082	3,943
1982-83	48,513	85,504	17,957	2,54,218	1,98,633	705	1,666	9,74,225	98,578	2,746
1983-84	60,386	1,35,718	16,828	3,08,821	1,74,852	571	2,140	10,07,105	92,350	2,689
1984-85	68,741	1,30,592	18,935	2,96,351	1,39,341	524	2,056	9,50,023	73,997	3,211
1985-86	64,703	1,15,406	15,638	3,03,893	94,210	363	1,885	9,00,257	1,03,695	3,705
1986-87	73,906	1,56,428	17,469	3,67,444	27,452	414	1,906	9,97,953	1,15,218	3,229
1987-88	82,736	2,85,373	19,667	4,95,648	25,052	432	1,747	9,99,583	97,832	8,129
1988-89	44,791	1,28,461	17,091	3,23,890	67,558	464	1,914	10,28,923	1,24,193	7,656
1989-90	47,150	1,82,915	20,599	3,73,947	41,209	499	1,295	10,62,466	1,15,749	4,709
1990-91	42,050	3,27,527	16,312	5,05,409	25,577	269	1,009	9,34,834	1,21,352	5,776
1991-92	30,520	4,10,524	14,175	5,95,538	16,677	225	1,119	9,37,833	1,31,238	5,559
1992-93	29,484	3,06,079	14,690	4,59,984	20,277	221	1,005	9,85,777	98,137	3,527
1993-94	27,634	4,43,808	13,102	5,72,020	17,539	203	1,327	9,04,436	78,436	3,607
1994-95	48,323	1,80,535	15,358	3,42,812	38,765	184	---	---	85,460	4,130
1995-96	28,563	2,53,036	13,112	3,94,358	37,000	166	---	---	62,503	2,964
1996-97	34,616	2,65,800	14,405	4,60,714	29,292	179	---	---	1,35,063	5,053

Contd....

Year	Total Non food crops	Total cropped area	Area more than once	Net sown area
1	31	32	33	34
1980-81	330,067	1,192,066	24,033	1,168,033
1981-82	448,098	1,446,240	47,916	1,398,324
1982-83	455,738	1,429,963	56,429	1,373,534
1983-84	487,008	1,494,113	71,400	1,422,713
1984-85	438,955	1,388,978	59,041	1,329,937
1985-86	401,238	1,301,495	39,632	1,261,863
1986-87	398,126	1,396,079	54,247	1,341,832
1987-88	527,212	1,526,795	111,841	1,414,954
1988-89	395,376	1,424,299	94,850	1,329,449
1989-90	418,542	1,481,008	103,244	1,377,764
1990-91	544,090	1,478,924	123,219	1,355,705
1991-92	615,389	1,553,262	167,956	1,385,306
1992-93	483,245	1,469,022	120,766	1,348,256
1993-94	592,963	1,497,393	145,485	1,351,908
1994-95	-	1,383,838	125,597	1,258,241
1995-96	-	1,430,514	118,097	1,312,417
1996-97	-	1,553,979	184,338	1,369,641

Table 4.4. A : Area of Principal Crops under irrigation in Bijapur district from 1980-81 to 1996-97

Year	Paddy		Total	Kharif	Jowar Rabi	Total	Bajra	Maize	Wheat	Navane	Total		
	Kharif	Total									Cereals & Millets	Gram	
	2	3	4	5	6	7	8	9	10	11	12		
1980-81	1,113	1,113	4,198	16,858	21,056	8,694	22,627	16,489	12	69,991	1,393		
1981-82	1,253	1,318	6,349	21,051	27,400	10,990	22,343	19,725	81	81,857	863		
1982-83	1,050	1,202	5,880	21,054	26,934	11,209	26,349	18,819	32	84,545	1,675		
1983-84	1,027	1,138	7,482	26,505	33,987	12,395	30,556	23,514	31	101,621	1,787		
1984-85	629	751	6,469	30,486	36,955	11,132	29,899	27,529	13	106,279	2,091		
1985-86	604	622	9,394	30,878	40,272	10,843	30,540	17,484	21	99,782	3,680		
1986-87	965	976	16,824	31,640	48,464	17,694	35,065	19,578	205	121,982	3,503		
1987-88	784	825	11,212	29,712	40,924	12,019	28,757	15,902	266	98,693	4,582		
1988-89	713	743	9,420	39,057	48,477	16,619	45,714	23,035	128	134,716	6,114		
1989-90	645	668	11,127	40,828	51,955	18,486	44,508	24,489	3	140,109	6,479		
1990-91	448	452	12,753	33,219	45,972	14,042	49,363	22,285	26	132,140	7,169		
1991-92	712	720	12,613	37,025	49,638	13,665	50,784	19,138	52	133,997	7,993		
1992-93	634	634	12,471	36,991	49,462	14,194	49,162	20,994	12	134,458	7,833		
1993-94	405	411	11,431	40,067	51,498	10,094	49,979	26,299	3	138,284	10,009		
1994-95	637	642	8,435	39,343	47,778	10,283	46,280	26,349	-	131,332	11,765		
1995-96	162	162	12,318	37,509	49,827	14,919	50,910	23,461	-	139,279	9,569		
1996-97	201	202	10,272	36,600	46,872	15,713	50,786	25,008	-	138,581	10,186		

Contd..

Area of Principal Crops under irrigation in Bijapur district from 1980-81 to 1996-97.

Year	Tur	Horse gram	Green gram	Kidney beans	Total pulses	Total food grains	Sugarcane	Total food crops	Ground nut	Til	Safflower
I	13	14	15	16	17	18	19	20	21	22	23
1980-81	152	64	1	122	1,732	71,723	11,549	83,272	9,461	-	-
1981-82	283	11	147	195	1,499	83,356	13,870	97,226	10,359	-	-
1982-83	326	12	99	422	2,534	87,079	19,888	106,967	11,618	-	20
1983-84	299	31	38	657	2,812	104,433	18,643	123,076	13,294	-	104
1984-85	376	420	96	835	3,818	110,097	16,177	126,274	15,206	-	325
1985-86	865	182	210	961	5,898	105,680	17,743	123,423	17,507	149	676
1986-87	1,450	1,108	474	1,376	7,911	129,893	18,251	148,144	17,934	14	213
1987-88	727	1,447	659	1,809	9,224	107,917	21,928	129,845	22,356	71	140
1988-89	1,806	231	245	996	9,392	144,108	28,248	172,356	26,151	47	544
1989-90	463	300	301	735	8,278	148,387	33,125	181,512	23,474	2	283
1990-91	1,125	685	483	905	10,367	142,507	34,688	177,195	28,694	117	395
1991-92	1,205	764	288	375	10,625	144,622	36,061	180,683	35,237	19	128
1992-93	1,039	467	301	257	9,897	144,355	33,797	178,152	29,817	11	121
1993-94	536	204	246	441	11,436	149,720	50,766	200,486	36,533	27	201
1994-95	-	-	-	-	11,765	143,097	-	143,097	32,253	-	556
1995-96	-	-	-	-	9,569	148,848	-	148,848	25,150	-	155
1996-97	-	-	-	-	10,186	148,767	-	148,767	32,042	-	457

Contd..

Area of principal crops under irrigation in Bijapur district from 1980-81 to 1996-97

Year	Sun Flower	Soya bean	Castor	Lin seed	Total oil seeds	cotton	Mesta	Total fodder crops	Total Non food crops	Total cropped area
	24	25	26	27	28	29	30	31	32	33
1980-81	-	-	-	-	9,461	-	-	-	9,461	-
1981-82	-	-	-	-	10,359	-	-	-	10,359	-
1982-83	4,816	-	6	6	16,466	11,066	64	732	28,328	157,628
1983-84	9,852	-	18	68	23,336	11,197	121	1,008	35,662	182,399
1984-85	13,765	-	22	192	29,510	9,547	111	941	40,109	190,459
1985-86	10,869	-	30	96	29,327	9,922	58	1,394	40,701	184,667
1986-87	21,135	-	39	132	39,467	4,614	66	1,462	45,609	214,456
1987-88	43,222	-	-	16	65,805	3,830	100	873	70,608	222,260
1988-89	32,281	30	4	9	59,066	7,641	64	864	67,635	267,167
1989-90	37,950	-	11	40	61,760	7,316	5	954	70,035	277,597
1990-91	64,756	-	19	155	94,136	6,345	6	659	101,146	305,146
1991-92	79,329	1,448	19	41	116,221	6,602	6	698	123,527	330,113
1992-93	55,595	6,259	3	32	91,838	13,329	-	810	105,977	309,143
1993-94	67,409	3,918	-	27	108,115	7,869	-	1,183	117,167	345,602
1994-95	45,828	-	-	-	78,637	13,726	-	-	92,363	1,383,838
1995-96	48,136	-	-	-	73,441	12,911	-	-	86,352	1,430,514
1996-97	49,275	-	-	-	81,774	11,956	-	-	93,730	1,553,979

Table 4.4 E : Details of Seasonwise major crops grown in the district during 1996-97.

Name of the crop/season	Irrigated			Rainfed		
	Area	Production	Yield	Area	Production	Yield
1	2	3	4	5	6	7
Paddy						
Kharif	201	500	2,618	266	486	1,922
All seasons	202	502	2,616	266	486	1,922
Jowar						
Kharif	10,272	22,395	2,295	8,537	8,159	1,006
Rabi	36,300	40,106	1,163	4,65,878	3,56,280	805
All seasons	46,572	62,501	3,458	4,74,415	3,64,439	1,811
Bajra						
All seasons	15,713	20,652	1,384	141,384	93,700	698
Maize						
Kharif	34,028	1,34,700	4,167	299	789	2,778
Rabi	13,788	38,308	2,925	5	4	850
All seasons	47,816	1,73,008	7,092	304	793	3,628
Wheat						
Rabi	25,008	39,563	1,665	35,971	19,376	567
All seasons	25,008	39,563	1,665	35,971	19,376	567
Total Cereals						
Kharif	44,501	1,57,595	9,080	9,102	9,434	5,706
Rabi	75,096	1,17,977	5,753	5,01,854	3,75,660	2,222
Summer	2,973	8,942	3,166	-	-	-
All seasons	1,22,570	2,84,514	17,999	5,10,956	3,85,094	7,928
Navane	-	-	-	1,427	938	692
Same	-	-	-	75	50	700
Haraka	-	-	-	67	26	412
Total Cereals& Millets						
Kharif	-	-	-	2,12,202	2,82,041	1,399
All seasons	-	-	-	7,92,125	7,84,620	1,043

Contd...

Table 4.4 E Details of season wise major crops grown in the district during 1996-97

1	2	3	4	5	6	7
Tur	-	-	-	24,798	9,989	424
Horse gram						
Kharif	-	-	-	23,490	11,314	507
All seasons	-	-	-	29,065	13,793	500
Green gram						
Kharif	-	-	-	47,861	6,684	147
All seasons	-	-	-	47,880	6,690	147
Bengal gram	10,186	5,971	617	54,429	27,870	539
Total pulses						
Kharif	-	-	-	1,17,087	35,157	316
Rabisummer	-	-	-	71,054	36,431	540
All seasons	10,186	5,971	617	1,88,141	71,588	856
Ground nut						
Kharif	12,010	8,899	780	1,03,021	30,535	312
All seasons	32,042	32,021	1,052	1,03,021	30,535	312
Caster	-	-	-	61	67	1,159
Sesame	-	-	-	5,053	1,887	393
Linseed	-	-	-	14,405	3,941	288
Soyabean	-	-	-	4,319	2,999	731
Huchellu	-	-	-	1,365	207	153
Sunflower						
Kharif	20,108	10,697	560	80,188	22,092	290
Rabi	24,075	16,605	729	1,36,267	41,058	317
All seasons	44,183	27,302	1,289	2,16,455	63,150	307
Safflower	457	315	725	34,159	20,606	635
Total oil seeds	-	-	-	-	1,86,653	429
Cotton	11,986	29,872	446	17,306	1,13,636	141
Sugarcane	-	-	-	52,221	48,61,775	78
Mesta	-	-	-	179	345	347

Source : Revised estimates of Area, Production and yield of principal crops during 1996-97.

Table 4.4 EE
Details of talukwise area under different crops grown in Bijapur district during 1995-96.

