

## CHAPTER IV

### AGRICULTURE AND IRRIGATION

THE total geographical area of the district is reckoned at 39,29,947 acres. The total forest area, not available for agricultural purposes, in 1964-65 was 1,71,005 acres. The cultivable waste occupies an area of 92,488 acres. The net area sown, as per figures supplied by the District Agricultural Office was 31,29,243 acres in 1962-63. From these figures it is clear that the area available for cultivation is about three-fourths of the total area of the district. The types of soil found in the district are of shallow to medium black, deep black, red sandy loams, laterite and alluvial. Vast areas in parts of Gulbarga, Chittapur, Seram, Chincholi and Shorapur taluks are covered with soils which are black in colour, showing distinctive features for facilitating dry cultivation. In some places, the black soils are uniform in texture and in others, they are intermixed with patches of red soils. In the latter case, the red soils usually occur on elevated areas and the black soils at the lower plains or in the valleys.

The black soils found in Gulbarga district are also called regurs, black earths and black cotton soils. These are compared to the chernozems found in temperate zones and differ from them in the low content of organic matter and humus. The black soils are slaty black to dark brown in colour and contract to an unusual degree on drying. The black colour of these soils has been variously attributed to a black mineral, titanite magnetite, usually found associated with this type of soil. The black soils have originated from different parent materials, *viz.*, Deccan traps, Dharwar schists, limestones and granites under uniform soil-forming factors. They are rich in bases like lime and magnesium and have a high base exchange capacity (50 to 66 milli-equivalents per 100 grams of soil). They often contain lime concretions called "Kankar" and occasionally crystals of gypsum in the sub-soil. The presence of gypsum crystals tends to improve sub-soil drainage and prevents the rise of alkali salts to the soil surface. The black soils are usually clayey with a clay content ranging from 40 to 70 per cent. The water holding capacity of these soils is high, *viz.*, 60.57 per cent. Various theories have been put

forward concerning the origin of black soils from their parent rocks. Two important local factors are ascribed to their formation, *viz.*, the arid climate and the petrographical peculiarities of the parent rocks. The depth of the black soils differs in different localities. On the uplands, the soils are thin, light-coloured and poor. On the valleys and low-lying plains, the soils are deep extending upto 20 feet. The black soils are also classified into shallow, medium and deep, depending upon the depth of the soils and the drainage characteristics of the sub-soil for purposes of localisation for irrigation and cropping. Soil test values conducted in the district prove that the soils have a high concentration of soluble salts which are either critical for growth or for germination. The organic matter has a high concentration of alkalinity. The results of detailed soil tests all over the district indicate a strong tendency for the soils to develop alkalinity. Seventy-three per cent of the soils are alkaline. The salt content is normally low and reaches harmful concentrations only in about six per cent of the soils. The majority of the soils are low in phosphorous content. They are, however, well supplied with available potash except in about 11 per cent where they are low.

#### Geology and Soils

Gulbarga district contains soils derived from Deccan traps, Vindhyan formations, granites, gneisses and laterites. Ancient alluvial gravels and limestone formations, sometimes of considerable thickness, occur along the valleys of the Krishna and Bhima rivers. The predominant type of the soil in the district is the black soil derived chiefly from the Deccan traps. Medium to shallow black soils occur in the taluks of Gulbarga, Yadgir and Jevargi. The soils are clay to clay loams with lime nodules and concretionary trap stones found intermixed. Medium to deep black soils are found in Gulbarga, Aland, Afzalpur, Chincholi, Shahapur and Jevargi taluks. Heavy deep black clays occur in Chittapur and Seram taluks with a substratum of sheet limestone. Light red sandy soils occur in the southern and south-eastern taluks of the district such as Shahapur, Shorapur and Yadgir and in Aland and Afzalpur taluks. Often, the higher elevations in these taluks are occupied by the lighter, open-textured soils and the lower valley and plain portions are occupied by heavy black soils. The northern parts of Gulbarga and Chincholi taluks possess laterites and soils derived from laterites. There are narrow alluvial strips along the banks of the Bhima and Krishna rivers. Large patches of chalk occur in the southern and eastern portions of the district, *viz.*, Shorapur, Yadgir, Chincholi and a part of Shahapur. The following table indicates the soil types in the district:—

<i>Type of soil and characteristics</i>	<i>Place</i>	<i>Crops</i>
<b>1 Shallow to medium black soils.—</b>		
Grey to deep black in colour, clay to clay loams. Lime nodules present. High base content and water holding capacity.	Gulbarga, Yadgir and Jevargi.	Irrigated or rain-fed jowar, gram, safflower, cotton and linseed.
<b>2. Deep black soils.—</b>		
Deep black in colour with concretionary trap stones. Lime nodules present. High base status, clayey in texture.	Parts of Gulbarga, Chittapur, Seram, Chincholi and Shorapur taluks.	Irrigated or rain-fed jowar, cotton, wheat, pulses, gram, safflower, linseed and paddy.
<b>3. Red sandy loams.—</b>		
Red to pale brown in colour, shallow to medium deep, well leached, sandy to sandy loam in texture.	Parts of Yadgir, Shorapur, Aland and Afzalpur taluks.	Irrigated paddy, bananas, vegetables, rainfed jowar, cotton and pulses.
<b>4. Laterite soils.—</b>		
Bright red to pale red, sandy to sandy loam in texture. Poor in water-holding capacity and in bases.	Northern parts of Gulbarga and Chincholi taluks.	Irrigated paddy, chillies, onions and vegetables, rainfed jowar, millets, pulses and groundnuts.
<b>5. Alluvial soils.—</b>		
Clay to clay loams, rich in bases.	Banks of the Bhima and Krishna rivers in Yadgir and Shorapur taluks.	Irrigated or rain-fed chillies, jowar, cotton and pulses.

**Land  
Utilisation**

Out of a total area of 39,29,947 acres, 31,29,243 acres had been utilised for growing various crops during 1962-63. The following table indicates the extent to which land was used for farming in the various taluks of the district during that year :—

<i>Taluk</i>	<i>Geographi- cal area</i>	<i>Net area sown</i>
	(in acres)	(in acres)
Gulbarga .. ..	4,20,512	3,20,316
Chittapur .. ..	4,22,714	3,47,925
Yadgir .. ..	4,19,949	3,11,611
Shahapur .. ..	3,96,940	3,33,915
Shorapur .. ..	4,38,936	3,16,714
Jevargi .. ..	4,46,453	3,92,737
Afzalpur .. ..	3,20,248	2,83,541
Aland .. ..	4,27,567	3,56,643
Chincholi .. ..	3,82,648	2,64,171
Seram .. ..	2,53,980	2,01,670
<b>Total</b>	<b>39,29,947</b>	<b>31,29,243</b>

*Cultivable Waste Land.*—According to a survey conducted during 1962-63, there were in all 92,488 acres of cultivable waste land in the entire district. The details of the cultivable waste are indicated below :—

Gulbarga ..	10,280 acres
Chittapur ..	25,600 „
Yadgir ..	9,282 „
Shahapur ..	6,715 „
Shorapur ..	7,754 „
Jevargi ..	6,296 „
Aland ..	6,322 „
Afzalpur ..	4,437 „
Chincholi ..	14,699 „
Seram ..	1,103 „
<b>Total ..</b>	<b>92,488 acres</b>

The extent of cultivable waste is more in Chittapur, Gulbarga and Chincholi taluks and less in other taluks. Efforts are being made to reclaim these waste-lands as far as possible, to grow more

food grains. Some portions have been given to Lambanis and other backward communities for cultivation.

The climate of the district is pleasant and agreeable during the post-monsoon months and also in winter. The maximum and minimum temperature ordinarily is 105.1°F and 78.6°F, respectively. There are three distinct seasons, namely, the winter from the beginning of October to the end of January, summer from February to the end of June and rainy season upto the end of September. In the pre-monsoon months, *i.e.*, February to March, the temperature goes on rising and continues so till the end of May. The south-west monsoon sets in the second week of June. The average rainfall of the district is 28.17 inches or 715.5 millimetres. The rains in Gulbarga district are not evenly spread. As most of the soil is of black cotton type, rainfall is required occasionally or else the soils cannot retain enough moisture for rabi or *hingari* crops. Sometimes continuous rains make interculture of kharif crops impossible as weeds grow rapidly. Fields are ploughed up and exposed to the sun. It is of interest to note that rabi sowings are delayed due to rains. If there is sufficient moisture, the rabi crops come up very well. Generally, crops are harvested in the months of February to March. Most of the cultivated area is under dry-farming methods. Unassured and scanty rainfall is the main disadvantage for cultivators.

**Rainfall**

Due to the peculiar nature of rainfall and the character of the soil, considerable erosion of soil and loss of moisture are noticed in dry tracts. The problems posed in such an area relate to conservation of the soil and the protection of the moisture for periodical tillage operations. The contour bunds constructed on catchment basis at suitable distances from ridge to valley not only save the soil from erosion but also conserve moisture. Till the end of the Second Five-Year Plan, 5,081 acres of land were bunded at a cost of Rs. 1,49,711. During the Third Plan period, 10,000 acres of land were to be bunded at a cost of Rs. 6.38 lakhs. The maintenance of contour bunds in good condition is as important as their construction, if they are to serve the purpose for which they are constructed. The adoption of suitable dry farming practices in such bunded areas along with the maintenance of bunds go a long way in increasing agricultural production. Large areas which were once under cultivation have got into disuse due to the development of alkalinity and acidity. In order to reclaim such lands, a subsidy of Rs. 50 per acre was being given during the Third Plan period. Under this scheme it was expected to reclaim 2,000 acres of alkaline and acid soils by the end of the Third Plan period at an estimated cost of Rs. 1.16 lakhs.

**Soil Conservation**

**Agricultural  
Seasons**

There are two distinct seasons for farming practices in the Gulbarga district, *viz.*, kharif and rabi. The kharif season commences at the end of June when sowing is done. The sowing continues upto the middle of July. The kharif crops are harvested during September. The rabi season, which is very important for sowing rabi jowar, commences after the middle of September. The crops are harvested in January. The rabi season is particularly important for a majority of cultivators in the district because after the south-west monsoon showers, there is a noteworthy moisture retention which is considered good for jowar cultivation.

**Land-  
Holdings**

What constitutes an economic holding is different in different regions, according to the soil, crops and price of saleable produce. An economic holding is one which not only maintains an average family of a cultivator but is also sufficient enough in area to give him and his pair of bullocks maximum work. The Mysore Tenancy Agricultural Land Laws Committee Report (1958) gives the following details of land-holdings in respect of the Gulbarga district :—

<i>Category</i>	<i>Holdings</i>	<i>Area in acres</i>
Below five acres	.. 54,018	1,50,407
Five to ten acres	.. 49,866	3,67,679
10 to 15 acres	.. 33,697	4,13,615
15 to 30 acres	.. 47,280	9,98,045
30 to 45 acres	.. 16,191	5,83,697
45 to 60 acres	.. 6,368	3,27,529
60 to 75 acres	.. 2,963	1,95,084
75 to 100 acres	.. 2,300	1,95,469
100 to 150 acres	.. 1,444	1,71,625
150 to 200 acres	.. 325	54,280
200 to 300 acres	.. 174	41,907
300 to 500 acres	.. 88	32,039
500 to 1,000 acres	.. 37	25,290
Above 1,000 acres	.. 10	24,757

Thus in all, there were 2,14,761 holdings in the district during that year, (*i.e.*, 1958) covering an area of about 35.8 lakh acres. The distribution of land-holdings cannot be uniform because of the law of inheritance, where fragmentation cannot be avoided. It is significant from the table given above that large holdings of over a thousand acres are quite small in number and holdings below five acres are the most numerous.

## IRRIGATION

The present sources of irrigation in the district are wells, tanks and natural streams. The uncertainty of a well-distributed rainfall has highlighted the importance of artificial methods of irrigation. There are a number of tanks in the district but in most of them, the supply of water diminishes rapidly or fails entirely after the end of the rainy season. The net area irrigated in the entire district utilising the waters of tanks, Government canals, private canals, wells and other sources was 38,244 acres in 1963-64. A large portion of this acreage was irrigated by wells, covering a total area of 21,321 acres. A total of 16,271 acres was under tanks and the rest came under other sources of irrigation. There were in all 4,198 irrigation wells in the district. The following table indicates the extent of acreage under well irrigation arranged taluk-wise (1963-64):—

Gulbarga	..	3,554	acres
Chittapur	..	800	"
Yadgir	..	974	"
Shahapur	..	2,241	"
Shorapur	..	123	"
Jevargi	..	383	"
Afzalpur	..	2,397	"
Aland	..	10,074	"
Chincholi	..	332	"
Seram	..	443	"
<b>Total</b>	..	<b>21,321</b>	<b>"</b>

Water in these wells is found at a depth of 30 to 35 feet from the ground level and the wells have a diameter of 15 to 20 feet. There are no big wells anywhere in the district. Lift irrigation is quite popular in the area and the water is lifted by leather moats with a pulley attached. The well-to-do cultivators use oil engine pumps to lift water for irrigation.

Gulbarga district has a large number of tanks which serve as sources of irrigation. These tanks generally get their water supply by drainage from a catchment area. The size of the tank is dependent on its catchment area. According to figures furnished by the Revenue Department, in 1964-65, there were in all 210 tanks in the district with a command area of 16,271 acres. Out of this area under tank irrigation, Yadgir taluk alone accounted for 11,982 acres, the highest in the district. Shahapur taluk came next with 1,746 acres followed by Seram with 1,393 acres. Only 446 acres were irrigated by tanks in Chittapur taluk. The following is the

list of major tanks in the district with their atchkat areas in acres :—

Kaloor tank	..	125	acres
Nidagunda	..	121	"
Oora tank at Itgal	..	149	"
Oora tank at Mudhol	..	160	"
Rama tank	..	116	"
Nala Katwa	..	110	"
Hundarki tank	..	126	"
Boothpur tank	..	121	"
Amal Sani Cheru	..	154	"

#### Minor Tanks

The atchkat area of any minor tank has never exceeded 100 acres anywhere in the district. Among the more important minor tanks are the Papance tank at Miryan (59-39 acres), Itga large tank (71 acres), Nalwar tank (87-19 acres), Kallur tank (52-09 acres), Ramapurahalli tank (75-28 acres), Kardal Nala (35-22 acres), Upalwat tank in Chittapur (79-29 acres), Devi tank (70-00 acres), Parameshwar tank in Nadpalli (79-14 acres), Fareed Sagar (65-05 acres), Nalakunta (55-19 acres), Narasappa tank (84-17 acres), Gurdom Katwa (62-19 acres), Oora tank in Kodla (91-36 acres), Gaon tank (82-03 acres), Guchi Katwa (85 acres), Purna tank (78-30 acres) and Maya tank (96-37 acres). The Harsoor tank in Gulbarga taluk is a minor tank having a command area of 34-34 acres. All these minor tanks are found in Chincholi, Gulbarga and Chittapur taluks. Both the major and minor tanks are managed by the Revenue Department which lets out water for irrigation purposes under specified laws. Generally, the irrigation of fields is done by flow irrigation and where this is not feasible, lift irrigation is adopted by making use of leather moats.

*Irrigation Pump Sets.*—During 1960-61, there were 292 irrigation pump sets, covering 1,600 acres of land in the entire district. This number rose up to 1,240 during 1965, of which 25 were electrical pump sets and the rest were diesel oil pump sets.

#### Irrigation Wells

As in other districts, minor irrigation plays an important part in the Gulbarga district also. Several schemes under the successive Five-Year Plans are broadly divided into two categories. The first category consists of schemes which are intended to help individual persons, whereas the second category aims at benefiting several cultivators collectively. Sinking of irrigation wells is an important item of work under minor irrigation, particularly in a dry district like Gulbarga, where major irrigation projects have yet to be taken up for utilising the river waters. During the period from 1960 to 1965, 3,950 irrigation wells were sanctioned for this district of which nearly 1,500 wells had been actually completed irrigating an area of about 4,150 acres and 1,530 more wells were



in different stages of progress as at the end of 1965. The cultivators are given financial assistance to the extent of Rs. 3,000 per well, out of which a sum of Rs. 500 is treated as subsidy and the balance as loan. The second scheme under minor irrigation is well-boring. At present, well-boring activities are confined to drinking water wells and these are executed by the Public Works Department. In view of the limited number of men and materials available in the Public Works Department, it is not in a position to extend its facilities for irrigation purposes. Hence it is proposed to launch a scheme under the Agricultural Engineering Section to help the cultivators in putting up test-bores for digging irrigation wells, to augment the water supply of the existing wells by deepening the wells and also to sink new bore-wells for irrigation purposes. The scheme of supplying electric pump sets on hire-purchase system which was started during the Second Plan period was continued during the Third Plan also so as to extend irrigation facilities to the farmers. It had been proposed under the Third Plan to supply power to 150 irrigation pump sets at a cost of rupees seven lakhs of which 76 pump sets had already been supplied with power till October, 1965. As it has not been possible to supply electricity to many places, it is proposed to continue the supply of diesel oil pumps on hire-purchase basis.

Several other minor irrigation schemes such as construction of storage tanks, percolation tanks, anicuts, pick-ups and bandharas all aimed at benefiting the farmers collectively, were taken up under the Third Plan programme, in various parts of the district. Of these, 45 anicuts and 11 tank-works were in various stages of progress during the year 1965-66. The following statement indicates the number of works in progress in each of the taluks and the area that is expected to be irrigated :—

<i>Name of Taluk</i>	<i>Anicut works</i>	<i>Tank works</i>	<i>Area to be benefited</i> (in acres)
Gulbarga ..	7	2	1,156
Aland ..	2	2	1,253
Afzalpur ..	13	..	805
Chittapur ..	3	..	235
Seram ..	9	3	2,469
Chincholi ..	3	3	1,214
Shorapur ..	5	..	534
Yadgir ..	2	..	70
Jevargi ..	1	1	690
<b>Total ..</b>	<b>45</b>	<b>11</b>	<b>8,426</b>

**Major  
Irrigation  
Schemes**

There are some important rivers flowing in the Gulbarga district, which when fully harnessed will, no doubt, change the face of the district and make it prosperous. The important rivers in the district are the Krishna, Bhima, Kagna, Amerja, Bennithora, Bori and Mullamari. The Hattikuni stream in Yadgir taluk has already been harnessed and the work is in progress by stages. The scheme which is under way is the construction of a reservoir across the Hattikuni stream. When completed, the storage in the reservoir will command an area of 5,300 acres. Several major and medium irrigation schemes are under contemplation.