Crop	Jowar	Bajra	Wheat	Maize	Total cereals	Gram	Other pulses	Tur	Total pulses	Ground nut	Sugar cane	Cotton
Bijapur District												
Basavan Bagevadi	68155	9639	8853	1293	87940	10169	4965	736	15870	7088	77	1850
Bijapur	108556	17117	1500	3127	130300	3380	12655	891	16926	7580	2080	2427
Indi	84379	34435	10956	1045	130815	7962	15072	2659	25693	14004	5398	2062
Muddebihal	43141	15011	3741	266	62159	3554	2763	842	7159	11025	28	3581
Sindgi	55264	22169	7452	569	85454	5436	12344	7404	25184	24935	2601	1897
Bijapur District												
Total	359495	98371	32502	6300	496668	30501	47799	12532	90832	64632	10184	11817
Bagalkot District												
Badami	25435	14465	1525	5212	46637	2050	3794	2067	7911	7224	87	1779
Bagalkot	39708	6940	2241	1830	50719	2861	3701	1426	7988	7034	135	4615
Bilgi	19644	6325	1982	5996	33947	1244	882	349	2475	3050	2696	2096
Hungund	48058	7256	4023	954	60291	6037	1760	663	8460	5359	15	10842
Jamkhandi	29201	2626	5493	14004	51324	3874	2566	429	6869	4002	17100	2928
Mudhol	24428	1814	5709	16773	48724	4063	1129	341	5533	1202	19387	2923
Bagalkot District												
Total	186474	39426	20973	44769	291642	20129	13832	5275	39236	27871	39420	25183
Grand total:	545969	137797	53475	51069	788310	50630	61631	17807	130068	92503	49604	37000

Source: District At a Glance 1996-97 Bijapur district. DES No 6/98

Paddy

In 1980-81, paddy was cultivated in 2800 hectares in the district. In 1996-97 the paddy area was limited to 468 ha. Paddy is cultivated in tank and canal commands. The recommendations of plant protection for rabi and summer are as under:

	Varities	Duration(days)	Grain Character
1.	Gama-318(avinash)	135-140	medium, coarse
2.	Jaya	140-145	long, coarse
3.	Vani and Sona	140-145	long, fine
4.	Prakash	145-150	long, fine
5.	I.R.20	130-135	medium, fine
6.	Pushpa	125-130	long, fine
7.	Madhu	120-125	medium, fine
8.	Mangala	105-115	medium, fine
9.	Pragathi	130-135	medium, fine
10.	Mandyavani	130-135	long, fine
11.	K M C -39 (Karna)	130-135	long, coarse
12.	Sona masuri	140-145	long, fine
13.	Tella Hamsa	120-125	long, fine

Important pests: The important pests are Mealy bug, Thrips, Brown plant hopper, stem borer, leaf roller, whorl maggot, paddy hispa, caseworm, grasshopper, armyworm, swarming caterpillar, blue beetle, and Gundhi bug

Important diseases : The important diseases are Blast disease, Bacterial blight, Udubatha disease, Black smut of rice, Leaf spot, and Jare Macche disease

Jowar

Jowar is an important food crop of the district. In 1995-96, jowar was cultivated in 49,827 ha of irrigated area and 4,96,543 ha of rainfed area. The local varieties of Jowar have been cultivated in 5,22,754 ha and the rest 23,616 ha, high yielding varieties of Jowar are cultivated. In the state out of the total Jowar area, Bijapur district area under Jowar forms 27.65 per cent and stands first in the state with respect to area. Bijapur district also stands first in production of jowar contributing to 23.13 per cent of State's production. The productivity is 765 kg per ha and among the districts, takes the 13th place. The productivity of jowar in the district (765 kg / ha) is below that of the State (915 kg/ha). The important high yielding varieties recommended for the district are as follows.

1. Irrigation
(Summer / Kharif) under

Hybrids Varieties	Duration in days	Productivity in Kharif (ha)
CSH 1	100-105	Grains: 50-55 quintals
CSH 5	110-115	Fodder: 8-10 tonnes
CSH 9	115-120	
CSH 10 (DSH)	115-120	Summer: Grains: 55-65 qtls Fodder: 9-11 tonnes

2. Hybrids for Kharif

Hybrids Varieties	Improved varieties
CSH 1	CSV 5 110-115 days
CSH 5	SB 2413 (DSK 1) 94-100 days
CSH 10	
SPH 221	

3. Irrigated jowar (rabi)

Hybrids Varieties		
CSH 5	110-115	Grain: 50-60 quintals
CSH 12R	115-120	Fodder: 8-10 tonnes
Improved varieties		
M 35-1 (Maldandi)	125-130	
5-4-1 (Muguthi)	120-125	

4. Rabi Jowar

Varieties		
M 35-1 (Maldandi)	125-130	Grain: 7 – 15 quintals
5-4-1 (Muguthi)	120-125	

Important pests : Shoot fly, leaf beetle, grasshopper, stem borer, aphids, shoot bug, earhead bug, earhead midge, plant hopper, swarming caterpillar.

Important diseases : Rust disease, Downy mildew, Leaf spot, Leaf blight, Ergot disease, Stalk rot of sorghum, Grain smut.

Maize : Maize is an important food grain cultivated mainly under irrigation. It is cultivated in 51,000 ha and the area is increasing over years. It can be cultivated in all seasons. However, it is best to sow in May-June, Sep-Oct and Jan-Feb. It is not suitable for winter. Among hybrids, **Deccan, Deccan 101** and **Deccan 103** are recommended with a duration of 105-120 days. Among composites, **Renuka (B-5)** and **Vijaya** are good and they can be harvested between 90 and 110 days yielding 50-60 quintals of grain and 8-10 tonnes of fodder. The district has set a record productivity of 32 quintals per ha. In 1996-97 the crop was cultivated in 51060 ha.

Important pests : stem borer, earhead bug, aphids, root grub

Important diseases : Downy mildew, Rust disease, stalk rot, leaf spot disease

Wheat : Wheat is an important food crop of the district. Under irrigation, it is cultivated on 23,461 ha and as rainfed crop it is cultivated on 30,000 ha. In 1996-97, wheat was cultivated on 60,979 ha. Under irrigation, **HD 2189, DWR 16 (Keerthi)**, and **HD 4502 (Duram wheat)** varieties are recommended and their duration is 105 to 110 days. Under irrigation, the crop is sown from Oct 2nd week to Nov 1st week. For rainfed, **Bijga yellow** and **DWR 137 (Kiran)** are good varieties which are harvested in 110-115 days. For sowing, the first fortnight of Oct is recommended. Wheat is locally referred as "Javegodhi", "Sajje" etc. This belongs to Diccum type of wheat. It is tall and is largely grown in Bijapur, Bilagi, Indi, Jamkhandi, Mudhol and Sindgi taluks. The local wheat varieties can be sown from mid Oct to mid Dec. The crop comes to harvest in 105 to 110 days. Under irrigated conditions, the productivity is 25 to 37 quintals, while under rainfed conditions the productivity is 5 to 8 quintals. In Bijapur district, record yields to the tune of 14 quintals per ha from irrigated condition and 14 quintals per ha from rainfed condition exist.

Important pests: Termites, stem borer, aphids, gundhi bug, leaf hopper, root grub

Important diseases: Rust disease, smut disease, blight and soft rot.

Cotton : Cotton is an important fiber crop of the district. It is cultivated in 13,000 ha under irrigated conditions and in 24,000 ha as a rainfed crop. During 1996-97, it was cultivated in 29,300 ha. The varieties for irrigated cotton are **170 CO 2, Veernar, A.H., 107, Sharada, ACP 71** and **GK 119 (Arunabha)**, while the varieties for rainfed cotton are **Suyodhar, Renuka (DB3-12), DDH-2** and **GK 2764** and among hybrids are **Varalakshmi, Jayalakshi (DCH 32)**. Under irrigated conditions, 20-25 quintals per ha can be obtained while under rainfed conditions, 6 to 8 quintals per ha can be obtained. From hybrid cotton, 30 to 40 quintals per ha can be obtained. Record yields to the tune of 5 quintals of irrigated cotton per ha, and 1.1 quintals per ha of rainfed cotton exist.

Important pests : Spotted bollworm, pink bollworm, aphids, leaf hopper, thrips, mites, Helic verpa, mealy bug, leaf roller, red cotton bug, Dusky cotton bug, white fly

Important diseases: Bacterial blight, leaf spot and leaf rot.

Bajra : Bajra is an important food crop cultivated on low rainfall receiving black soils and sandy soils. It is cultivated on 1.22 lakh ha. The crop is cultivated on 15,000 ha under irrigated conditions. Bijapur district has the first place in the State with respect to area and production of Bajra. During 1996-97, the crop was cultivated in 1,57,082 ha. The recommended variety is WCC 75 with a duration of 90 to 100 days. This is a variety responsive to high doses of fertilizers, with heavy tillering, uniform earheads and high yielding. In summer, it is sown during January, and in Kharif, sown from June to mid July. The irrigated crop yields 30 to 37 quintals of grains and 5 tonnes of fodder. However in the district, under irrigation, 13 quintals of grains and 7 tonnes of fodder per ha have been harvested. Under rainfed conditions, with improved agronomic practices, 15 quintals of grains and 2.5 to 3.8 tonnes of fodder can be harvested.

Important pests are Blister beetle and earhead bug.

Important diseases are ergot disease, rust disease, downey mildew, and green ear disease.

Groundnut : Groundnut is an important oilseed crop, cultivated in 12,000 ha in kharif and in 23,117 ha in rabi-summer (1996-97). Under irrigation, it is cultivated on 32,042 ha and as rainfed crop cultivated in 53,207 ha, with a total production of 49,128 tonnes and a productivity of 605 kg per ha, lower than that of the State. During 1996-97, groundnut was cultivated in 1,35,063 ha.

Varieties	Type	Duration (days)	Oil content (percentage)	Productivity (quintals / ha)
Spanish				
improved	Bunchy	110-120	44	24
TMV 2	Bunchy	110-120	49	10
S-206	Bunchy	110-115	46.5	19
DH 330	Bunchy	100-120	46.5	28
JL 24	Bunchy	90-95	50.7	18
KRG 1	Bunchy	105-110	49	22
DH 8	Bunchy	105-110	46	32
ICGS 11	Partially spreading	120-125	48.7	20
S 230	spreading	135-140	50	13

During Kharif, after thorough land preparation when there is adequate moisture, the crop is planted during June-July. During summer, under irrigation, Dec – Jan sowing is appropriate. It is crucial to maintain the right plant population in groundnut. For bunchy varieties, the plant population should be 2.6 lakhs per ha, while for spreading varieties, the plant population should be 1.5 lakhs per ha. In areas receiving good rainfall, cultivating a full crop of groundnut followed by safflower or Bengal gram is profitable. The **important pests** are leaf miner, thrips, aphids, leafhopper, red headed hairy caterpillar, root grub and termites. The **important diseases** are tikka disease, rust disease, psudospora, bud necrosis, stem necrosis and pod rot. With deep ploughing, the soil borne pests and egg cases will surface which are destroyed due to exposure to sun and are also picked by birds. Sowing castor all around the groundnut plot will attract pests of groundnut and can save the main crop to some extent. It is desirable to have crop rotation in groundnut plots.

Among the varieties, TMV 2, S 206, KRG 1 and ICGS 11 are recommended for irrigated conditions. In Kharif, 20 to 22 quintals per ha can be harvested while in summer 25 to 30 quintals can be harvested. In kharif, depending on the variety, under rainfed conditions 7.5 to 10 quintals can be harvested. In 1996-97, from irrigated crop, 7.8 quintals and from rainfed crop 3.12 quintals per ha have been obtained. This is lower than the State productivity of groundnut.

Safflower

Safflower is an important oil seed crop, cultivated in rainfed and irrigated conditions. It gives good yields under low rainfall conditions. During 1980-81, it was cultivated on 46,483 ha, while in 1996-97 it was cultivated on 34,159 ha. The crop is largely cultivated as rainfed crop.

Varieties	Year of release	Oil content percentage	Duration(days)
Annigeri – 330	1957	31	115-120
Annigeri – 1	1969	29	115-120
S –144	1973	32	115-120

Though the oil content in Annigeri-1 variety is lower than that of Annigeri-300, it yields higher. The variety S-144 tolerates dry climatic condition. For Safflower, medium and deep black soil, black soils with good drainage capacity is suitable. This crop can tolerate salinity and alkalinity in soils. The sowing season is Sep-Oct. In good rainfall areas, there is a practice to cultivate early season green gram or black gram in kharif and sow safflower in rabi. Cultivating groundnut in kharif and safflower in rabi is a highly profitable double cropping sequence. There is a practice of mixed cropping where for every three lines of Bengal gram, one line of safflower (3:1) is sown or for every four lines of Bengal gram, 2 lines of safflower are sown. Crop rotation with safflower after cotton or cotton after safflower has resulted in low crop yields. Therefore it is recommended to follow crop rotation once in two years with Bengal gram followed by safflower and vice versa.

Important pests of safflower are aphids, capitulum borer, leaf eating caterpillar. The **important diseases** are neck blast and seedling blight. In Bijapur, in 1996-97, 20,606 tonnes of

safflower are produced realizing a yield of 5.91 quintals per ha, below the state average of 6.48 quintals per ha. With improved agronomic practices, one can harvest 7.5 to 10 quintals per ha.