**Upper  
Krishna  
Project**

The Upper Krishna Project, which is a major irrigational venture in the State, proposes to harness the waters of the river Krishna to irrigate large areas in Gulbarga district. This mighty undertaking envisages the construction of two storage reservoirs on the river, one at Almatti in Bagewadi taluk of Bijapur district and the other at Siddapur in Muddebihal taluk of the same district.

The river Krishna has a total drainage area of about 97,000 square miles, out of which about 45,000 square miles lie in Mysore State. In order to harness the irrigational potentialities of this mighty water resource for the benefit of extensive areas in Bijapur, Raichur and Gulbarga districts, the Upper Krishna Project was first mooted in 1960. The project was further examined in 1963. Originally, the second storage dam site was decided to be constructed at Narayanpur in Gulbarga district. But later inspections and technical scrutiny gave rise to a change in the location. It was decided to locate the second storage dam at Siddapur about four miles upstream from Narayanpur. This new dam site lies in Bijapur district, but the benefits will accrue to the cultivators in Gulbarga district. Preliminary works connected with the project are under way.

*Chandrapalli Project.*—This project envisages the construction of an earthen dam across the Sarnalla stream which is a tributary of the Mullamari river near Chandrapalli village in Chincholi taluk. The impounding capacity of the reservoir is 767 MC ft. With the right and the left bank canals of six and a half and seven miles in length, respectively, it is proposed to irrigate an area of 12,500 acres in Chincholi taluk. Work on this project is in progress.

*Bhima River Schemes.*—Two major schemes are contemplated in the district to harness the water potential of the Bhima river. These are: (1) the Bhima irrigation scheme and (2) the Bhima lift irrigation scheme. In the Bhima irrigation scheme, it is proposed to construct a reservoir across the Bhima river near Thangadgi village in Shahapur taluk. The catchment area at the dam site has been worked out with a yield of 556 TMC feet. Two

canals, one on each bank, will irrigate one lakh acres in Gulbarga district. The Bhima lift irrigation scheme envisages the construction of a storage reservoir across the Bhima river near Afzalpur to lift water by means of pumps, jack well and rising mains to irrigate another one lakh acres.

*Amerja River Project.*—The Amerja river project envisages the construction of a dam across the Amerja river near Sangulgi village in Aland taluk. The catchment area is about 205 square miles at the dam site. Canals will be constructed on both the banks to irrigate an area of 15,500 acres.

*Bennithora Project.*—There is a proposal to construct three irrigation works across the Bennithora river and its tributaries to bring under irrigation a total area of 72,800 acres. The first site is situated across the river near Savalgi village in Aland taluk. The catchment area at the dam site is 462 square miles. Two canals to be taken out from the reservoir will irrigate an area of 30,000 acres. The second site is situated across the Gandori stream which is a tributary of the Bennithora river near Ambalga village in Gulbarga taluk. The catchment area at the site is about 100 square miles. The canal on the left bank will irrigate 12,800 acres. The third and the last is located across the Bennithora river near Kansur village in Chittapur taluk. Two canals to be taken out will irrigate an area of 30,000 acres.

*Mullamari Project.*—The Mullamari river project contemplates the construction of a reservoir across the Mullamari river near Karakmukki village in Chincholi taluk. The catchment area at the reservoir site is 325 square miles. A right bank canal has been envisaged to bring under irrigation an area of 24,200 acres.

*Mudhol Project.*—This project as now contemplated envisages the construction of an earthen dam across the Mudhol stream — a tributary to the Kagna river at a site near Rajoli Khurd village in Seram taluk. The canal on the left flank will irrigate an area of about 1,400 acres of seasonal crops in Seram taluk.

*Kagna Project.*—This project envisages the construction of a diversion work across the river Kagna near Yadhalli village in Seram taluk. The right and left bank canals will irrigate an area of 20,000 acres of seasonal crops in Seram and Chittapur taluks.

*Indankal Tank Project.*—This scheme, as envisaged now, comprises an earthen dam across the Muchkula nala, a tributary of Kagna river at a site near Indankal village in Chittapur taluk. The scheme is likely to benefit an area of 4,400 acres in Chittapur taluk.

## Forestry

It was in 1867 that the Forest Department was created in Hyderabad State. Till 1912, this department was under the management of non-technical men. During the first two decades after 1867, some of the valuable forest species were declared as reserved trees and the work of the department was confined to protecting the species under the control of the revenue authorities. During 1900-1901, a Forest Act was promulgated with the main object of developing the forest wealth. After 1912, the department was reorganised and staffed with trained technical personnel. The jurisdiction of the present Gulbarga Forest Division includes Bidar district also. Forest areas in Gulbarga district are found in Gulbarga, Yadgir, Shahapur, Chincholi and Seram taluks. Some taluks like Afzalpur and Jevargi have no forests at all. Due to working plan operations some area in Aland taluk has been afforested in recent years. According to the statistics furnished by the Divisional Forest Officer, the extent of forests in each taluk in 1964-65 was as given below :—

<i>Taluk</i>	<i>Areas</i>
Gulbarga .. ..	12,255
Chittapur .. ..	6,623
Yadgir .. ..	57,549
Shahapur .. ..	4,799
Shorapur .. ..	13,430
Jevargi .. ..	..
Afzalpur .. ..	..
Aland .. ..	4,326
Chincholi .. ..	70,087
Seram .. ..	1,936
Total .. ..	1,71,005

The percentage of forests to the total geographical area works out roughly to about four per cent in the district. The National Forest Policy stipulates that at least  $33 \frac{1}{3}$  per cent of the land area should be under forests. The percentage of Gulbarga falls very short of this minimum. There are some fairly large tracts of barren area in charge of the Revenue Department under revenue waste and *gairanas* (grazing land). If these areas are afforested according to a phased programme, the percentage of forests may be increased. The rainfall in the area is very low, varying between 20 to 30 inches. The heavy exploitations in the past have made the area barren resulting in heavy denudations exposing the rock below. The first step towards improving these conditions would be to stop the soil erosion by means of contour trenching and afforestation. If this is done systematically and regularly and the land covered with some vegetation, grass would grow in the areas thus improving the grazing position and raising the water level.

The forests in the district are dry, tropical thorny forests which are in a depleted condition because of heavy fellings and

unscientific management in the past. During the last eight or nine years, a systematic working plan was drawn up and the implementation of this policy has shown some improvement. The main forest trees are the teak, satin, tirman, mhowa, sundra, dindal and bijasal. The forests are divided into three categories, *viz.*, the mixed teak forest, mixed firewood forest and the dry scrub forest. The mixed teak is a typical tropical dry, deciduous teak covering an area of about 15,000 acres. The teak compares well with the all-India quality. The main teak forests are found mostly in Chincholi range. The mixed fuel forests are the tropical, deciduous forests without teak, yielding mostly firewood with an occasional sandalwood. The main species are satin, sundra, tugli and a little of anjan. These are found in several taluks of the district. The dry scrub forests are rocky forests with thorny scrub with stunted tree growth. These forests yield minor forest produce. The major forest produce comprises constructional timber of pole size and also of firewood. Sandalwood which formed a major forest produce before 1948 was fully exploited. The crop that was left after exploitation is quite young and it will take some time before sandalwood is exploited as a major forest produce. The main tree species which yield timber are teak, satin and tirman. The main forest products are beedi leaves, mohwa flowers, gule rousa grass, fodder grasses, bhilawan, soapnut seethapal, gum, honey, wax and fruits. The revenue realised from the Gulbarga Forest Division during 1960-65 is given below\* :

<i>Year</i>	<i>Revenue</i>		
		Rs.	
1960-61	..	4,07,506-69	These figures include revenues from the forests of Raichur and Bidar districts also.
1961-62	..	4,06,615-74	
1962-63	..	3,45,137-18	These figures include revenues from the forests of Bidar district also.
1963-64	..	3,36,802-06	
1964-65	..	3,13,918-35	

Roughly, about fifty per cent of the revenue is realised from the sale of timber and firewood, while the rest comes from minor forest produce. The timber and fuel forests are worked under a systematic working plan. This plan is drawn up by

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\*Till the end of March 1961 the Gulbarga Forest Division included the forests of Bidar and Raichur districts as well. After 31st March 1961 the Raichur district forests were separated from the Gulbarga Division. The Bidar district forests, however, continue to be under the Gulbarga Forest Division.

experienced technical personnel and the Chief Conservator of Forests. The Inspector-General of Forests, Government of India, finalises the policy to be pursued. The working plan prescriptions vary with the actual requirements noticed from time to time. Some experiments are being carried out locally to improve the quality of tanning bark species, medicinal plants and the like. On the strength of the achievements of research, further developments are likely to take place. In course of time, forestry in the district would be put on a sure foundation. There is large scope for lac industry, and for improvements in tanning products. The prescriptions of the working plan are being implemented regularly and the results show that there is a sustained supply of timber and firewood in the district. The existing stock is also likely to improve in quality in the coming years. From the year 1962, the 'Rab' system has been introduced in the coupes worked in the previous years. Under this system, the fallen debris—i.e., the unwanted stuff left by the contractors—is collected in patches of 33' × 33' or multiples thereof and burnt and this area known as the 'Rab' is stacked and planted with teak stumps.

During the Second Plan period, a total area of 2,819 acres of new forest plantations was raised. There were several schemes under way in Third Plan period. Under the pasture improvement scheme, some improvements were being effected in grazing areas. Cashew, being an important commercial crop, a well thought out scheme for developing cashew plantations is being implemented in the district. The plantation of this species is proposed to be raised on an extensive scale. Under the forest consolidation scheme, district forest un-reserves which were managed by the Revenue Department were to be handed over to the Forest Department.

There are no research centres or forest schools in Gulbarga. In the adjoining district of Bidar, the Forest Department has raised a demonstration plot near the District Offices, where the hill slopes are contour-trenched and afforested with firewood and timber. This plot is serving as a pilot demonstration centre for the public. The forest staff in the district consists of rangers, foresters and guards. The higher officers and the rangers are trained at Dehra Dun and Coimbatore, respectively. The foresters who work in the district are trained at Dandeli in North Kanara district, while the guards get their training in Bidar and Kushalnagar in Coorg district.

The following table indicates the acreages under different Principal principal crops in Gulbarga district, during the year 1963-64 :— crops

Paddy	..	..	58,990	acres
Kharif Jowar	..	..	2,27,389	„
Rabi Jowar	..	..	13,17,964	„
Bajra	..	..	2,51,501	„
Maize	..	..	580	„
Ragi	..	..	8,946	„
Wheat	..	..	57,811	„
Barley	..	..	461	„
Gram	..	..	56,354	„
Other millets	..	..	1,39,717	„
Tur Dhal	..	..	2,47,158	„
Cotton	..	..	1,81,111	„
Groundnut	..	..	2,04,482	„
Sesamum	..	..	36,815	„
Mustard	..	..	537	„
Linseed	..	..	42,811	„
Castor	..	..	1,066	„
Onions	..	..	1,863	„
Chillies	..	..	24,205	„

It is relevant at this stage to give the figures of actual production as furnished by the District Agricultural Office. The figures relate to the year 1962-63 :—

Paddy	..	..	8,858	tons
Kharif Jowar	..	..	23,210	„
Rabi Jowar	..	..	1,62,462	„
Wheat	..	..	5,998	„
Bajra	..	..	11,968	„
Barley	..	..	85	„
Maize	..	..	48	„
Ragi	..	..	1,928	„
Green Gram	..	..	5,886	„
Tur Dhal	..	..	25,870	„
Black Gram	..	..	3,063	„
Horse Gram	..	..	993	„
Sugarcane	..	..	2,972	„
Groundnut	..	..	57,908	„
Cotton	..	..	13,034	„
Linseed	..	..	4,147	„
Castor	..	..	109	„
Tobacco	..	..	197	„
Chillies	..	..	1,589	„
Sesamum	..	..	2,847	„
Little Millets	..	..	1,912	„
Other Millets	..	..	3,466	„
Turmeric	..	..	79	„

**Modes of  
Cultivation**

The farming practice prevalent among the cultivators in Gulbarga district is based on tradition. This time-honoured tradition has not much changed; however, scientific methods of agriculture are becoming popular among the well-to-do agriculturists. The general practice that is being followed in the district is to grow only one crop in a year. The usual rotations that are common are kharif jowar, tur and groundnut with rabi jowar at the end. Paddy is usually rotated with gram. Mixed cropping is also common. Various pulses, oil seeds and fibre plants are generally grown as mixed crops, *e.g.*, kharif jowar and groundnut tur and groundnut, kharif jowar and tur, safflower and Deccan hemp with rabi jowar. The traditional methods like bunding, carting farm yard manure and using leguminous crops in rotation are adopted with a view to increasing the fertility of the soil. The use of synthetic manure is on the increase.

After the harvest of rabi crops, the land is ploughed only after examining whether the field has any moisture and whether it is soft enough for using the plough. Otherwise, the cultivator waits for some casual rains and, if the expected precipitation occurs, he then ploughs the field and harrows it once or twice. Then, farm-yard manure is applied to the soil. This is usually done once in three to four years. After these preparations, kharif crops are generally sown only after good rains are received in the second or third week of June. The sowings are continued upto the middle of July. Kharif crops are harvested in the month of October, with the exception of tur which is harvested in December. There are some crops which are harvested earlier like mung dhal (green gram) and some varieties of groundnut. Irrigated paddy is transplanted usually in August as the tanks become full only at that time.

Rabi lands are harrowed at least two to three times during the monsoon months. The rabi sowings start generally from the month of October and the crops are harvested in the month of March and completed by the end of April. In some places in the district, double crops are also raised in a year, particularly paddy under tank beds. The mode of cultivation of important crops in the district is discussed in the following paragraphs :—

**Jowar**

Jowar (*Sorghum vulgare*)—*Jola*—is the most important cereal and at the same time the largest and most widely grown crop in Gulbarga district, having 15,45,353 acres under both kharif and rabi sowings (1963-64). The cultivation of jowar is carried on in



all the taluks of the district, the extent of acreage being as follows (1962-63) :—

<i>Taluk</i>	<i>Kharif</i> ( <i>in acres</i> )	<i>Rabi</i>
Gulbarga .. ..	6,126	1,66,526
Chittapur .. ..	11,331	1,84,241
Yadgir .. ..	18,420	1,08,994
Shahapur .. ..	34,264	1,34,265
Shorapur .. ..	67,834	86,693
Jevargi .. ..	21,627	2,19,914
Afzalpur .. ..	..	1,58,425
Aland .. ..	832	1,67,448
Chincholi .. ..	10,947	84,498
Seram .. ..	3,145	98,985

Out of a total of 31,29,243 acres sown with food and other crops in the district, the jowar acreage alone is nearly half of the cropped area. As a food crop, it is better than rice, as the grain contains more proteins, while it also has more starch than wheat. The grain is chiefly used for preparing unleavened cakes, which form the principal food of the people. Jowar is equally important for fodder and it is perhaps no exaggeration to say that of all the plants yielding fodder, jowar probably stands first in being capable, under a great variety of conditions, of producing a very large quantity of palatable fodder in a minimum of time. The distribution of the crop is regulated by the amount and distribution of rainfall, but the depth and character of the soil play an equally important part. In parts of Gulbarga where the soils are shallow, jowar gives place to bajra. Jowar is essentially a crop of deep and heavier soils, while the best results are obtained in places with an average rainfall of 25 to 40 inches. Various pulses, oil seeds and fibre plants are generally grown mixed with kharif jowar. The best jowar is grown on black soil, sometimes in rotation with cotton, but the crop does particularly well on the deep alluvial soils. The kharif jowar in Gulbarga district is generally sown in June as soon as the land is sufficiently moistened. The crop matures in four-and-half months but when grown for fodder alone, it is cut in three months. Rabi jowar which occupies a prominent place in Gulbarga, is sown with drill in September or October and is harvested in February or March. The success of this crop depends upon a deep moisture-retaining soil and late rainfall.

The best varieties of jowar are grown extensively in the district besides improved varieties like Baswan moti, Chittapur white etc. The average yield of jowar per acre comes to about 500 lbs. for the kharif dry and 550 lbs. for the rabi crop. Under proper irrigation, the yield comes to about 1,500 to 2,000 lbs. per acre.

The average yield of fodder per acre in addition to the grain comes to about 1,700 lbs. The normal proportion of grain to fodder is about 1 to 2.5. The improved varieties of jowar which are quite popular in the district are the P. J4. R., which is a selection from Parbhani in Maharashtra State and M. 35-I (rabi), also a selection from Mohol Farm in Maharashtra State. The P. J4. R. variety is sown during September-October and harvested after 120 to 130 days and yields about 900 to 1,100 lbs. The sowing period of M. 35-1 variety is also the same; but it is most suitable for drought conditions. These improved varieties are adaptable to a variety of soils and are drought-resistant.

*Cultivation.*—Gulbarga district is a tract that has scanty and uncertain rainfall. As the rainfall is very ill-distributed, the conservation of moisture is of paramount importance. As a result of these handicaps, dry farming practices are prevalent in the entire area as per the results of research undertaken on the Government Agricultural Farm, Raichur, and the Agricultural Research Station, Hagari, in Bellary district. The jowar fields get a preparatory tillage before the actual sowings commence. For jowar fields, contour bunding and contour cultivation become necessary so as to prevent soil erosion. In the medium deep and deep black cotton soils, a thorough deep ploughing once in three years is resorted to. This method of deep ploughing brings lower soil to the surface and facilitates the eradication of deep rooted perennial weeds like *hariyali*. Immediately after the harvest, if conditions permit, the plots are ploughed by a light plough crosswise and the field is then allowed to remain in the sun for drying, during summer months. After the summer showers, the clods in the field crumble down. At this stage, the field is harrowed thoroughly. In order to conserve soil moisture and to keep off the weeds, the fields are harrowed after each shower. After the ploughing and harrowing, five to six cart-loads of farm-yard manure or compost per acre are evenly spread and mixed into the soil by means of harrowing. In Gulbarga district, the fertiliser dose recommended is 12 lbs of N and 8 lbs. of P<sub>2</sub>O<sub>5</sub> per acre with the usual farm-yard manure dosage. This manurial application is made just three to four weeks before the actual sowing and mixed into the soil by means of harrowing. Under irrigated conditions, double the manurial dose is recommended. The recommended variety of jowar for Gulbarga area is M. 35-I which is a rabi variety. This is a drought-resistant variety which has a loose type of earhead with bold pearly white grains. This variety which is very popular throughout the district matures within four months and yields on an average 500 lbs. per acre, apart from 1,500 to 2,000 lbs. of straw which is a bit hard. Besides, there is another variety, M. 47-3, which is a further improvement on M. 35-I, the straw of which is soft and palatable and which yields earlier than M. 35-1.

In kharif, the D. 340 variety is recommended. It is a selection from Pulmadi evolved in the Dhadesugur farm in Raichur district. The grain of this jowar is pale white and the fodder is sweet and juicy. The yield is about 1,000 to 1,200 lbs. per acre under rainfed conditions.