Season	Area (ha)	1995-96 Production (tonnes)	Productivity (quintals/ha)	1996-97 Production (tonnes)	Productivity (quintals/ha)
Kharif	92,291	34,618	3.95	1,10,296	3.27
Rabi	1,56,718	47,011	3.16	1,60,412	5.76
All seasons	2,53,036	85,642	3.56	2,65,800	9.41
Irrigated crop	28,566	16,039	5.91	49,275	3.09

Sunflower

In recent years, sunflower has emerged as an important oilseed crop next to groundnut. It can be cultivated both under rainfed and irrigated conditions. As an irrigated crop it is cultivated in 48,136 ha and as rainfed crop it is cultivated in 2,04,900 ha. As a kharif crop it is cultivated in 92,291 ha, as rabi crop it is cultivated in 1,56,718 ha and as summer crop cultivated in 4,027 ha. The varieties are EC 68415 (Armavitski) – 90 to 100 days, Mordane on 75 to 80 days, BSH 1 (Hybrid) 90-100 days. This crop can be cultivated on all types of soils. However the crop should be rotated. The kharif crop is sown in June and rabi in Oct-Nov, summer crop in Feb. Good quality seed is the prerequisite for determining the yield and oil content. **Important diseases** are rust disease, leaf spot, neck blast, root rot. **Important pests** are Heliothis, Diacrisia, Mylocerus weevil. During flowering in the morning hours, hand pollination will increase the productivity. The crop has to be on watch and ward to save from bird infestation for one month from the time of grain filling. From irrigated crop, 20 to 25 quintals can be expected per ha while from rainfed crop 10 to 15 quintals can be expected per ha.

Sunflower seeds contain nutritious and high quality edible oil used in preparation of medicine and in other industries. Since the crop can with stand dry weather conditions, it can be cultivated on ordinary soils. This is a short duration crop and can be included in multiple cropping system. The district stands first in the cultivation of sunflower. In 1995-96, the area, production and productivity are as under

Season	Area (ha)	1995-96 Production (tones)	Productivity (quintals/ha)	1996-97 Production (tonnes)	Productivity (quintals/ha)
Kharif	92,291	34,618	395	1,00,296	32,789
Rabi	1,56,718	47,011	316	1,60,412	57,663
All seasons	2,53,036	85,642	356	2,65,800	94,070
Irrigated	28,563	16,093	591	49,275	30,920

Sugarcane

Sugarcane is an economically important crop cultivated in an area of 46,604 ha on different types of soils.

Varieties	Duration (months)	Planting season
CO 419	12-16	June-Aug; Oct-Nov and Jan-Feb
CO 740	11-15	Oct-Nov and Jan-Feb
CO 62175	12-14	June-Aug and Oct-Nov
CO 6415	11-13	Jan-Feb
CO 7219	10-11	Jan-Feb
COC 671	8-9	Jan-Feb

Important pests: Shoot borer, shoot fly, pyrilla, mealy bug, root grubs, termites, Scales

Important diseases: Smut disease, viral disease, yellow leaf disease, pineapple disease, leaf spot disease.

Considering the variety and the season of planting, the crop comes to harvest in 10-14 months. During 1995-96, 49,95,123 tonnes of sugarcane were produced, with a productivity of 106 tonnes per ha. The productivity level of the district is about 90 tonnes higher than that of the State.

Plant protection

Crop	Disease	Area	Control measures
Jowar	Downey mildew	Badami, Beelagi, Hunagund, Jamkhandi, Mudhol, Indi	Disease resistant variety CSH 5, CSH 10, CSV 4, CSV 10, CSV 11, SB 1079 have to be used, Disease infected plants should be picked and burnt
Groundnut	Tikka disease	Badami, Bagalkot, Vijapur, Beelagi, Hunagund, Indi, Jamkhandi, Mudhol	Spray 5 grams carbon dizem in 18 litres water, Cultivate DH 8
	Mosaic disease	Badami, bagalkot, Vijapur, Beelagi, Hunagund, Indi, Jamkhandi, Mudhol	In order to control the disease infestation, spray dimethoate or monocrotophos

	Rust disease	Badami, Bagalkot, Vijapur, Beelagi, Hunagund, Indi, Jamkhandi, Mudhol	2.22 grams Menkojib to be dissolved in 1 liter of water and sprayed
Maize	Leaf mosaic disease	Badami, Bagalkot, Vijapur, Beelagi, Hunagund, Indi, Jamkhandi, Mudhol	Cultivate Deccan 103 disease resistant variety 2.2 grams Menkojib to be dissolved in 1 liter of water and sprayed
Cotton	Leaf spot disease	Badami, Bagalkot, Vijapur, Beelagi, Hunagund, Indi, Jamkhandi, Mudhol	Spray Agrimycin 100, 100 ppm
	Leaf mosaic disease	Badami, Bagalkot, Vijapur, Beelagi, Hunagund, Indi, Jamkhandi, Mudhol	Spray of 2.2 ml Zairam in 1 liter water or 3.33 gram blitox in 1 liter of water
Sunflower	Leaf spot and rust disease	Badami, Bagalkot, Vijapur, Beelagi, Hunagund, Indi, Jamkhandi, Mudhol	Spray of 2.22 mili gram Menkojeb in 1 liter of water.

Improved agricultural implements

The Balaram plough and iron plough are used for ploughing. The Balaram plough is suitable for medium to deep soils. This needs a pair of bullocks for ploughing. This deshi plough is manufactured from improved iron metal, it has facility to change the plough shear, for deep ploughing. This wears out slowly. The iron plough is suitable for all types of soils and is better than the country plough for earthing up and crushing the clods. This enables farmer to plough his land completely without leaving any clod or any piece of land uncovered.

For deep ploughing, iron plough, grubber and footgi cultivators are used. A good pair of bullocks with iron plough is used to plough deep black soils in summer to control weeds and improve drainage. Usually in black soils, this practice is done once in three years after rabi crop is harvested. The grubber is useful to plough on all types of soils instead of plough. The footgi cultivator loosens the black soils and facilitates in the conservation of soil moisture.

The clod crusher is an indigenous equipment. After ploughing to prepare the land and make it free of stubbles and other dirt on all types of soils, harrow is used. Ridger is used on well prepared land to make ridges and furrows of various dimensions in irrigation as well as for border strips to grow crops. Bund former is used to erect bunds in well prepared land for irrigation and for soil moisture conservation. It is also useful in erecting bunds in narrow spaced crop fields.

The seed-cum-fertilizer drill is useful to sow safflower, tur, jowar, bajra and so on. Different types of improved indigenous seed-cum-fertilizer drill are available. This enables to change the spacing between seeds and also to sow seeds and apply fertilizers in different rows. The groundnut seed-cum-fertilizer drill has four blades with two containers. This enables to sow higher quantity of seeds. In order to cover the seeds with soil, the crop line harrow is used which has long yoke and head.

For intercultivation, the blade harrow, slit blade harrow, shovel type harrow, duckput harrow and the groundnut intercultivator are used which have the facility to change the yoke. In blade harrow which has provision to adjust the yokes of different dimensions, there is no need to keep more number of blade harrows. For all border strip crops, for intercultivation, slit blade harrow was used and this removes weeds close to the crop sown. The shovel type blade goes below the depth at which seeds are sown and earthens up facilitating greater soil moisture conservation. The duckfoot shaped blade harrow loosens the soil effectively by moving deep. In addition, it is useful in weeding and in earthing up in strip crops.

Among the harvesting equipments, improved sickle is in vogue. The hacksaw, has the provision to change the blades thus avoiding need to sharpen frequently. With special types of handles, it can be used to harvest crops close to ground without physical injury to labourers. Other equipments used in cultivation for different purposes are as under: Sunflower thresher, pipe shaped maize thresher, manual maize thresher, groundnut thresher, mechanized groundnut thresher, Tungabhadra pedal and power driven winnower. Among the equipments used for leveling, leveler, long handled bulk soil scrapper, floating leveler and cultivator.

Agricultural Implements

Among the agricultural equipments, tractor, power tiller, thresher, paddy transplanter, sugarcane planter, rotovator, have good demand. The demand is significantly on the rise for these equipments especially in assured rainfall and irrigated areas. In order to attain higher level of productivity and to encourage scientific cultivation among farmers, subsidy is being extended to promote wide use of tractors, power tillers, and other mechanised equipments. The subsidy is 30 per cent or a maximum of Rs. 30,000 for purchase of Government of India approved tractor model of capacity upto 30 HP. Farmers will have to pay for accessories. Under this plan a subsidy of 33 per cent is offered to women farmers. Under the scheme to promote power tillers, a subsidy of 25 per cent or a maximum of Rs. 15,000 is extended. For purchase of paddy transplanter, sugarcane planter, rotovator, under the scheme to promote use of high-tech equipments, for improved hand operated agricultural equipments, subsidy of 50 per cent or a maximum of Rs. 1500 per equipment is extended. For power operated agricultural implements, a subsidy of 50 per cent, with a maximum of Rs. 25000 per implement is extended. In order to monitor the quality control of agricultural implements, at the state level and district level, agricultural implement release committees have been formed.

Agricultural extension scheme

The Agricultural Extension scheme which began during 1978 under the World Bank assistance ended in 1992-93. The scheme is being continued under the State Zonal Planning scheme since 1993-94. The Department of Agriculture was implementing the soil conservation programs along with other responsibilities till 1994. In order to facilitate smooth and effective implementation of agricultural extension, since 1995, the Department of Agriculture was restructured keeping in view the dry land development program on watershed basis. In the newly reorganized program, all extension related work including horticultural extension will be undertaken keeping the gram panchayath as the unit and for this purpose 'agricultural assistants' have been appointed providing them office space. The Agricultural Assistant, and the zonal assistant agricultural officer are directed to participate in the gram panchayath meetings. In each zone, office of assistant agricultural officer has been opened with an Agricultural assistant for providing technical help. In order to help the Assistant Director of agriculture in every taluk, on the basis of crop density, Agricultural officer (subject matter specialist) has been appointed. The District has been divided into two divisions, and for each sub-division a Deputy Director of Agriculture takes the leadership and at the District level, Joint Director of Agriculture has been appointed. After reorganization, in all taluks, on the first and third Monday of every month, fortnightly training is being arranged. On the second and fourth Monday of every month, at the zonal level, progress review meetings and discussion on the problems of different regions are being conducted.

From 1995-96, the extended agricultural extension project is being implemented. With the help of the Departmental Agricultural extension workers, the technical information on horticulture crops is being imparted to farmers along with the objective of the programs. The district level Agriculture Departmental officers participate as subject matter specialists identifying the needed technical inputs for the extension workers. In the next stage, it is proposed to include the social forestry concept also in the extended agricultural extension program. Based on the recommendations of the technical expert committee, the technical information is being provided through the field staff contact group, moving away from the earlier method of imparting information through contact farmer.

Dry land Development Board

The Dry land Development Board is constituted from 17th October 1995. The main objectives of the Board are (a) developing water bodies in dry lands and promoting their conservation, (b) adopting soil and water conservation practices in rainfed agriculture in dry lands, (c) promoting dryland horticulture development, (d) encouraging and offering support to zonal agriculture and allied activities and (e) promoting animal husbandry activities in dry land agriculture.

For these purposes, at least 60 per cent of the released budget should be utilized according to the Notification. The remaining 40 per cent of the released budget can be used for complementing activities such as building school, road, bridge and other works. According to the Notification of the Government, the Board will have: 14 Members of the Parliament, 74 Members of the Legislative

Assembly, 9 Members of the Legislative Council, 8 Presidents of the Jilla Panchayaths, 3 Divisional Commissioners, 8 Deputy Commissioners, 10 Members nominated by the Government, totalling 127 members. In the Bijapur district, apart from Jamkhandi taluk, all other taluks are under the purview of the Dry land Development Board.

Irrigation Water Management: Recommended measures for efficient utilization of water

1. **Border strip irrigation:** This method can be followed in all types of soils which can be levelled with low expenditure without reducing the soil fertility. The land to be irrigated is divided into long narrow strips extending lengthwise along the natural slope and each strip is separated by two borders which are parallel to each other. This confines the water which flows in sheet like form within these strips. The water is supplied from supply ditches and wets the soil as it moves further. The interbund space is around 30 cms. For efficient use of irrigation water and for equal distribution, depending upon the available water flow, the size of the strip can be still reduced. This method is suitable for wheat, jowar, Italian millet (navane), groundnut, pulses and fodder crops which are narrow spaced crops.
2. **Check basin method of irrigation:** Here the land to be irrigated is leveled and is surrounded by embankments in which the water supplied may be allowed to stand till the required water is absorbed. The basin is constructed for each tree and as such there is no necessity for leveling the land within each basin. Each basin is rectangular in shape and will have one tree in it. This method is used for orchard crops, when the furrow method is not suitable, where the wetting of partial area in the furrow makes it difficult to secure sufficient absorption and in the porous soils where excess percolation occurs at the upper end of the furrows. Here water is supplied directly or from basin to basin. This method is suitable for wheat, maize, jowar, bajra, pulses, oilseeds, fodder crops and orchard crops.
3. **Furrow irrigation:** In this method to have a smooth flow of water along the slope, the land should be suitably leveled. In order to have adequate wetting of soil, water is let in through small furrows. This method can be used in different types naturally sloped lands laying furrows across the slope. Considering the force of water, and by letting water in different furrows simultaneously, water application can be controlled. This method is suitable for crops with higher inter row spacing like cotton, sugarcane, tur, maize, sunflower, chillies, tomato and so on.
4. **Corrugation furrow method:** This method is used for soils which are prone to erosion due to flooding. Here water is let in small shallow furrows and is suitable in situations, where water is scarce and is suitable for narrow spaced millet and fodder crops. The water moves in S shape in the furrows. Where there is land with not so uniform leveling, water can be applied in undulated furrows. In all these methods of irrigation, it is desirable to provide drainage at the end of the field lined with grasses to enable proper drainage of excess water.
5. **Sprinkler irrigation:** This method is used where water is scarce and on lands which are undulated, cannot be easily leveled and on shallow soils where surface irrigation is impossible.

Water is applied in the form of fine spray distributing water uniformly to a small depth of irrigation. Here losses due to percolation and surface evaporation can be eliminated as water is applied to the root zone, by using the sprinklers and choice of conveyance pipe considering the right pressure.

Agroforestry

Agroforestry is cultivation of trees along with crops and rearing of livestock. This method can be used in the right type of land and soil. Agroforestry is useful on soils which are continuously cultivated and suffering from loss in soil fertility and here agroforestry complements the income. The population pressure, leads to encroachment of forest lands for cultivation of crops, industrialization, pressure on firewood and fodder extraction from forests, and cultivation on lands unsuitable for agriculture resulting in erosion and fertility loss. In order to overcome such problems, cultivation of trees along with crops is essential. Growing natural forest tree species on waste lands, cultivable lands, will help in maintaining natural balance. There are ten types of agroforestry and farmers need to consider the land use classification, weather, their needs, the market situation before practicing agro forestry.

Types of agroforestry

1. **Planting on bunds:** In order to maintain the field bunds and for different purposes, growing trees on bunds is a normal practice. For meeting small timber needs, neem, mango, *Cassia siamea*; for firewood *Acacia nilotica* (kari jali), *Casuarina equisetifolia* (Gali mara), Subabul; for fodder, subabul, *Acacia ferruginea*, *Bauhinia malabarica*; for fruits Mango, tamarind, exotic tamarind, *Ziziphus mauritiana*, and for agricultural implements *Acacia nilotica*, *Acacia ferruginea*, and neem and so on have been recommended for growing.

2. **Different methods of row sowing of tree crops:** In this method, along with annual plants forest and fruit trees can be grown. The different species of trees / plants / crops used are as under:

Purpose

A. Forest

Trees

Subabul, sesam, Bangali Jali, Galimara, *Acacia lucocephala*, (bili jali); annual crops including kharif and rabi crops

B. Horticultural and other Annual crops

Banana, Fig, Drumstick, *Phyllanthus emblica*, *Annona squamosa*, *Annona reticulata* Green gram, Cow pea, Jowar, groundnut, *Phaseolus radiatus*, *Setaria italica*, Mustard, Wheat, *Dolichos lab lab*, *Glycine max*, Coriander

C. Forest trees and Fodder crops

Soobabul, Neem, *Acacia nilotica*, Tamarind, *Acacia ferruginea* *Cymbopogon caesius*, Grass of *Pennisetum spp*, grass of dicotyledon spp.

3. Planting trees in different plots of the farm: Refers to planting trees in different plots of the farm in such a way that these trees will not affect the productivity of other crops through shade effect, competition for nutrients and so on. Instead, these trees complement farm income and provide stable income during drought period. These trees are neem, nerale (*Sizigium cumini*), Tamarind, *Hardwickia binata*, *Dalbergia sissoo*, *Acacia ferruginea*.

4. Live Bunds: In order to conserve soil and water, instead of constructing bunds using earth and stones, vegetative bunds where on the earthen bunds, herbs, shrubs and trees are planted are preferred as they have greater strength than mere earthen bunds and are also less expensive. On earthen bunds growing Soobabul, grass spp, haemata, vetiver grass, across the slope will strengthen bunds from plant spp. The soobabul is tree fodder which can be harvested 6 to 7 times a year and has nutritive value both as fodder and as green manure. Other trees and crops which can be grown on bunds are glyricidia, perennial tur, fodder crops and so on.

5. Planting trees in gullies and ravines: In cultivated land, in order to prevent further degradation of gullies and ravines, trees and shrubs can be planted. The trees like *Acacia nilotica* (kari jail), *Prosopis juliflora* (bellary jail), *Ficus bengalensis*, *Leucena leucefera*, Bamboo; and the shrubs like *Agave americana*, *Acacia sinuate*, *Acacia concinna* (soapnut); *Cymbopogon caesius* (*Anjana hullu*), *Sapindus emarginatus* (*Antuvala*), *Dihanthium annulatum* (*marvale hullu*)

6. Planting trees in degraded and low fertile lands: On such lands which are not suitable for cultivation, due to nutrient depletion and scarcity of soil moisture, cultivation of annual crops is not suitable. Therefore, on such lands, after following the appropriate land reclamation methods, cultivation of forest spp or fruit trees is recommended.

7. Planting trees on the banks of river streams: Planting trees on banks of river streams will prevent soil erosion and in addition improve the soil conditions enabling realization of reasonable net returns.

8. Raising plantations for fuelwood, fodder and small timber: In some situations, plantations for meeting needs of fuelwood, fodder and small timber can be raised for overall productivity.

9. Planting avenue trees and trees on canal banks: By planting avenue trees and on canal banks, the land can be properly utilized and canal breaches can be prevented.

10. Planting trees on the sides of farm ponds: By using the farm pond water, perennial crops can be cultivated for profit. In addition on the bunds of farm ponds forest spp or horticulture spp trees can be cultivated raising the farm incomes

Control of rodents: Usually rodents (field rats) are a predicament for all crops. From the time of sowing till harvest, including in storage, the rats are a menace. They damage the crop at the time of sowing by eating seeds, cutting the succulent roots, stems and feeding on ear heads.

The rodents in addition store the grains in rat holes. For the control of rodents, rat trap, bait and fumigation are some of the methods. By using rat baits and fumigation, farmers can control rats at the community level and can reduce the menace to a large extent.

Control of storage pests: The harvested grains need to be properly stored for use either as food or as seeds for sowing. Else, they are subjected to attack by rats, fungi and stored pests. Some of the storage pests are paddy weevil, rice weevil, rice moth, borer, saw fly, pests of pulses, rice mealy bugs, mealy hispa bugs, pulse beetle, red flour beetle, borer, angunice grain moth and so on. Some of the pests will enter storage from the field right from the harvest stage. The pests which are in storage cell, will multiply *in situ*. Therefore it is necessary to take preventive control measures to save the harvested grains from storage pest / disease attack in addition to controlling the storage pests / diseases after their attack. As a prophylactic measure, a fortnight before harvest, on the earheads of paddy, maize and of pulses, application of 2 ml Malathion 50 per cent concentration in one liter of water is desirable. The grains with 10 to 12 per cent moisture can be stored for a year effectively at the temperature of 65 to 70 degrees Fahrenheit. If the grains are to be stored for two years, the moisture level should be less than eight per cent. If the grains have already been infested, fumigation is required storing the grains in closed containers. Fumigation is done by inserting 1 Aluminum phosphide tablet for 1 quintal of grains or for 1 cubic meter area in the stored container or sealed container. After removing the fumigated grains, they need to be stored in gunny bags. On the gunny bags, 5 per cent malathion powder has to be sprinkled every month. Oil seeds and floor should not be fumigated.

Control of Termites: Crops prone to termites attack are wheat, maize, barley, sugarcane, cotton, sunflower, groundnut, niger, pulses and so on. Termites feed on crop through constructing a tunnel with a thin layer of soil. The termite attack increases with the fall in soil moisture. Since termites feed on roots and stem closer to ground the plants dry up. In Black soils and in irrigated lands, termite attack is not apparent. In order to control termites which arise from the termite hill, for a 1 square meter termite hill, two aluminum phosphide tablets are applied and all the outlets of the termite hill have to be closed with moistened red earth. Else liquid pesticides like chloropheriphos, aldrin, chloredane, solution should be applied to each termite mound.

Use of water in agriculture: At least 80 per cent of used water goes for agriculture. The northern parts of the State which receive low rainfall, groundwater has been the major source of water for irrigation than from rivers or tanks. From the groundwater survey of 1978 to 1990, it was found that Bijapur district has a large area under groundwater irrigation. The analysis of survey results further indicated that in Bagalkot and Indi taluks, groundwater quality is good. In Hungund, Jamkhandi, Mudhol and Biapur taluks salt content in groundwater is high. Alkalinity in groundwater is found in Muddebihal, Beelagi, Sindgi and Basvana Bagevadi taluks. The talukwise groundwater survey results and the classification of taluks based on groundwater quality is provided below.

Taluk-wise groundwater situation in Bijapur district

Taluk	Good quality	Quality of groundwater Saline	Alkaline
Badami	68.1	17.2	14.7
Bagalkot	90.2	4.9	4.9
Basavana Bagevadi	69.0	8.3	22.7
Bijapur	70.9	20.2	8.8
Bilgi	58.0	5.0	37.0
Hungund	52.9	38.2	8.8
Indi	85.6	13.6	0.8
Jamkhandi	71.6	24.3	4.1
Muddebihal	12.5	3.0	84.5
Mudhol	68.1	23.6	8.3
Sindgi	70.6	2.8	26.6

Classification of taluks in Bijapur district based on groundwater quality

Groundwater quality	Taluks	Points to be noted
Good quality	Bagalkot, Indi	
Saline	Hunagund, Jamkhandi, Mudhol, Bijapur	When the salinity in soils increases, salts should be leached out using excess water
Alkaline	Muddebihal, Beelagi, Sindgi, Basavana Bagevadi	Water should be treated with gypsum or gypsum can be applied to soil considering the level of alkalinity.

IRRIGATION

Rivers like Krishna, Ghataprabha and Malaprabha flow through the district but scarcity and drought occur frequently. The total geographical area of the district is 17,12,348 ha out of which net sown area is 12,58,241 ha. Total irrigated area is only 2,94,864 ha. Area irrigated by sources like canals and wells is 71,300 and 1,16,269 ha respectively. Talukwise net area irrigated in the is given in Table 4.5 'A' and sources wise area irrigated details for the years from 1980-81 to 1994-95 is given in Table 4.5 'AA'.

Details of area irrigated for the selected years are given below

Particulars	1970-71	1980-81	1990-91	1995-96
Net area sown out of the total geographical area in ha.	83.46	68.21	79.17	76.64
Net area irrigated out of net sown area in ha.	3.60	8.60	19.10	21.46
Gross irrigated area out of gross sown area in ha.	3.90	10.48	20.63	22.22
Per cent irrigated area out of gross irrigated area				
Canals	11.92	17.10	26.23	25.26
Tanks	11.00	2.69	3.78	2.50
Wells	68.00	64.00	46.00	42.96
Other sources	2.00	11.00	25.00	29.30

During 1996-97, an area of 67,001ha from canals, 7,153ha from tanks, 1,08,875 ha from wells, 23,370 ha from deep wells, 78,061 ha from other sources, 5,287 ha from lift irrigation schemes totaling to 2,89,747 ha of land has been provided with net irrigation facility. Talukwise area irrigated figures in the district during 1995-96 is given in the Table 4.5 A.

Bijapur District

Table 4.5 'A' : Sourcewise area irrigated (in hectares) details in Bijapur district from 1980-81 to 1996-97.

Year	Canals		Tanks		Wells		All Sources		Area irrigated more than once
	Gross	Net	Gross	Net	Gross	Net	Gross	Net	
1980-81	29352	17282	3085	2718	75523	66099	124981	100948	24033
1981-82	26244	23804	7667	7080	92481	75414	149257	127211	22046
1982-83	32228	30032	6085	5676	93012	75707	157628	134438	23190
1983-84	47046	45562	8210	6953	98399	77873	182399	154258	28141
1984-85	48680	46327	7651	6917	106444	88498	190459	166646	23813
1985-86	51497	48218	6046	5418	92140	79641	184667	163999	20668
1986-87	65081	60973	6248	5858	99032	85161	214456	190306	24150
1987-88	40576	37455	8417	8012	111878	93820	222260	191311	30949
1988-89	67805	63646	10707	10080	125128	102812	267167	229982	37185
1989-90	63009	59327	10845	10072	131533	108824	277597	240729	36868
1990-91	70551	67802	10783	9783	144576	112171	305046	258510	46536
1991-92	72363	71863	11023	10034	152203	127631	330113	287979	42134
1992-93	73040	72540	9705	8998	125033	104578	309143	270887	38256
1993-94	69681	69281	9889	9357	140943	121165	345602	308558	37244
1994-95	--	71340	--	7405	--	116269	--	294864	--
1995-96	--	71117	--	7056	--	102148	--	281587	--
1996-97	--	67001	--	7153	--	108875	--	289747	--

Table : 4.5 'AA' : Source wise area irrigated in the district from 1980-81 to 1993-94

Year	Length of canal in km.	Number of		No. of lift irrigation schemes	No. of tanks with atchkat > 40 ha	No. of tanks with atchkat > 40 ha.	Pumpsets	
		bore wells	open wells				Electric	Diesel
1980-81	328	2	41126	15	59	25	25201	9087
1981-82	328	2	44055	25	70	21	29357	9091
1982-83	328	3	44745	31	76	22	31638	8905
1983-84	79	3	45155	31	76	22	36512	8905
1984-85	79	22	45544	31	81	22	42882	7521
1985-86	79	55	46686	33	85	22	48840	6196
1986-87	79	208	47620	33	91	22	55406	4213
1987-88	119	500	49373	33	91	16	60499	3671
1988-89	119	613	49875	36	91	16	65287	3295
1989-90	119	778	50227	36	91	16	69657	3243
1990-91	122	1582	50556	36	91	16	75374	2955
1991-92	122	2743	50912	36	91	16	81273	2753
1992-93	122	3980	51022	37	91	16	89375	2576
1993-94	122	5714	54358	37	91	16	91515	2321

Table : 4.5 'E' Taluk-wise statistics of irrigated area during 1995-96.