The time of sowing varies from tract to tract depending on the distribution of rainfall. The cultivators in Gulbarga district start sowing earlier in light soils than in black soil. The seed rate per acre also varies from place to place. It is very important to regulate the distribution of seed in the line. Large gap or over-crowding reduces the yield considerably. As a measure of precaution, the seed distribution is done by skilled persons who see to it that the seed is sown uniformly, methodically and carefully. Sowing is carried out with a three or four-coultered drill. A gap of 12 inches is allowed between two plants in the line. Wherever possible, dibbling is adopted to get ten to fifteen per cent more yield. The spacings of jowar in Gulbarga are 15 inches to 18 inches and if dibbling is done, the spacings are exceeded by another three inches. Ordinarily four to five seeds are dibbled at each spot. The seeds are dibbled in a circular way at each spot and later, weak seedlings are taken out, keeping one or two healthy seedlings at a spot.

In order to get a good jowar crop, improved manurial application is practised widely in the area. Jowar being a fibrous rooted plant, it responds well to manuring. About five cart-loads of farm-yard manure or compost are applied per acre. As it is difficult to get enough manure to cover all the area, manuring is done by rotation. The soils in Gulbarga being deficient both in nitrogen and phosphorus, plant nutrients applied in proper quantities increase the yield. For kharif jowar, fertilizers are applied in two doses, first at the time of sowing and the second about one to one and a half months later. For rabi sowings, the fertilizer is applied only at the sowing time. For irrigated jowar, it is applied in two doses. The fertilizer is placed one inch to one and a half inches deep in the soil and three inches to four inches away from the crop line where the roots are concentrated. Immediately after top-dressing, inter-cultivation is carried out with the blade-hoe so as to cover the furrows opened by the top-dressing implement.

*Threshing.*—For threshing jowar earheads, stone rollers are used in this region. This helps by way of saving time and also labour. About 5,000 lbs. of earheads can be threshed by stone rollers employing two men and two bullocks in three hours. If the threshing is done by treading under the feet of the bullocks, more time is required.

*Insect Pests of Jowar.*—Agricultural crops, as they are being raised in the fields, are liable to be damaged by insect pests. As

a result of these attacks, the yield may be reduced considerably. The major insect pests of jowar are (1) the jowar stem-borer, (2) the army worm, (3) the Deccan wingless grasshopper, (4) the surface grasshopper, (5) jowar shoot bug, (6) jowar stem fly and (7) mites. The stem borer caterpillar is half to three-fourth inch long with a dark brown head. It is found inside the affected stems. The caterpillar bores into the growing stem from the top downwards and causes the drying of the central shoot. Such dried shoots are popularly called dead hearts. The drying of the plant is later accompanied by reddening of stems. The activity of the pest is visible in the field from July to December on kharif jowar and November to February on rabi jowar. In the early stages of infestation, the affected plants are pulled out with the caterpillars and promptly destroyed. Chemical measures have not yet proved effective in checking this pest. The army worm has a life cycle of five to six weeks. This pest is active on the jowar crop from June to October. It is observed that when a long dry spell follows a good start of monsoon, this pest assumes an epidemic form. If there are heavy rains, the activity of the pest is much reduced. If the attack is located, the caterpillars are collected and destroyed. Recently, insecticidal measures have been found effective.

The Deccan wingless grasshopper which is considered as the worst enemy of a robust jowar plant attacks it from June to December. These insects have only one generation in a year. The cultivators are quite familiar with the mode of controlling this infestation. The egg masses are destroyed by ploughing and harrowing the affected fields, especially along the bunds soon after the harvest. The surface grasshoppers are the same as the Deccan wingless grasshopper. The jowar leaf and shoot bugs are active in the field from July to October on kharif jowar and during November to February on rabi crops. The pest completes a number of generations during the season and builds up a sizable population. It shows a tendency to subside if heavy rains occur during the kharif season. The pest is easily controlled by spraying insecticides. The jowar stem fly attacks young seedlings in large numbers. The infested plants show dead hearts in the early stages. The pest is active from July to September on kharif jowar and November to December on rabi jowar. In order to control this infestation, the seed rate is increased to make up the loss. The jowar mites generally feed on the underside of leaves. The infested leaves turn red and get gradually straw-coloured. In cases of heavy attack, the leaves and stalks get dried up. The affected area is treated with sulphur and thereby the infestation is reduced.

The common diseases of the jowar crop are the grain smut, loose smut, head smut, long smut, rust, red leaf spot, downy mildew, sugary disease, striga and hollow stem. Since the majority of diseases are seed borne, it is effectively controlled by

pre-treatment of seeds with sulphur. The infected leaves are collected and destroyed.

Paddy (*Oryza sativa*)—*Bhatta*—is grown in all the taluks of Paddy the district to a greater or lesser degree. The area under paddy in the entire district in 1963-64 was 58,990 acres.

The popular varieties of paddy usually grown in the district are the H.R. 35 and H.R. 19 which are selections from *Kichidi Sanna* and *Amritsari*. The H.R. 35 is rabi variety with late maturing. This is harvested after 170 to 180 days of sowing. The rice from this paddy is fine and takes a good polish. This variety is grown in rich soils, yielding 3,500 to 4,000 lbs. per acre. The H.R. 19 variety is a medium selection from the *Amritsari* variety grown in the Punjab. This is harvested after 120 to 130 days. The H.R. 19 variety is very popular in Gulbarga and Yadgir taluks, yielding 2,500 to 3,000 lbs. per acre. In addition to these improved varieties, the cultivators in Gulbarga also grow coarse and very coarse varieties of paddy, which are locally called Tekusanna, Mota, Konamani, Ramasagar, Akati, Kusuma, Masral, Kaladhan, Gutkal, Garkal and Deshi Mota. All these varieties are grown both as Abi and Tabi crops. (Abi is the autumn or monsoon crop and Tabi is the summer crop). The proportion between Abi and Tabi is four to one. Some of these coarse and very coarse varieties of paddy yield early and some yield late. The early varieties ripen in 90 to 120 days and the late varieties in 120 to 180 days. As a food grain, rice is not equal either to jowar or bajra, as it is starchy and somewhat deficient in fat and proteins. These deficiencies give it, however, excellent keeping quality in hot, humid climate. As a fodder crop also, it is far inferior to jowar both in quality and quantity of the straw. The seed rate of paddy in Gulbarga is 80 lbs. per acre if broadcasted and 42 to 50 lbs. if transplanted.

Paddy freely responds to manuring. For successful cultivation, a good and constant supply of water is absolutely essential. This is best secured by having level plots with proper embankments. This levelling is brought about by a very skilful and elaborate process of terracing according to the contour of the land. This method of terracing the paddy fields prevents scouring and enables the small plots to hold evenly fair depths of water all over the field. As paddy thrives in damp soil, abundant water is required for irrigation. Most of the irrigated paddy fields in the district are fed by tank water. The Chemistry Division of the Agricultural Department has conducted valuable investigation bearing on the aspects of the optimum soil conditions for paddy growing and the manurial requirements under different conditions for improvement of crop yields. In fact, along with the development of high yielding varieties, the application of manures to the paddy crop as a direct means of enhancing the crop yields has been

one of the more important lines of work. As is well known, paddy is a crop which thrives in the warm humid climate of the tropics under abundant rainfall or irrigation facilities. In Gulbarga, as explained already, a considerable part of the acreage under paddy is irrigated. The paddy crop is semi-aquatic in nature; it is necessary to make a special study of the soil conditions and behaviour of the plant. Paddy is grown under a variety of soil and climatic conditions and the major deciding factor is the availability of a continuous supply of water throughout the life period of the crop. The trap soils found in Gulbarga are best suited to paddy growth. The mixed red and black soil in some areas also affords opportunities for paddy cultivation.

*Cultivation.*—The method of paddy cultivation varies in certain respects from one tract to another due to various soil types, rainfall and seasonal conditions obtaining in that particular area. The lands are terraced and bunded to facilitate impounding and to maintain equal distribution of water all over the plot. Each such plot is provided with an outlet to allow excess water to flow away. The size of the plot varies from a few guntas to about  $\frac{1}{4}$ th of an acre depending on the situation of the plot, topography and gradient. These terraces are fed by water coming from the high lands. The soils on high lands are poor and less retentive of moisture. Generally, such lands do not have tank irrigation facilities and so, the early yielding varieties are grown. In low lands, there is always water for a longer period and the soils are also retentive. So the late varieties are grown in such lands. Ploughing of paddy fields is done soon after the harvest, except in the low-lying areas where it is done after a month when the soils become workable. Ploughing is done early with a view to facilitating the subsequent operations quickly. Otherwise soils would go hard and cannot be ploughed until sufficient rains are received. Ploughing in Gulbarga is done by using the traditional wooden plough. In recent years, light iron ploughs are gaining popularity. The wooden ploughs open the furrows to a depth of three inches to four inches. As this method is found to be deficient in turning over the soil completely, iron ploughs are being preferred. After ploughing, the clods are crushed. The uneven patches in the plots are levelled by means of indigenous levellers or by hand tools. This operation is very important as otherwise the spread of water would be uneven.