Taluk	Total geo. area in ha	Net sown area in ha	Net irrigated area in ha	Sourcewise net irrigated area during 1995-96 in ha.					Total from all sources	
				Canals	Tanks	Wells	Bore wells	Other sources		
Bijapur district										
Basavanabagevadi	197865	157102	15660	0	1598	13366	206	490	15660	
Bijapur	265769	181778	21199	0	225	16814	578	3582	21199	
Indi	222492	199680	32858	0	2334	15718	925	13881	32858	
Muddebihal	149744	121828	7899	0	772	4796	116	2215	7899	
Sindgi	217601	188628	22259	0	640	17080	3665	874	22259	
Total:	1053471	849016	99875	0	5569	67774	5490	21042	99875	
Bagalkot district										
Badami	136420	74367	21060	5980	885	4480	3690	6025	21060	
Bagalkot	93627	74680	15641	0	0	4028	1736	9877	15641	
Bilgi	78169	49919	23524	10595	0	3482	1369	8078	23524	
Hungund										
Jamkhandi	135358	109123	8632	0	602	2430	670	4830	8532	
	116853	81149	54875	29550	0	8986	363	15976	54875	
Mudhol										
	95450	74163	57980	24992	0	10968	5456	16564	57980	
Total:	655877	463401	181712	71117	1487	34374	13284	61350	181612	
Grand Total:	1709348	1312417	281587	71117	7056	102148	18774	82392	281487	

Source: Bijapur district statistics at a glance, 1996-97, District Statistical Office, Bijapur DES, No.6-98

Upper Krishna Project

Upper Krishna Project is a multipurpose irrigation project (Major irrigation project). It is constructed across river Krishna to alleviate drought by providing irrigation benefits to the districts of Bijapur, Gulbarga and Raichur. Upper Krishna Project was proposed to provide irrigation facility to Raichur and Gulbarga districts, which were under the control of the then Nizam of Hyderabad State. During that time, Hyderabad State proposed construction of Upper Krishna project along with Lower Krishna Project (now called as Nagarjuna Sagar Project). Considerable area of Bijapur district that was part of Bombay Presidency was under submersion under this project. To provide irrigation benefits to the drought affected areas in Bijapur district, the then Bombay Presidency Government undertook investigation for the construction of a separate project across river Krishna. After Reorganisation of States in 1956, Gulbarga and Raichur districts that are getting benefits from this project came under the control of Mysore State (now Karnataka). Bijapur district whose considerable area is going to be submerged also came under Mysore State. Later, the then Mysore State took up the investigation for the construction of Upper Krishna Project to provide irrigation benefits to Bijapur, Gulbarga and Raichur districts.

To provide irrigation benefits to Gulbarga and Raichur districts, the then Hyderabad State proposed to construct a reservoir near Narayanpura. To provide irrigation benefits to Bijapur district also, the Upper Krishna Project proposal was revised by proposing construction of two storage reservoirs (Almatti and Narayanpur). It is proposed to complete the project in two stages. In Stage I, it is proposed to irrigate to 4,24,935 ha by utilising the allocated share of 119 tmc. In Stage II, it is proposed to provide additional irrigation benefits to 1,97,000 ha of land by utilizing the allocated share of 54 tmc of water. As per Krishna Water Disputes Tribunal Award, 734 tmc of water is allocated to the State, out of which 173 tmc of water (119 tmc for Stage I and 54 tmc for Stage II) is earmarked to Upper Krishna Project.

The river Krishna flows through Maharashtra, Karnataka and Andhra Pradesh states for a distance of 299, 483 and 576 km respectively. Out of the total Krishna river valley catchment area, Karnataka stands at the first place with an area of 1.12 lakh km. The catchment area of Andhra Pradesh and Maharashtra in the valley is 75,000 and 69,000 sq.kms respectively. Karnataka would get 1,156 tmc of water from the Krishna river valley. In Karnataka, 11 districts lie in the Krishna river basin and Bellary, Bijapur, Gulbarga and Raichur districts lie completely (i.e., 100%) in the Krishna basin. Construction of Upper Krishna Project was taken up during 1969 itself to provide maximum irrigation benefits to the drought prone districts like Bijapur and Gulbarga. This project is a multipurpose project. Apart from providing irrigation benefits, it is proposed to produce electricity from Almatti reservoir.

Under Stage I works of Upper Krishna Project, it is proposed to construct Almatti dam near Almatti village of Basavana Bagevadi Taluk, Bijapur district across river Krishna upto a height of 509 m (1670 ft), spillway with a solid radial crest gates of size 15 m x 15.24 m to achieve a

FRL of 512.2 m and to provide irrigation to 0.16 lakh ha. and to construct Narayanpur anicut across river Krishna near Bachihal village of Muddebihal taluk of Bijapur district and to provide irrigation to 4.09.lakh ha through Left bank canal. Under Stage I, it is proposed to irrigate 4.25 lakh ha of land by utilizing 119 tmc of water. Stage I works have been taken up in 3 phases.

The works of the first phase under Stage I were completed using World Bank Assistance of 117.64 million American dollars. Details of works taken up under phase I are as below:

1. to construct spillway to partial height along with the construction of Almatti dam and other related works.
2. to construct Narayanpur Left bank canal from 35.5 km to 78 km.
3. to construct Narayanpur dam and allied works
4. to provide irrigation to 79,629 ha.

Works under Phase 2 of Stage I includes the following works:

1. to raise the Almatti crest level of spillaway to RL 509 m (1670 ft) above the river bed level.
2. to construct flyers and road bridges
3. to construct part of Indi branch canal
4. to construct distributory canal works completely and to provide irrigation to 1.7 lakh ha.

The phase -3 works in Stage - I includes completion of Stage - I works in all respect and it is proposed to provide irrigation to 1.5 lakh ha of irrigable land.

Under Stage II of Upper Krishna Project, it is proposed to raise the height of Almatti dam to 524.265 m (1720 ft) by storing 54 tmc (1907 Mcum) of water and to irrigate 2.35 lakh ha.

Reservoirs and canals:

Few important features of Almatti and Narayanpur reservoirs are as under:

Features	Almatti	Narayanpur
Length of the dam in metres.	1564.8	10637
Height in metres.	48.29	29.7
Storage capacity in tmc	42.19	37.86
Utilisable quantity of water in tmc	29.73	30.69
Unutilisable quantity of water in tmc	12.47	7.12
No. of villages coming under submersion	136	42
Area coming under submersion in ha.	21290	15698

List of villages coming under submersion in Almatti reservoir:

a) Athani Taluk1. Janwad village

b) Bagalkot taluk

1	Alur	2	Amindinni	3	Andamurnala
4	Bannidinni	5	Bennuru	6	Chabbi
7	Chikkagulabal	8	Chikkahodalur	9	Chikkamuramatti
10	Devanal	11	Hiregulabal	12	Hiremaramatti
13	Hirehodalur	14	Hodalur	15	Ilyal
16	Jadramakunti	17	Kadampura	18	Keshnur
19	Mallapura	20	MAstihal	21	Mugalalli
22	Muralal	23	Muttatti	24	Nakargundi
25	Salagundi	26	Sangondi	27	Siddanal
28	Sindi	29	Siraguppi	30	Sokanadagi
31	Sarkoppa	32	Telagihal	33	Veerapur
34	Yenkanchi				

c) Bijapur taluk

35	Bellubbi	36	Devaragennuru	37	Hangaragi
38	Hosuru	39	Jainapura	40	Jambagi
41	Ningadalli	42	Sutagundi		

d) Basavana Bagevadi

43	Alamatti	44	Baluti	45	Benal
46	Bisilakoppa	47	Chimmalagi	48	Devalapura
49	Gani	50	Gonal	51	Halerulli
52	Kolhar	53	Majerekoppa	54	Maradagi
55	Marimatti	56	Siddanath		

e) Bilgi taluk

57	Anagawsdi	58	Badagi	59	Badaradinni
60	Balluru	61	Birakabbi	62	Budihal
63	Budihal S.J.	64	Chikkahanchinal	65	Chikkasangam
66	Chiniwalkoppa	67	Chowdapur	68	Dharmasalla
69	Dhavaleshwara	70	Doddihal	71	Galgali
72	Girigov	73	Godhihal	74	Gudadinni

75	Gundanahalli	76	Govinadinni	77	Gulabal
78	Hadrihal	79	Hanchinal	80	Heggar
81	Herkal	82	Honnihal	83	Kamadali
84	Kandagal	85	Korti	86	Koppa S.K.
87	Kovalli	88	Lingapura	89	Managruu
90	Mundaganuru	91	Muttaladinni	92	Sangama
93	Sonna	94	Takkalaki	95	Thimmapura
96	Yemanatthi	97	Yelligurti		

f) **Jamkhandi taluk**

98	Chinagundi	99	Kadakol	100	Kamatagi
----	------------	----	---------	-----	----------

List of villages coming under submersion in Narayanapura reservoir:

a) **Hungund taluk**

1	Amarawadagi	2	Dashabal	3	Dannuru
4	Havargi	5	Hullahalli	6	Inclawar
7	Islampura	8	Kamaladinni	9	Koujaganur
10	Marelkoppa	11	Sangam	12	Sangam archak
13	Voddaragonal				

b) **Lingasugur taluk**

14	Chitapura	15	Gidujavur	16	Halikavatagi
17	Hirejavur	18	Kamaladinni	19	Navali
20	Palagaladinni	21	Ramapura	22	Tondihal
23	Tumbalagadda	24	Upanal anakal	25	Bachinal
26	Baladinni	27	Bijjur	28	Gurasangi
29	Phalpujji	30	Ingalagi	31	Janjargudda
32	Kankari	33	Karkur	34	Kapanur
35	Madri	36	Rakkasagi	37	Siddapura
38	Sultanpur				

c) **Shorapur taluk**

39	Mailgudda
----	-----------

Project Estimate

The Planning Commission has accorded administrative approval during 1978 to the Stage - I of Upper Krishna Project at an estimated cost of Rs. 283.65 crores at the SR of

1975-76. The estimate was revised for Rs. 1500 crores during 1981-82 and for Rs. 3579 crores during 1996-97.

Table 4.6 : Annual Financial and Physical progress under Upper Krishna Project

Year	Expenditure in Crore Rs.		Potential created in ha	
	Annual	Cumulative	Annual	Cumulative
1980-81	40.19	100.90	-	-
1981-82	44.78	141.10	5,356	5,356
1982-83	40.98	185.88	12,280	17,636
1983-84	49.10	226.76	18,404	36,040
1984-85	41.35	275.86	14,828	50,868
1985-86	46.22	317.21	33,074	83,942
1986-87	47.53	363.43	22,074	1,06,016
1987-88	40.42	410.96	4,693	1,10,709
1988-89	50.12	451.37	627	1,11,336
1989-90	54.60	501.49	2,004	1,13,340
1990-91	69.09	556.47	5,960	1,19,300
1991-92	101.82	625.55	13,871	1,33,171
1992-93	127.56	727.37	14,131	1,47,302
1993-94	240.90	854.93	24,593	1,71,895
1994-95	-	1905.84	9,931	1,81,826
1995-96	274.44	1627.79	34,269	2,16,095

Bachawat Commission: Tribunal

Before re-organisation of States, the Krishna basin was spread in the States of Bombay, Mysore, Hyderabad and Madras. In an Inter State the Centre had drawn up conference held in New Delhi in 1951, for apportioning the waters of river Krishna among the then Basin States, a memorandum of agreement. Karnataka did not ratify this. With the re-organisation of States on 1st November 1956, Maharashtra, Mysore (now Karnataka) and Andhra Pradesh became co-basin States. The States of Maharashtra and Mysore raised objections to the clearance of new projects on the basis of allocations shown in the 1951 Memorandum. At the same time disputes arose between Karnataka and Andhra Pradesh on the sharing of Tungabhadra waters. Ignoring the objections of Maharashtra and Mysore, the State of Andhra Pradesh continued with renewed pace the construction of its giant projects of Nagarjunasagara and Srisaïlam for irrigation and power benefits and this development aggravated the dispute. Hence, on the applications of the

States of Maharashtra and Mysore, The Government of India on 10th April 1969, under the Inter State Water Disputes Act, 1956, constituted the Krishna Water Disputes Tribunal, popularly known as Bachawat Tribunal.

The basin States had filed before the Tribunal data of Krishna river flows in the basin for the period from 1894-95 to 1969-70. The average yield was determined to be between 2,390 to 2,394 tmc and the Tribunal arrived at the 75% dependable flow of river Krishna at Vijayawda as 2,060 tmc. The Tribunal decided to consider 75% dependable flow of 2,060 tmc for allocation amongst the riparian States.