*Manuring.*—After the land is prepared, well-rotted farm-yard manure, at the rate of about five cart-loads per acre, is applied according to availability. This is spread by the basket method and then harrowed so as to ensure a uniform mixture of the manure with the soil. Green leaves are trampled in between the rows. The recent researches in the field of green manure have been brought home to the cultivators and they now realise the need for these manures to get a good crop. In order to meet the shortage of

organic manures, wide application of green manure leaves is suggested. The quantity of green manure applied usually varies from 4,000 to 8,000 lbs. per acre. Application of inorganic manures like nitrogenous fertilisers and phosphatic fertilisers in addition to organic manures is also being practised.

*Transplanting.*—In order to obtain better yields, the cultivators have recourse to transplantation. In this method, the field is ploughed after the harvest of the previous crop. The clods are crushed in the seed-bed by using the wooden hammer or wooden plank. Farm-yard manure is then applied to the seed-bed at the rate of about ten cart-loads per acre. Three to four guntas of paddy land are required for raising seedlings for transplanting an acre. Nearly 40 lbs. of seeds are required to raise enough seedlings for an acre. The seedlings in the nursery bed will be ready for transplanting after three to four weeks. Before the actual transplanting, the paddy field is puddled by running the plough in water. This is done by the end of July or middle of August. Then five to eight seedlings in a bunch are transplanted at a spacing of six inches to eight inches. In August, hand weeding is done. Harvesting of paddy starts in the second or third week of November or middle of December depending on the duration of the crop. In the rabi varieties of paddy, the water in the field is drained off. The farm-yard manures or green leaves are applied to the field. The land is ploughed to loosen the soil and to incorporate the manures. The sprouted seeds at the rate of 80 lbs. per acre are broadcast, at the end of December. Water is let in on the ninth day after broadcasting. As the plants grow, the quantity of water is gradually increased taking care that plants are not submerged under water. The harvesting starts in the third week of March.

*Irrigation.*—Paddy crop requires adequate supply of water after one and a half months from the sowing date. Particular care is taken by the cultivators to avoid impounding of water in earlier stages. When the paddy plants are about 12 inches to 14 inches in height, regular impounding of water is resumed. In heavy soils care is taken to see that water is not impounded continuously.

*Inter-cultivation.*—Timely inter-cultivation for paddy helps in controlling weeds and keeping the soil well aerated. The first inter-cultivation is light and it helps in removing crust formation and facilitates the easy emergence of seedlings, particularly in the drilled variety. The subsequent inter-cultivation is continued upto two months. Once or twice hand-weeding becomes necessary for keeping the land free from weeds.

*Japanese Method.*—Since large-scale irrigation facilities are lacking in Gulbarga, there is not much area under this method. It is popular only in Yadgir taluk.

*Harvesting.*—At the time of harvesting, the plants are cut by a sickle. The grains are separated by beating the bundle of plants against a thick plank. Fifteen women are required to reap an acre of paddy in a day. Sixteen bullocks are required to thresh an acre of paddy in one day and four to six labourers are required to look after the threshing.

*Diseases and Pests.*—The worst disease of paddy is caused by the fungus, *Piricularia oryzae*, which has a number of physiological races. This is caused by excessive application of nitrogenous fertilizers, late planting, infection of the previous crop and the humid cloudy weather. This disease spreads rapidly through wind and rain and in common parlance it is called "Blast" or *Benki-roga* in Kannada. The grasses on the bunds of the paddy fields carry the infection. After the infestation of the disease, small, pale and somewhat watery oval spots appear on the leaves. The spots get enlarged, uniting with one another causing the leaves to dry up. The dried up patches of the crop put forth a blasted appearance in the nursery and in the field. The infected earheads, in severe cases, break at the weakened neck region. The grains on the earheads do not develop well and the loss of robustness is a sure sign of the blast disease. If there is a serious infestation of the blast, the loss in yield may go up to about ten per cent. The usual treatment adopted to check the disease is to dust sulphur or ceresan lime at the rate of five lbs. per acre. The infected leaves are cut off and the clippings are burnt.

The other disease which affects the paddy crop is called the Brown Leaf Spot, also caused by a fungus. This is not so serious as the *Benki-roga*. The infection is carried both internally and externally on the seed. This causes poor germination and results in seedling blight. The disease develops and spreads rapidly under moist conditions. As soon as the disease occurs, small brown to dark brown spots appear on the leaves, leaf sheaths and on the glumes. The spots are smaller and more numerous than those caused by blast. They increase in size, become irregular in shape and unite with one another. The leaves gradually wither and the plants turn yellow. Dark brown spots are also noticed on the grains. Infected grains do not develop well and become chaffy. The treatment adopted to check the disease is the same as adopted for the blast diseases. The *Karikaddi roga* is also caused by the fungus, *Ephelia oryzae*. This disease spreads from seeds of the infected corn. This infection is sporadic in the field and readily made out at the earhead stages. The infected earheads emerge from the sheath as a glistening cylindrical rod and stand out prominently at a later stage as a rigid, black, simple spike. The seeds are disinfected before sowing with ceresan, agrosan or tillex. The other diseases which affect the paddy plant occasionally are false smut or green smut, stem rot and chara. The common insect pests of paddy are the stem-borer, case-worm, grasshopper,



paddy gall fly, swarming caterpillar, green beetle and the rice hispa. Several known insecticides are used to control the pests.

*Bajra*—(*Pennisatum typhoideum*).—Kannada name: *Sajje*. **Bajra**  
Bajra is another important crop cultivated in all the taluks of the district. The following table indicates the taluk-wise acreage under Bajra during 1962-63 :—

<i>Taluk</i>	<i>Acreage</i>
Gulbarga .. ..	36,821
Chittapur .. ..	19,500
Yadgir .. ..	15,403
Shahapur .. ..	10,723
Shorapur .. ..	23,949
Jevargi .. ..	38,132
Afzalpur .. ..	21,087
Aland .. ..	38,417
Chincholi .. ..	12,343
Seram .. ..	3,550
<b>Total .. ..</b>	<b>2,19,925</b>

When Hyderabad was a separate dominion, it ranked fifth among the bajra-growing provinces in India. Hyderabad had nearly seven per cent of the total area under bajra in India. Bajra is the staple food crop of a large number of people in the district. It is grown only where it gives better results than jowar. It is always a kharif crop, grown in light soil, while jowar is chiefly sown on heavier soils both in kharif and rabi. The crop grows well when the climate is moderately dry and when the monsoon rains come in light showers with plenty of sunshine between showers. This spiked millet is a nutritious food containing about ten per cent of proteins and 70 per cent of starch and compares very favourably with jowar as food. The straw is a poor fodder and cannot compare with jowar straw. The cultivators in the district raise bajra as a mixed crop sown with several kinds of pulses. Bajra is sown after the advent of the south-west monsoon in June and harvested in September and October. The normal average yield is about 400 lbs. per acre. The proportion of grain to straw is generally the same as jowar—being about one to 2.5. The cultivation methods adopted for bajra are the same as those of jowar. The bajra grain is made into flour and is used in preparing bread.

*Barley* (*Hordeum vulgare*)—Kannada name: *Yave* or *Jave*. **Barley**  
Barley is not so extensive as the jowar or the bajra crop. The cultivation of this crop is confined only to four taluks of the district,

*viz.*, Gulbarga, Shahapur, Jevargi and Afzalpur. The total acreage under this crop in 1962-63 was only 614, of which Afzalpur taluk alone had 547 acres. It is grown as a rabi irrigated crop and like irrigated wheat, is often a second crop in garden lands and takes its place in rotation among various garden crops. Barley is also grown as a separate crop, though occasionally there is a sprinkling of rape seed or mustard. This crop is essentially a light land crop, the sandy loam soil being particularly suitable. It is usually sown in October, the seed rate being 100 lbs. per acre. The crop matures in about four months. It is harvested at the end of January, threshed in the same way as wheat. Barley is a grain crop which resembles wheat in many respects. It is a crop of very ancient origin and for a very long time, it was of equal importance with wheat as a food crop. Before sowing, the field is ploughed several times, all clods broken and all weeds and stubble removed and burnt. In gardens where it is grown, the field is heavily manured with cowdung at the rate of ten cartloads per acre and ploughed well. The yield per acre comes to about 1,500 lbs. Though about a ton of straw is obtained, it does not make a good fodder. As a food, barley flour is prepared into unleavened bread. It serves as a wholesome diet for patients.

Wheat—(*Triticum sativum*)—Kannada name: *Godhi*. This is an important crop which is grown in all taluks of the district, Jevargi taluk alone having 20,237 acres out of the total area of 81,408 acres. It is also extensively grown in Chittapur, Shorapur, Aland and Afzalpur taluks. The following table indicates the taluk wise acreage under wheat in 1962-63 :—

<i>Taluk</i>	<i>Acreage</i>
Gulbarga .. ..	5,781
Chittapur .. ..	13,310
Yadgir .. ..	1,701
Shahapur .. ..	3,501
Shorapur .. ..	11,488
Jevargi .. ..	20,237
Afzalpur .. ..	10,416
Aland .. ..	10,252
Chincholi .. ..	2,166
Seram .. ..	3,000
<b>Total .. ..</b>	<b>81,408</b>

Prior to the introduction of the P.W.-5 improved variety of wheat into the district, the cultivators were sowing the *Bansi*, *Lal* and *Jod Gahoon* varieties. The *Bansi* is a semi-hard, golden yellow variety well-suited to the soil. The *Lal* or red is a hard variety, while the *Jod Gahoon* is an irrigated variety. The

P.W.-5 improved variety is a selection from Parbhani and it yields 300 to 500 lbs. per acre. Wheat is always a rabi or spring crop in the district sown from September to November and harvested from February to March. It is the bread cereal of moderately dry temperate climates. Wheat thrives best in regions having an annual rainfall between 20 and 30 inches. Wheat grown in the more humid areas is generally soft and starchy. The crop is grown on silt loams and clay loams usually of high fertility, fine texture and with large humus content. As a dry crop, it grows best on deep black soil. For the irrigated variety, lighter soil is more suitable with a substratum of murram, two to three feet from the surface, to ensure good drainage. Dry crop wheat is sometimes sown alone and sometimes mixed with safflower, linseed or gram. This is rotated with cotton or jowar. The usual trade classification of hard and soft white wheats applies also to Gulbarga wheats. The hard whites have a higher percentage of gluten which gives them a flinty translucent appearance. The soft whites are starchy and opaque. The hard red wheats, popular in the district, are the best of the lot. The *Jod Gahoon* variety is classed as hard red. The seed rate is 55 to 66 lbs. per acre.