Each of the three basin States, had putforth before the Bachawat Tribunal its total demand in Krishna waters. The Tribunal while allocating the waters of the river Krishna, first protected the existing uses in each of the basin State totalling to 1,694 tmc and allocated the remaining 366 tmc of water, out of 75% dependable flows to the three States. This allocation is referred to as Scheme 'A'. The Tribunal allowed the States to use regenerated waters out of the schemes from their own projects using 3 tmc or more annually over and above the utilizations for such irrigation in the water year 1968-69 from such projects. Thus the share of the States under Scheme 'A' is as given below:

Figures are in tmc.

Particulars	Maharashtra	Karnataka	Andhra Pradesh	Total
States water demand	861.0 (20)	1,432.4(33.3)	2,008.1(46.7)	4,301.5(100)
Protected use	439.6(26)	504.5(29.8)	749.2(44.2)	1,693.3(82.2)
Allocation of remaining waters	120.4(32.7)	195.45(53.3)	50.84(13.9)	366.7(17.8)
Total allocation	560(27.2)	700(34.0)	800(38.8)	2,060(96.7)
Share out of regenerated waters	25(35.7)	34(48.6)	11(15.7)	70(3.3)
Total	585(27.5)	734(34.4)	811(38.1)	2,130(100)

The Tribunal had also drawn a scheme for allocation of balance water i.e., for a fuller and better utilization of the water of the river Krishna, which includes the waters available over and above 75% dependable flow. This scheme is referred to as Scheme 'B'. The Tribunal had worked out the share of all the three States during surplus and deficit years. It had also noted that for successful implementation and harmonious function of Scheme 'B', it was essential to establish Krishna Valley Authority. The Tribunal had also drawn up complete Scheme 'B' in two parts viz., Part-I and Part-II and had incorporated the same in its Further Report. Though, the Government of India asked for Scheme 'B' to be made part of the Final Order, the Tribunal declined to do so as they felt that the Final Order should contain only such provision as may be implemented independently of any agreement or law made by the Parliament. On implementation of Scheme 'B', Karnataka would get an additional quantity of 165 tmc of water, Maharashtra 89.5 tmc and Andhra Pradesh 75.5 tmc on an average.

The Scheme 'A' allocations are presently in use. 734 tmc of waters of river Krishna has been allocated to the State of Karnataka and this water has to be used before 2000. This order of the Tribunal is open for review by a competent authority or Tribunal at any time after the 31st May 2000. The basin States have got a right to ask for such a review.

Under the Godavari Water Tribunal Award, 80 tmc of Godavari water is being diverted to river Krishna through Pollavaram Project. Out of these waters, Karnataka is entitled to use an additional 21 tmc of water in Krishna basin. Considering 2 tmc of regenerated water, Karnataka's share would be 23 tmc.

Projectwise allocations (in tmc) and the potential created (in ha) in the State under Scheme 'A'

Name of the Project	Water Resources		Irrigation benefits	
	Allocation	Utilisation	Ultimate	Created
1	2	3	4	5
a) Completed Projects:				
Areshankar	0.38	0.38	1,255	1,255
Chitwadagi	0.26	0.26	891	891
Ghataprabha	32.45	32.45	1,39,383	1,39,383
Gokaka canal	1.40	1.40	5,757	5,757
Kalaskop	0.33	0.33	1,143	1,143
Kolchi weir	0.53	0.53	1,257	1,257
Chandrampalli	1.90	1.90	5,223	5,223
Hattikoni	0.50	0.50	2,145	2,145
Nagathal	0.08	0.08	650	650
Ramanahalli	0.44	0.44	1,943	1,943
Soudaghar	0.26	0.26	1,417	1,417
Upper Mullamari	1.24	1.24	3,279	3,279
Bhadra Anicut	3.10	3.10	4,466	4,466
Tunga Anicut	11.50	11.50	8,704	8,704
Bhadra Reservoir	61.70	61.70	2,44,381	2,44,381
Tungabhadra	132.00	132.00	80,910	80,910
Vijayanagar channels	12.05	12.05	12,210	12,210
Anjanapura	2.50	2.50	673.6	673.6
Ambligola	1.40	1.40	2,955	2,955
Jambadahalla	0.70	0.70	1,538	1,538
Dharma	2.20	2.20	5,668	5,668

1	2	3	4	5
Kanakanala	0.40	0.40	2,064	2,064
Hagaribommanahalli	2.00	2.00	2,966	2,966
Narihalla	0.90	0.90	1,512	1,512
Rajolibanda	1.20	1.20	2,380	2,380
Vanivilas sagar	8.20	8.20	9,190	9,190
Gayatri	0.45	0.45	2,305	2,305
Narayanpura	0.60	0.60	1,624	1,624
Minor Irrigation	101.67	101.67	-	4,69,000
Total:	382.34	382.34	11,54,266	11,55,266
b) Ongoing Projects:				
Hipparagi Stage I	8.56	-	59,690	59,690
Upper Krishna Stage I	119.00	49.00	4,24,935	2,16,095
Ghataprabha Stage III	45.15	10.29	1,78,064	35,432
Malaprabha	44.00	35.75	2,18,190	1,59,276
Bennithora	5.75	-	20,236	-
Lower Mullamari	3.08	-	9,713	-
Amarja	1.92	-	8,903	3,000
Hirehalla	2.27	-	8,013	-
Maskinala	0.78	-	2,833	-
F.C. to Ranikere	1.50	0.34	3,238	283
Minor Irrigation	9.10	-	83,836	3,157
Total:	241.14	95.38	10,17,652	4,17,243
c) New Projects:				
Dudganga	4.11	-	19,668	-
Upper Krishna Stage II	54.00	-	1,97,085	-
Markandeya	4.50	-	32,375	-
Ramthal lift irrigation	6.21	-	22,260	-
Harinala	1.2	-	8,013	-
Bhima lift irrigation	6.66	-	24,282	-
Gandhorinala	2.22	-	8,094	-
Upper Tunga	26.7	15.09	94,700	-
Singatalur	-	-	20,241	-
Basapura	-	-	2,276	-
Itagi Sasalwad	-	-	5,700	-
Total	110.18	15.09	4,34,694	-

Upper Krishna Project is a major multipurpose irrigation project. It is proposed to irrigate 6.20 lakh hectares of land in the districts of Bijapur, Gulbarga and Raichur, after the completion of the irrigation project. It is proposed to produce 1,100 MW of power from the Almatti dam. River Krishna is one among the large rivers in the country and flows for a distance of 1,392 km. through the States of Maharashtra, Karnataka and Andhra Pradesh and joins Bay of Bengal. During its journey, the river Krishna, flows a distance of 304, 408 and 680 km. through the States of Maharashtra, Karnataka and Andhra Pradesh respectively. River enters the State of Karnataka at an altitude of 533 m above mean sea level at a length of 304 km. After flowing for a distance of 408 km in the State, the river enters the State of Andhra Pradesh. The Krishna basin area is spread over the three States namely Maharashtra, Karnataka and Andhra Pradesh. The Statewise basin areas is as under:

State	Krishna basin area	Percent area
Maharashtra	68,621 sq.km.	26.81
Karnataka	1,11,959 sq.km.	43.74
Andhra Pradesh	75,369 sq.km.	29.45
Total	2,55,949 sq.km.	100.0

In Karnataka, 92 per cent of the basin area is cultivable. It is proposed to utilize 173 tmc of water under Scheme 'A' and all the quantity that would be available under Scheme 'B' in Upper Krishna Project. The remaining waters of the basin in the State is being utilized in Tungabhadra, Malaprabha, Ghataprabha, Bhadra, Upper Tunga and other medium irrigation projects.

Progress of the Project

Phase I of Stage I under Upper Krishna Project is being called as Karnataka Irrigation Project -1 and was executed between March 1978 to March 1983 and again during March 1986. The expenditure incurred on the project was around Rs.700 crores as per the revised estimate. 1.05 lakh ha. of land is provided with irrigation by utilizing 31 tmc of water. World bank assistance of Rs. 119 crores has been taken. Under Phase - I, construction of Narayanapura anicut, Alamatti anicut (500 m height), Narayanapura left bank canal (78 km long) and its distributaries, Shahapur canal (76 km) and its 9 distributaries are all virtually completed. 43 villages completely and 54 villages partially are submerged in the backwaters of Narayanapura reservoir. The catchment area of Narayanapura reservoir is 132 sq.km.

Phase II of UKP was executed between August 1989 and December 1996 and again during June 1997. Under Phase II, it is proposed to provide irrigation to around 1,45,000 ha of land, and till the end of June 1997, 1,23,260 ha. of land is provided with irrigation. Under this, Indi canal(64 km), Mudbal canal(50 km) and Shahapur canal are included.

Phase III of Stage I would be executed between June 1996 and June 1999. Under this, it is proposed to complete all the works under Phase I and to provide irrigation to 1.50 lakh ha. of land.

Other Irrigation Projects in the district

Areshankar irrigation project: Areshankar irrigation project was started in 1953 and completed in 1957. An earthen dam is constructed on either side of Areshankar halla near Arehshnakr village in Bagevadi taluk. It is proposed to utilize 10.75 Mcft of water.

Salient features of the project are:

Length:	3900 ft;	Top width:	15 ft;
Bottom width:	265 ft;	Spillway length:	750 ft;
Spillway discharge:	36,600 cusecs;	Storage capacity:	254 Mcft;

Length of left bank canal is 3.2 km and right back canal is 16 km. and irrigates 1255 ha of land in Bagevadi taluk. Rajanala village is submerged and the total area under submersion is 220 ha.

Chitwadagi irrigation Project: The project is constructed across Kadlappana halla (Tributary to Ilkal river in Krishna valley) near Kadur village in Hundgund taluk.

Chitwadagi irrigation Project was started in 1966 and completed in 1971. An earthen dam with side spillway is constructed. The catchment area is 145 sq.km.

Salient features of the project

Length:	5,030 ft;	Top width:	12 ft
Height of dam:	39 ft;	Bottom width:	213 ft
Spillway length:	500 ft;	Spillway discharge:	31,500 cusecs
Storage capacity:	117 Mcft.		

Left bank canal is 6.4 km long and right bank canal is 6.4 km long. Under the project an area of 390 ha is irrigated in Hungund taluk of Bijapur district and Kushtagi taluk of Raichur district. Total area under submersion is 206 ha.

Kalaskop irrigation project: The project is constructed across Endigere halla (Tributary joining Ghataprabha river) near Kalaskoppa village in Bagalkot taluk. The Project was started in 1957 and completed in 1960. An earthen dam partially with side spillway is constructed.

Salient features of the project

Length:	1,616 ft;	Top width:	12 ft
Height of dam:	52 ft;	Bottom width:	278 ft
Spillway length:	909 ft;	Spillway discharge:	30,500 cusecs
Storage capacity:	185 Mcft		

Left bank canal is 10 km long. Under the project an area of 1,143ha is irrigated in Bagalkot. Total area under submersion is 200 ha.

Nagathana irrigation project: The project is constructed across Kyadadi halla (Tributary to Bhima in Krishna valley) near Nagathana village in Bijapur taluk.

Nagathana irrigation Project was started in 1958 and completed in 1961. A partial earthen dam with side spillway is constructed.

Salient features of the project

Length:	3,700 ft;	Top width:	12 ft
Height of dam:	35 ft;	Bottom width:	175 ft
Spillway length:	240 ft;	Spillway discharge:	8,800 cusecs
Storage capacity:	85 Mcft		

Right bank canal is 6.5 km long. Under the project an area of 650 ha is irrigated in Bijapur taluk. Total area under submersion is 130 ha.

Ramanahalli irrigation project: The project is constructed across Navile halla (Tributary to Bhima) near Balaganuru village in Sindgi taluk. Ramanahalli irrigation Project was started in 1954 and completed in 1965. A partial earthen dam with side spillway is constructed. Catchment area of the project is 374 sq.km.

Salient features of the project

Top width:	12 ft;	Height of dam:	39 ft
Bottom width:	192 ft		

Left bank canal is 20 km long. Under the project an area of 1,943 ha is irrigated in Indi and Sindgi taluks. Total area under submersion is 800 ha.

Hipparagi Barrage Project: Hipparagi Barrage Project is constructed across river Krishna near Hipparagi village of Jamkhandi taluk in Bijapur district. A gated Stone masonry spillway is constructed and an extent of 59,690 ha of land in Belgaum and Bijapur districts is irrigated by lifting water on either side of the river. Works of foundation and earthen spillway are in progress. The estimated cost of the project is Rs. 41,877 lakhs and an expenditure of Rs. 1,594 lakhs has been incurred by the end of March 1995. Work of the project was started in 1973.

Malaprabha irrigation project: The project is constructed by stone masonry spillway across Malaprabha river, a tributary to river Krishna near Navile village in Soundatti taluk of Belgaum district. It is proposed to irrigate 2,18,191 ha of land from both the canals in Dharwad, Belgaum and Bijapur districts.

Salient features of the project

Length:	154.5 m;	Top width:	37 ft
Height of dam:	40 m;	Bottom width:	69 ft
Spillway length:	210 ft;	Spillway discharge:	1,34,400 cusecs

Right bank canal is 138.0 km long and left bank canal is 169.0 km. Length of Kolchi right bank canal is 64.0 km. Under the project it is proposed to irrigate an area of 62,785 ha of land in Soundatti, Ramdurg and Bailahongal taluks of Belgaum district, 1,19,339 ha in Gadag, Hubli, Naragund, Navalgund and Ron taluks in Dhawad district and 31,092 ha of land in Badami taluk of Bijapur district.

The estimated cost of the project is Rs. 52,873 lakhs and the expenditure incurred upto the end of March 1995 is Rs. 35,791 lakhs. An area of 1,55,902 ha of land is provided with irrigation to the end of March 1995.

Progress planned under Ghataprabha valley: Under Ghataprabha irrigation project, it is proposed to construct (a) an anicut across Gahtaprabha river, a tributary to river Krishna near Hidkal in Hukkeri taluk of Belgaum district (b) construction of left bank canal from Dhupdal weir, down stream of Hidkal dam and (c) construction of right bank canal and to provide irrigation benefits to Bijapur and Belgaum districts to an extent of 3,17,447 ha of land. Under this project, Badami (8,701 ha), Bagalkot (34,281 ha), Bilgi (23,426 ha), Hungund (7,406 ha), Jamkhandi (25,348 ha) and Mudhol (57,339 ha) taluks of Bijapur district are getting irrigation benefits. The estimated cost of the project is Rs. 73,815 lakhs and the expenditure incurred till the end of March 1995 is Rs. 21,173 lakhs. Potential created to the end of March 1995 is 32,206 ha.

Projects under investigation

Archanala irrigation project: It is proposed to construct an anicut across Kallahalla (in Krishna river valley) near Archanala village in Indi taluk and to irrigate 1,700 ha. of land. Under this project, an extent of 268 ha of land is going to be submerged. It is proposed to utilize 320 Mcft of water in this project.

Alamela irrigation project: It is proposed to construct a reservoir across Alamela nala (in Bhima river valley) near Alamela village in Sindgi taluk and to irrigate 1,420 ha. of land. It is proposed to utilize 175 Mcft of water in this project. The project is under investigation.

Kadlewada irrigation project: It is proposed to construct of 7,957 ft long, 37 ft high earthen dam across a nala joining river Bhima near Kadlewada village in Sindgi taluk. It is proposed to

provide irrigation to an extent of 300 ha. of land by proposing 4 k m long left bank canal and 2.8 km right bank canal. Under this project, an extent of 64 ha of land is going to submerge.

Kolhar irrigation project: It is proposed to construct of 2,880 ft long, 49 ft high earthen dam across big nala (Krishna valley) near Kolhar village in Bagevadi taluk. It is proposed to provide irrigation to an extent of 400 ha. of land using 152 Mcft. of water by proposing 7 k m long left bank canal and 4.8 km right bank canal. Under this project, an extent of 64 ha of land is going to submerge. The scheme comes under Upper Krishna Project.

Doni irrigation project: It is proposed to construct a reservoir across Doni halla (in Krishna valley) near Embathnala village in Bagevadi taluk and to provide irrigation to an extent of 5,000 ha through left bank canal. The scheme is still under investigation.

Balakundri irrigation project: It is proposed to construct 4,300 ft long, 46 ft high, top width 12 ft and bottom width 248 ft earthen dam with right partial spillway across a nala (nala is a tributary joining Ilkal river in Krishn valley) flowing near Ilkal village in Hundgund taluk. The length of spillway is 1,000ft and the spillway is designed for a flood discharge of 38,000 cusecs. It is proposed to provide irrigation to an extent of 1,960 ha. of land through left bank canal of 9.6 km long. Under this project, an extent of 205 ha of land is going to submerge.

Benakanadoni irrigation project: It is proposed to construct a reservoir across Ilkal river (in Krishna valley) near Benkandoni village in Hundgund taluk and to irrigate 600 ha of land. The scheme is under investigation.

Madikesiruru irrigation project: It is proposed to construct of 3,320 ft long, 31 ft high earthen dam across Sogli nala (Krishna valley) near Madikesiruru village in Muddebihal taluk. It is proposed to provide irrigation to an extent of 528 ha. of land by providing 5.5km long left bank canal and right bank canals. Under this project, an extent of 120 ha of land is going to submerge.

Rangasamudra irrigation project: It is proposed to construct of 1,015 ft long, 65 ft high stone masonry dam across Rangasamudra nala (joining Malaprabha river) near Rangasamudra village in Badami taluk. It is proposed to provide irrigation to an extent of 994 ha. of land, by providing 11.2 k m long left bank canal and 4.8 km right bank canal. Under this project, an extent of 88 ha of land is going to submerge.

Rakkasagi irrigation project: It is proposed to construct a reservoir across Rakkasagi nala (a tributary of Malaprabha river) near Rakkasagi village in Hungund taluk. It is proposed to provide irrigation using 50 Mcft. of water. The projects under investigation are included under Upper Krishna Project.

HORTICULTURE

In Bijapur district, grapes, pomegranate, banana, lime and vegetable crops are the major horticulture crops. Quality grapes, pomegranate and lime are being supplied both to domestic and international markets from the district. In 1997-98, horticulture crops were cultivated on 50,000 ha of which grapes occupied 2,541 ha, pomegranate 2,716 ha, lemon 3,697 ha, banana 2,377 ha, mango 2,369 ha, sapota 969 ha, guava 477 ha, custard apple 112 ha and papaya 134 ha. The vegetable and other fruit crops occupied 35,129 ha. Due to scarcity of groundwater, drip irrigation is adopted for horticulture crops on 4,282 ha. It is estimated that instead of irrigating 1 ha using flow irrigation, 5 ha can be irrigated with drip irrigation.

In 1997-98, horticulture development is undertaken at a cost of Rs. 464.59 lakhs, of which Rs. 289 lakhs is incurred towards promoting drip irrigation, benefiting 1295 farmers providing irrigation to 1,273 ha. Under special unit plan, 627 farmers have been benefited in horticulture. Under Employment Guarantee Scheme, small and marginal farmers have been accommodated. In 1996-97, Rs. 42 lakhs have been incurred to develop 2,016 ha of fruit crops. Under the State Zonal Plan, seedlings of fruit crops in addition to mango, lemon, pomegranate and sapota have been provided. In addition, 61,875 grafts were raised.

In order to store the different horticulture produce in the District, two cold storages have been initiated in Bijapur. The Bagalkot cold storage unit is under construction with a grant of Rs. 13 lakhs, while Bijapur cold storage unit is built with a grant of Rs. 53 lakhs. The District Horticulture crops Growers Cooperative Society has been granted Rs. 81.86 lakhs by National Cooperative Development Corporation, in order to provide good market for the horticulture produce. An expenditure of Rs. 9.6 lakhs is incurred towards four fruit storage centers, Rs. 25 lakhs to develop 25 horticulture crop selling centers; Rs. 15 lakhs towards three light vehicles; Rs. 27.6 lakhs for other facilities. In Table 4.7, details of horticulture and plantation crops are provided.

Table 4.7 : Plantation and Horticulture crops grown in the district during 1995-96 and 1996-97, with Area (ha), Production(tonne) and Yield(Kg/ha).

Crop	Season	1995-96			1996-97	
		Area	Production	Yield	Area	Production
Onion	Kharif	5,003	46,803	9,355	6,048	28,026
	Rabi	3,040	30,850	10,148	3,674	43,309
	Summer	2,011	21,246	10,565	1,495	16,436
	Total	10,054	98,899	9,837	11,217	87,771
Tomato	Kharif	682	4,388	6,434	962	10,014
	Rabi	410	3,144	7,668	485	5,562
	Summer	111	785	7,068	96	544
	Total	1,203	8,317	6,914	1,543	16,120

Contd..

Crop	1995-96			1996-97		
	Season	Area	Production	Yield	Area	Production
Beans	Total	44	300	6,827	-	-
Brinjal	Kharif	554	6,236	11,256	675	3,961
	Rabi	469	2,667	5,686	521	5,846
	Summer	287	5,728	19,957	238	3,030
	Total	1,310	14,728	11,169	1,434	12,840
Banana	Annual	1,551	69,722	44,953	1,492	51,744
Sweet root	Annual	367	1,174	3,200	148	469
Grapes	Annual	894	27,267	30,500	1,016	44,770
Mango	Annual	265	1,427	5,384	502	3,324
Papayi	Annual	24	66	2,751	25	68
Goa	Annual	201	2,820	14,028	182	1,697
Chikku	Annual	546	2,675	4,900	426	2,419
Lemon	Annual	1,699	19,255	11,333	1,679	20,813
Dry Chilly	Kharif	2,034	1,464	720	2,247	3,101
	Rabi	392	337	860	303	1,436
	Summer	153	263	1,719	236	447
	Total	2,579	2,064	800	2,786	4,984
Turmeric	Annual	400	2,654	6,636	398	2,585
Garlic	Annual	282	236	837	270	224
Coriander	Annual	347	33	95	355	33
Coconut	Annual	511	2,466	4,826	493	2,355

Source : Revised estimate of all major Agriculture crops, 1995-96 and 1996-97, Directorate of Economics and Statistics, Bangalore.

Banana

Banana is a major fruit crop. It has more than 20 per cent sugar. Basically it is a crop of the tropical climate. It desires moist dry climate on alluvial, black clayey and well drained soils. *Dwarf Cavendish, Robusta, Rasabale, Madranga, Nendran, Elakki, Chandra bale, Putta bale, Boodu bale* are the major varieties. Usually the first crop of Banana comes to harvest after 12 - 14 months of planting of Banana suckers. The subsequent crops can be harvested once in 6 to 8 months. The yield per ha of Dwarf Cavendish is 30 to 40 tonnes, Robust 40 to 45 tonnes and other varieties 20 to 30 tonnes. Banana is being cultivated on 1,551 ha, producing 49,722 tonnes in 1995-96, with an yield of 44,953 kgs per ha. The number of Banana suckers per ha is 2,435 and the

district has in all 37.76 lakh banana plants. The pests - banana stem borer, and diseases - bunchy top of banana, banana leaf wilt, banana blight and Kole roga affect banana yield.

Mango

Mango is an important fruit crop providing Vitamin A and Vitamin C in large quantities. It can be cultivated in all areas with dry weather and moist climate. The productivity of mango crop increases if the crop is irrigated from June to October. June-July is the best season for planting mango. Red soils are the most suitable. The crop is not suitable for saline soils. The grafted mango crop begins to yield from 3 to 4 years of planting. Application of recommended dose of fertilizers, manures with proper weeding improves the crop yield. Rainfall coupled with cloudy weather is congenial for attack by leaf hoppers and powdery mildew.

In 1995-96, the area under mango was 2,650 ha producing 1,427 tonnes, with 61 fruit bearing trees per ha, each tree yielding 88 fruits. In all there are 16,157 trees in the district. Following modern horticulture methods, after 5 to 10 years, from each tree 50 to 500 fruits; after 11 to 20 years 500 to 1,500 fruits; and after 20 years, more than 1,500 fruits can be expected.

Among the pests, mango hopper, hispa, mealy bugs, leaf feeding weevil, stem borer and fruit borer are important. Among mango diseases, powdery mildew, leaf blight, fruit rot, loranthus parasite are prominent.

Pomegranate

This is an important crop traditionally being cultivated. The fruit with its cooling effect properties attract consumers. The fruit is used for preparing cool juice. The district produces 2500 tonnes of pomegranate. Good quality pomegranates can be grown in winter cool climates and summer hot weather. During fruit formation and ripening stages, the crop needs dry and hot weather. The crop withstands temperature even above 38 degrees celsius and can withstand any severe drought and can be cultivated on different types of soils. The plant can yield good quality fruits with adequate irrigation and irrigation also prevents splitting in Pomegranate. Among the seedless varieties, *Gujarath's Dolku*, *Karnataka's Basken seedless* and *South India's Papershell* are the major ones. Among the seeded varieties, *Ganesh*, *Sweet-1*, *Yerkada 1* and *Jyothi* varieties are popular. The crop is being propagated both vegetatively and through seeds. Kharif season is the most suitable period for planting. The plant starts bearing 4 to 5 years after planting and till then as the plant does not occupy full space, inter crops like cowpea, *dolichos lablab*, cabbage, peas, onion can be grown. The plant responds well to appropriate doses of manures. After the fourth year, each plant starts bearing around 20 to 25 fruits and this number goes on increasing. After ten years, each plant bears 200 to 250 fruits and the plants have an economic bearing till 25 to 30 years.

Sweet orange (Mosambi) and Orange

Usually sweet orange is cultivated in regions with varying temperature dry weather (with summer and winter), with irrigation facility. Usually sweet orange can be cultivated on all types of

soils. In deep black soils, drainage is essential to drain off excess water. The plants are planted at a distance of 6 to 8 meters depending on the soil fertility during June-July. Later plants need to be protected providing irrigation, weeding, plant protection, and removing sprouts below the stem portion. The plant starts bearing 4 to 5 years after planting. A ten year old tree bears upto 500 fruits harvested once a year.