The field for wheat is well ploughed three to four times before the actual sowing. Cattle manure is then applied at the rate of about 20 cart-loads per acre. Ammonium sulphate is also given as a top dressing. The blade harrow is used for harrowing. The irrigated variety requires watering once in 15 to 20 days. Wheat is the chief cereal used in bread-making.

*Ragi* (*Eleusine coracana*).—Of the total acreage of 13,546 **Ragi** under ragi in the district, Yadgir taluk alone has an area of 9,451 acres, while Seram taluk comes next with 3,105 acres. Since ragi is grown on the red and gravelly soils with low moisture content, preparatory process is an important agronomic practice to increase the moisture-holding capacity of the soil. The land is brought to good tilth by ploughing four to five times with the improved iron ploughs and then levelled. This crop is entirely a rainfed crop in Gulbarga and thrives well on lands where the rainfall is 30 to 35 inches. Different sowing practices are in vogue, viz., drilling, broadcast and transplanting. Wider spacing with good tillering scope is allowed. About ten cart-loads of farm-yard manure and tank silt are applied per acre before the actual sowing. Inter-cultivation is very essential for controlling weeds, removing extra seedlings and loosening of soil. Sometimes it is rotated by sesamum and niger. A fair average crop will yield from 600 to 1,000 lbs. of grain per acre. Ragi keeps well for a very long time if stored in underground pits.

*Tur* (*Cajanus indicus*)—Kannada name: *Togari*—This is a very important pulse in daily use by all sections of the population. A total of 1,90,013 acres was under tur cultivation in 1962-63, the

highest acreages being in Gulbarga and Aland taluks. The following table indicates the acreages taluk-wise during 1962-63.

<i>Taluk</i>	<i>Acreage</i>
Gulbarga .. ..	32,204
Chittapur .. ..	26,424
Yadgir .. ..	11,125
Shahapur .. ..	9,848
Shorapur .. ..	11,127
Jevargi .. ..	12,950
Afzalpur .. ..	13,828
Aland .. ..	28,510
Chincholi .. ..	20,287
Seram .. ..	23,710
Total .. ..	1,90,103

This is grown in all varieties of soils. Soils with a large lime content are said to yield the best quality. The quality of the pulse consists in the quickness with which it softens on boiling. In Gulbarga, it is grown as a mixed crop with ragi and jowar. The total yield of tur dhal in 1962-63 was 25,870 tons. The C-28, an improved variety, is popular in the district.

Bengal Gram (*Cicer arietinum*)—Kannada name: *Kadle*.—This crop is grown in all the taluks of the district, Chittapur taluk alone accounting for 18,200 acres out of a total acreage of 76,109 (1962-63). The following table gives details of acreages in different taluks in that year :

<i>Taluk</i>	<i>Acreage</i>
Gulbarga .. ..	5,328
Chittapur .. ..	18,200
Yadgir .. ..	4,038
Shahapur .. ..	6,390
Shorapur .. ..	5,584
Jevargi .. ..	8,715
Afzalpur .. ..	6,357
Aland .. ..	10,640
Chincholi .. ..	5,703
Seram .. ..	5,154
Total .. ..	76,109

This gram is grown as a rabi crop and is raised in deep black soils and also in tank beds. It is the sole crop of the year for the rabi season. Dry crop gram does very well on deep retentive black soils. The crop is sown in October and it ripens in February. The average yield is 400 to 500 lbs. per acre. It is also grown on alluvial soils when they are clay loams. The gram plant is useful in a variety of ways. It is used green as a vegetable; the foliage is often sun-dried and stored for use when required as a vegetable substitute. The ripe grain is used for dhal or is eaten parched or made into sweet-meats. A useful bye-product is secured from the leaves of the growing plant termed locally as *Amb*. This is the acid excretion of leaves and is collected by spreading a wet cloth over the foliage and wringing out the absorbed substance called *Amb*. Besides this, the crop is valuable in more than one way. It is a valuable rotation crop or dry and irrigated land. It is restorative like the other leguminous crops. A good crop is dense and shades the ground and therefore suppresses the growth of weeds. On dry black soil, it may be called a fallow crop. There are four varieties of gram which differ obviously in colour of the seed, viz., black, red, yellow and white. The first three varieties are grown together. White or Kabuli variety is grown in some places. The chief pest is the pod cater-pillar which bites through the green pods and attacks the seeds.

*Moong Dhal* (Green gram)—*Phaseolus aureus roxb*—Kannada name : *Hesaru*. This is an important pulse grown over a total area of 60,550 acres in the district in 1962-63. The total production during that year was 5,886 tons. The average yield per acre is 442 lbs. This pulse is made use of in different ways in culinary practices and is best relished when made into cakes. The husks are usually removed and the split gram is boiled, fried or ground into flour. The plants are less hairy and in appearance less dark and more greenish and slightly taller than the black gram plants. The flowers have a lighter tint of yellow. The pods are slender and the seeds are green. The split pulse is yellow in colour. This crop is cultivated in both the early and late seasons. There are different varieties of the monsoon crop. Similar to black gram, moong is sown on paddy fields, partly as a green manure crop and partly for the sake of its produce. The seeds for this crop are sown either broadcast or harrowed in. The seeds are also sown in rows in plough furrows, some ten inches apart mixed with jowar. Within 70 days of sowing, the green pods are ready to pick and in another three weeks or a month, the pods become dry and then the crop is finally harvested. The seed rate is about 15 lbs. per acre. **Moong Dhal**

*Kulthi* (Horsegram)—*Dolichos biflorus*—Kannada name : *Huruli*. This is a pulse crop grown over a total area of 23,441 acres in the district (1962-63), the total production being 993 tons. The yield per acre as worked out by the District Agricultural Office was 175 **Kulthi**

lbs. This crop is sown in rows and is also broadcast. It is sown in plough furrows about nine inches apart and covered by the adjacent furrow or narrowed through the three-coultered jowar seed drill. The kulthi plants are thin-leaved, particularly climbing bushes reaching a height of only a foot. They come up thick and cover the ground completely under normal conditions. This crop is looked upon also as a source of green fodder. It is considered as a poor man's pulse crop and eaten both boiled and fried. It is also given as food for horses.

#### Masur

*Masur* (English name: Lentil).—This is also a pulse crop cultivated over an area of 895 acres (1962-63). The production in the same year was 27 tons. The lentil is a pulse of considerable importance in the district. Although it is sparsely grown and its dhal is in use only to a small extent, its cultivation has assumed some importance in the area. Masur is grown in a variety of soil types, such as light loams, alluvial soils and black cotton soils. It is raised as a cold weather crop in the same way as Bengal gram. The field intended for lentils is prepared very thoroughly in the case of black cotton soils which are ploughed soon after the monsoon rains and are then worked with the bladed harrows and brought into a rough tilth for sowing. The crop has a three and a half months' duration from February to April depending upon the time of sowing. The split pulse or dhal which resembles small-sized tur dhal is deep orange in colour, unlike the yellow of the tur dhal. It is not subject to serious pests. The lentil is an important food crop, being a pulse rich in proteins.

#### Sugarcane

*Sugarcane* (*Saccharum officinarum*)—Kannada name: *Kabbu*. According to the statistics supplied by the District Agricultural Office, the total area under sugarcane in the district in 1962-63 was 2,162 acres with a total production of 2,972 tons. The improved variety of cane which is popular in the district is Co 419. The main sowing season is from January to March. The sugarcane in the district is raised under well irrigation. Sugarcane grown in the district is marketed either as cane for chewing or manufactured into *gur*. Before the advent of improved varieties, there were many varieties called *Poondia*, *Kabirya*, *Kavangiri*, *Bangdya*, *Khadya* and *Wansi*. Sugarcane is a perennial plant springing up from the root-stock after cutting. A uniform high temperature, strong sunlight and frequent showers during the growing season are very desirable to keep the cane growing. Cool or cloudy weather and drought are likely to stunt the growth. Sugarcane requires a fertile soil and well-manured fields. The crop is propagated from sets (16,000 per acre or 40 maunds per acre) planted usually in prepared beds. According to the soil, climate and the variety to be grown, the time of planting varies in different localities. In Gulbarga area, the canes are planted in March and April. Everywhere the cane takes 12 to 14 months to mature. It was

usual for sugarcane to be planted in the same field after harvesting. But this practice is now fast declining. When the cane is harvested, the field is prepared for paddy. This is akin to the block system that is in vogue in the Visvesvaraya Canal area in Mandya district. In the first year, canes are not pulled out, but are cut clean with a hatchet close to the ground. The field is cleared of dry leaves, all rubbish is burnt and the crop is irrigated. After the shoots have grown two to three feet high, the field is dug up and farm-yard manure is applied. Sugarcane is subject to the attack of several diseases and pests, the most harmful of which are the red rot disease and the sugarcane borer.