In Bijapur district under irrigation *Nagpur Santhra* (orange) can be cultivated. The eye buds of *Nagpur Santhra* are bud grafted on to the root stocks of disease resistant varieties like *Rangapura Limbe* or Roughlemon. Even though orange can be cultivated on different types of soils, it requires well drained soils. The spacing recommended is 5 to 6 meters from plant to plant. The plant starts bearing fruits from 4 to 5 years after planting. A mid aged plant yields 800 to 1,000 fruits. The fruit is susceptible for canker disease through a bacteria which leaves yellow color spots, which turn white and grey later on. Sweet orange, orange, grapes and lime are all susceptible to canker. With proper prophylactic measures, this disease can be controlled.

Tomato

Tomato is a popular vegetable cultivated all through the year and requires well drained medium black soils and tank silt mixed sandy soils. The seeds are planted in Jan-Feb, June-July, Oct-Nov. During 1995-96, tomato was cultivated on 1,203 ha producing 14,631 tonnes yielding 6914 kgs per ha. *Pusa Ruby*, *Siyaks*, *NTR 1*, *Hybrid Karnataka*, *Roma*, *Arkasourabh* and *Arkavikas* are a few of the varieties. The crop should not be cultivated on soils after cultivating tomato, brinjal, potato, chillies and tobacco. Harvesting begins 10 to 12 weeks after planting and continues till 6 to 8 weeks, yielding 20 to 25 tonnes per ha. Among the pests, white fly, fruit borer, root borer, hopper are prominent, while among diseases, leaf spot, damping off of seedlings, leaf curl disease and fruit rot diseases are prominent.

Brinjal

Brinjal can be cultivated all through the year in all seasons. In Bijapur district, area under Brinjal is 1,310 ha producing 14,728 tonnes. The crop is rich in Vitamin A and Vitamin B. While it can be cultivated on all types of soils, well drained clayey soils are found to be good. The prominent varieties are *Pusa Kranthi*, *Malapura*, *Composite 1* and *2*, *Arka Navaneeth*. The crop requires 250 to 375 grams seeds, 25 tonnes of farm yard manure, 125 kg Nitrogen, 100 kg phosphorous and 50 kgs potash per ha. Seedlings from nursery are planted in 75 cms rows with proper weeding, irrigating once in 4 to 5 days. Prominent pests are stem borer, fruit borer, aphids, mites, stem cut worms. Prominent diseases are fruit rot, bacterial wilt and leaf spot. The Horticulture department periodically gives information on timely plant protection measures. The crop yields 38 to 50 tonnes per ha from high yielding varieties and 25 tonnes from other varieties.

Onion

Onion is an important commercial crop of Bijapur district and is also used as a spice. The crop comes up well on alluvial and sand mixed clayey soils with pH ranging from 5.8 to 6.5. The seeds

are selected from the rabi crop for cultivation all through the year. The recommended varieties are *bellary red*, *Pusa red*, *Arka pragathi*, *Arka Nikethan*, *Arka Kalyan*, *Bombay, N53*. In addition, the local varieties *Telagi red* and *Telagi white* are popular. For seed drill sown onion, 7.5 kgs to 10 kgs of seeds are required per ha, while for transplanted onions, 5 to 6 kg of seeds are required per ha. Other inputs are 30 tonnes of Farm Yard Manure, 125 Kgs Nitrogen, 50 Kg Phosphorous and 125 Kg Potash. For transplanting, nursery seedlings are planted in 15 cm rows with 7.5 cm spacing from plant to plant. The crop is irrigated once in 4 to 6 days in tune with the weather. Proper weeding, interculture and plant protection as and when required are crucial. Among pests thrips and cut worms, while among diseases smut and blast are prominent. When the leaves turn yellow, the crop is ready for harvest and yields 20 tonnes per ha. In 1994-95, the crop was cultivated on 10,054 ha producing 98,899 tonnes.

ANIMAL HUSBANDRY AND VETERINARY SERVICES

Provision of health care and services to livestock and increasing the production of milk, eggs, wool and meat are the major tasks of animal husbandry and veterinary services department. The district has 18.17 lakh livestock, 7 veterinary hospitals, 14 veterinary dispensaries, 81 primary veterinary clinics, 6 artificial insemination centers, 3 mobile veterinary clinics and in all 110 veterinary institutions. The epidemic and infectious diseases such as rinder pest disease, foot and mouth disease, *Hemorrhagic septicemia*, black quarter, sheep pox are being controlled by administering vaccines. The local cattle breeds such as Deoni, Krishna valley; Deccan breed of sheep, the Mudhol breed of dogs are all being developed. The details of the veterinary institutions, veterinary census and cattle fairs details are in tables 4.8 to 4.11.

Regional Poultry and Training Centre, Bijapur

Year	Chicks supplied to the farmers	Production of eggs	Production of Chicks	Trained persons
1987-88	6,293	-	-	344
1988-89	6,933	-	-	601
1989-90	5,573	-	-	339
1990-91	3,901	-	-	323
1991-92	1,412	-	-	451
1992-93	3,018	-	-	237
1993-94	2,305	-	-	178
1994-95	2,057	-	-	517

Sheep breeding centre, Anagawadi, Bijapur district, Deccan sheep breed.

Year	Total sheep	Total lambs	No. of sheep supplied	Production of Wool in kg	No. of sheep sold
1987-88	240	88	23	254	23
1988-89	227	91	56	213	56
1989-90	231	57	61	265	61
1990-91	252	184	45	257	45
1991-92	257	97	34	265	34
1992-93	235	70	34	250	34
1993-94	125	59	42	104	42
1994-95	213	18	42	230	42

Estimated quantity of milk produced and eggs laid.

Year	Estimated quantity of milk production in thousand tonnes	Estimated Egg production in lakhs.
1987-88	144.6	406.9
1988-89	153.7	428.7
1989-90	152.0	406.1
1990-91	153.1	415.8
1991-92	157.3	464.3
1992-93	115.2	483.1
1993-94	138.6	390.3
1994-95	151.2	394.1

Bijapur District

Table 4.8 : Detail of livestock census in Bijapur District from 1951 to 1997

	1951	1956	1961	1966	1972	1977	1983	1990	1997
Cattle	5,17,532 (42.32)	5,08,554 (43.58)	4,88,326 (39.02)	5,47,013 (38.2)	5,21,829 (33.72)	5,46,528 (34.15)	5,76,811 (30.66)	5,24,001 (27.85)	5,16,829 (23.17)
Buffaloes	1,82,830 (16.01)	1,90,794 (16.35)	2,02,339 (16.17)	2,109,795 (15.35)	2,27,786 (14.72)	2,40,841 (14.97)	2,56,421 (13.63)	3,07,194 (16.33)	3,49,002 (15.64)
Sheep	2,10,808 (18.46)	2,00,816 (17.21)	2,28,108 (19.03)	3,06,868 (21.43)	3,02,276 (19.53)	3,07,569 (19.11)	3,51,276 (18.52)	3,48,513 (18.52)	5,95,981 (26.71)
Goats	2,19,543 (19.23)	2,50,940 (21.50)	3,09,076 (24.69)	3,36,252 (24.48)	4,76,407 (30.78)	4,86,876 (30.26)	5,78,160 (30.73)	5,30,357 (28.24)	6,12,969 (27.48)
Pigs	-	6,705 (0.57)	3,472 (0.28)	13,882 (0.97)	12,628 (0.82)	17,833 (1.11)	15,819 (0.84)	26,703 (1.42)	48,334 (2.17)
Other livestock	11,151 (0.98)	9,216 (0.79)	7,234 (0.58)	8,139 (0.57)	6,711 (0.43)	6,406 (0.40)	1,02,919 (5.47)	1,09,279 (5.81)	1,07,814 (4.83)
Total livestock	11,41,864	11,67,025	12,51,546	14,32,003	15,47,637	16,09,053	18,81,406	18,81,406	2,30,926
Poultry	2,02,556	3,12,604	3,69,907	4,32,527	4,75,071	5,07,670	5,24,066	6,41,277	7,87,052

Figures in parenthesis show the per cent of total livestock

Source: Hand book on Veterinary care, Veterinary sciences and Veterinary health department

Table 4.9 : Talukwise Veterinary Health Centres in Bijapur District

Taluk	Veterinary hospitals	Veterinary Dispensaries	Primary Veterinary Centres	Mobile Veterinary Clinics	Artificial insemination center sub centers	Total
Badami	2	2	11	1	0	16
Bagalkot	1	0	10	1	0	12
B. Bagewadi	1	3	11	1	0	16
Bijapura	1	2	12	1	7	23
Hungund	1	4	16	1	0	22
Indi	1	3	15	1	10	20
Muddebihal	1	3	6	1	0	11
Mudhol	1	1	8	1	0	11
Bilgi	1	2	6	1	0	10
Sindgi	2	1	13	1	0	17
Jamkhandi	1	3	6	1	7	18
Total :	13	24	114	11	14	176

Table 4.10 : Livestock census in Bijapur district as per 1991 census.

Taluk	Exotic cows	Indigenous cows	Total cows	Buffaloes	Sheep	Goats	Pigs	Dogs	Other	Total	Poultry
Badami	633	56,364	56,997	28,949	68,805	47,191	1,143	7,579	617	2,11,281	51,712
Bagalkot	191	40,606	40,798	21,298	31,858	35,631	2,744	5,690	228	1,38,246	41,247
B.Bagevadi	228	50,122	50,350	26,459	24,419	27,841	2,404	10,697	418	1,42,588	74,693
Bijapur	769	60,236	61,005	34,162	60,011	72,453	2,909	14,856	650	2,46,046	98,950
Hungund	239	42,265	42,504	20,757	31,154	37,458	2,577	6,572	347	1,41,369	49,376
Indi	271	61,522	61,793	32,961	28,214	82,388	2,512	17,234	263	2,25,365	86,238
Muddebihal	141	45,242	45,383	21,343	22,017	40,420	2,237	8,426	370	1,40,196	59,879
Mudhol	904	36,356	37,260	32,319	25,935	30,324	730	6,855	1,356	1,34,777	29,437
Bilgi	233	31,027	31,260	18,842	20,419	31,840	182	4,099	31	1,06,673	35,600
Sindgi	24	52,999	53,023	23,187	14,907	55,636	2,422	12,498	369	1,62,042	77,963
Jamkhandi	1343	42,286	43,629	46,917	20,774	40,175	6,843	9,611	515	1,68,464	36,182
Total	4,976	5,19,025	5,24,001	3,07,194	3,48,513	5,01,357	26,703	1,04,115	5,164	18,17,047	6,41,277

Table 4.11 : Particulars about cattle fairs conducted in Bijapur

Fair name	Place	Hobli	Taluk	No. of day	No. of cattles in the fair	Nearest railway Station and its distance	Starting
Siddeshwara Babalad	Bijapur Babalad	Bijapur Bijapur	Bijapur Bijapur	10 5	12,000 3,00	Bijapur 35 mls from Bijapur	Sankranti Shivaratri
Shivayogi mandira	Shivayogi mandira	Badami	Badami	3	80	10 miles from Badami	Shivaratri Chair Suddha
Avarayi	Jamakhandi	Jamakhandi	Jamak handi	8	10000	34 mls from	
Kudchi Motagai Basave shwara: Magighatta Basappa Digambara swamy	prathama Bagalkot	Bagalkot	Bagalkot	5	4000	3 mls from Bagalkot	Magha suddha Pournima
Gurulinge Shwara	Kolhar	Bagevadi	Bagevadi	3	400	12 mls from Telgi	Magha suddha ashtami
Sangameshwara	Kalghatgi	Bagalkot	Bagalkot	2	500	5 mls from	Chaitra suddha shasti Pushya bahula amavasye Margashira Suddha
Revana Siddeshwara	Chada chana Horti	Chada chana Horti	Indi	2,700 6	18.5 mls from Indi 10,000	5 mls from Nimal Dashami	Chaitra trayodashi
Ramanavami	Mudhol	Mudhol	Mudhol	5	500 from	36 mls suddha Chickodi	

PISCICULTURE

Bijapur district has large and small irrigation tanks with a water spread area of 5,964 ha. and 1,228 ha. respectively, in addition to the Narayanpur reservoir with water spread area of 11,250 ha. forming a total water spread area of 18,442 ha. for inland fishery. The district has two fish fingerling multiplication center under the Fishery department. The Narayanpur fingerling multiplication center has 29 ha. of area with 503 small ponds, with the total water spread area of 12.34 ha. The Bhoothanal fish fingerling multiplication center has 0.84 ha. of waterspread area with 26 ponds. In 1996-97, in large tanks, 23.47 lakh fingerlings and in reservoir 44.16 lakh fingerlings were stored. The district has 6 ice production units preparing 36 tonnes of ice. There are 5 cold storage units with a capacity to store 24.5 tonnes in chilling condition.

The district has 22 inland fishery co-operative societies with 2,934 members. In order to promote co-operatives, plans are underway to subsidize and share investment. The details of fish production in the district are under :

Fish production (tonnes)	
1990-91	643
1991-92	967
1992-93	1,175
1993-94	1,274
1994-95	2,024
1995-96	2,448
1996-97	2,848

In the district, there are 4,072 fisherman of which 1965 are active fisherman. For fisherman under the housing scheme, 192 homes have been sanctioned, of which 104 homes will be constructed and eight borewells have been commissioned.