*Chillies* (*Capsicum frutescens*)—Kannada name: *Mensinakai*. **Chillies**  
This important cash crop is grown in all the taluks of the district, Chincholi taluk alone accounting for 7,851 acres out of a total area of 21,804 acres; the following table indicates the extent of acreage in different taluks in 1962-63.

<i>Taluk</i>	<i>Acreage</i>
Gulbarga .. ..	1,326
Chittapur .. ..	1,224
Yadgir .. ..	1,512
Shahapur .. ..	1,656
Shorapur .. ..	1,285
Jevargi .. ..	697
Afzalpur .. ..	1,441
Aland .. ..	482
Chincholi .. ..	7,851
Seram .. ..	4,330
Total .. ..	21,804

Chillies are generally grown in garden lands. The crop is invariably planted during the rainy season and if helped by irrigation, the growth extends into the rabi season. Chillies, to a large extent, are grown as a separate crop and sometimes planted as a subsidiary to other garden crops. The best dry-crop chillies are grown on deep retentive black soils. The irrigated crop is raised in the mixed black soil. The field is thoroughly prepared and well-manured. The seedlings which are raised in a nursery are transplanted by about July. The fruit ripens within three months after transplantation. Picking goes on for three to five months. The irrigated crop lasts longer than the unirrigated crop. Where there is demand for green chillies, they are picked three times a month. Ripe chillies are picked three to four times in the course of the whole season. After picking they are dried in the sun and taken to the market. A good, unirrigated crop produces about 1,000 lbs. per acre. The irrigated yields are higher. Chillies are an uncertain crop as cloudy weather at the time of flowering proves harmful. There are several varieties of chillies such as the ordinary long, narrow and tapering variety called *Lavangia*. Another variety

is *Bor Mirchi* which bears small round fruits. *Bari Mirchi* with large long pods and *Vilayati Mirchi* with large broad pods are also grown. Chillies are used as ingredients in food preparations.

**Non-Food  
Crops**

Among the non-food crops grown in the district, cotton is the most important. It is sown in all the taluks of the district. The following table indicates its acreage in each taluk in 1962-63 :—

<i>Taluk</i>	<i>Acreage</i>
Gulbarga .. ..	20
Chittapur .. ..	642
Yadgir .. ..	10,590
Shahapur .. ..	42,324
Shorapur .. ..	43,327
Jevargi .. ..	19,132
Afzalpur .. ..	302
Aland .. ..	251
Chincholi .. ..	..
Seram .. ..	32
Total ..	1,16,620

Cotton is known to have been cultivated in India as early as 800 B.C. It is the most important source of material for clothing and household fabrics and has also many industrial uses. The production of cotton has increased at a somewhat greater rate since 1840. With the invention of the gin, this fibre rapidly replaced linen and wool for many common purposes and the demand for cotton has now become very great. The best cotton soils are the deep black soils or fertile silt. The outturn varies according to soil, rainfall and the attention bestowed on the crop. On an average, the district produces 300 lbs. of seed cotton per acre or 100 lbs. of lint, but the variation from area to area is great. Similar to other crops, the cotton crop is also subject to mishaps. Cloudy weather causes shedding of flowers and untimely showers cause deterioration in the quality of the lint. But with all this, cotton is a favourite crop with the cultivators. Comparatively, its cultivation is easier. It is not subject to diseases which totally destroy the crop. Above everything else, it can be converted into a cash crop as soon as the fields are picked. There is no threshing or delay of any kind and there is always a ready market for the picked cotton. Hence, the cotton crop is considered by the cultivator as his chief crop for paying the land revenue assessment and providing money for his means of livelihood, while the jowar crop is for his food.

In Gulbarga district, cotton is rotated with jowar in heavy soils and with bajra in light soils. But the rotation is modified according to the area, season and the conditions of the field.



Wheat, tur and linseed are grown sometimes as rotation crops. In Gulbarga district, cotton is sown after white jowar and other crops. The ploughing of the cotton field is done once in five or six years or oftener. Repeated harrowing with the bladed harrow is quite common in the district. Cotton is sown in lines with the wooden drill called *tiphani* or *mogha*. The drill may be single, two or three-coultered. The distance between rows varies from twelve to twenty-two inches. Paired rows of tur are planted after every 10 to 15 rows of cotton. Interculturing is done two to three times by means of the bullock hoe (*Kolpa*). In Gulbarga, cotton is sown after the north-east monsoon showers in September. If it is sown earlier than September, the lint would be ruined by late rains. The yield is higher for kharif than for rabi cotton. Sowing of kharif cotton is done in Gulbarga from June to mid-July. This crop is called the *Mungari* crop. The *Hingari* crop is sown in September or in the early part of October. Picking for kharif is done from November to January and for rabi from February to April. There are usually four pickings. Most of the produce is marketed as *Kapas* or unginned. The popular varieties of cotton grown in Gulbarga district are Jayant, Laxmi and Jayadhar.

Tobacco (*Nicotiana tabacum*) was grown in an area covering only 1,401 acres 1962-63 with an outturn of 197 tons. It is an important cash crop and is grown on any soil in the district. But the best crop requires particular types of soil. It is grown in small patches round about villages on loamy soil. The area of tobacco increases or decreases according to the cultivation of chillies which are said to fetch better prices than tobacco and are easier to be handled. Besides, the same fields are suitable for chillies and the method of cultivation is practically the same. In the cultivation of tobacco, 90 per cent of the acreage is unirrigated and ten per cent is irrigated. It is the irrigated crop that is usually exported while the unirrigated crop is locally consumed. Two varieties of tobacco are grown in the district. The *Nicotiana rustica* with yellow flowers and coarse texture and round oblong leaves are used for *hookah* and snuff. The second variety called the *Nicotiana tabacum* with pink flowers and elongated smooth leaves is used for smoking. Tobacco requires very careful treatment of the seed-bed and of the field. The field is well-prepared and manured. Seeds are sown in July on raised beds at the rate of 1½ ounces for an acre. Seedlings will become ready for transplantation in about 40 days. The planting is usually done in August. After six weeks, the young crop is tapped, keeping 10 to 15 leaves per plant, the lowest three of which are subsequently removed. Hoeing and weeding are also done at the same time. It is mostly a dry crop. The methods of harvesting and curing vary according to the quality required.

**Oil-seeds—  
Groundnut**

Groundnut (*Arachis hypogea*)—Kannada name : *Nelagadale*. Among the oil-seeds, groundnut is most extensively grown in all the taluks of the district. It covered an area of 2,49,309 acres in 1962-63. The crop is widely grown in Yadgir, Gulbarga Shorapur and Aland taluks. The following table indicates the extent of acreage in different taluks in that year :—

<i>Taluk</i>	<i>Acreage</i>
Gulbarga .. ..	36,416
Chittapur .. ..	11,941
Yadgir .. ..	48,036
Shahapur .. ..	31 451
Shorapur .. ..	34,175
Jevargi .. ..	18,328
Afzalpur .. ..	25,853
Aland .. ..	32,360
Chincholi .. ..	6,193
Seram .. ..	4,556
Total .. ..	2,49,309

The T.M.V.-2 bunch type variety evolved at the Agricultural Research Station at Tindivanam in Madras State is quite popular in Gulbarga. This is a kharif and irrigated summer variety sown in June-July and takes about 105 to 115 days to mature. Groundnut can be grown both as a dry and as an irrigated crop. In Gulbarga district, it is exclusively a dry crop. The seed rate employed is 60 lbs. per acre. The groundnut plant is a hardy one and easy to cultivate. It needs little cultivation beyond weeding. Two or three hoeings before the nuts are formed usually suffice. It requires little manure except when grown for several consecutive years on comparatively heavy soil. It is often grown in a three-year rotation with a cereal and cotton or in a two-year rotation with one of these. After the soil has been pulverised to a depth of four to five inches, the nuts are sown, sometimes in their shells about one to two inches deep and three to four inches apart with about 24 to 36 inches between the rows. Usually nuts from the previous crop are used, but a periodical renewal of the seed stock is desirable to maintain the yield and strengthen resistance to attacks of insects and diseases. The growth depends upon the variety of seed planted. The bunch variety which is popular in the district is harvested by working the harrow directly in the field. The plants are uprooted through this process. The plants with the pods are then collected and taken to the threshing yard where they are allowed to dry for

four or five days. From an acre of groundnut field about 800 lbs. of dry, good fodder are obtained. The shells of the pods are used for manure. Oil and cake are the products of the kernel. Of late, the demand for groundnut oil has increased. It is used as an edible oil for culinary purposes and also for the manufacture of margarine and soap. Groundnut cake is a very highly concentrated nitrogenous food and in moderate quantity it is excellent for milch cattle and for hard-worked bullocks and for sheep. It is also a very useful manure for sugarcane.

*Sesamum* (*Sesamum indicum*)—Kannada name: *Yellu*. **Sesamum**  
This is an important oilseed. It covered an area of 36,604 acres in Gulbarga district with a yield of 2,847 tons in 1962-63. This crop flourishes on lighter soils. It does not withstand heavy rainfall. In some areas, it is sown separately, though in others it is grown as a mixed crop. It is mainly a kharif crop being generally sown from May to July and harvested from September to December. A fair average crop yields from 280 to 400 lbs. per acre. There are three varieties of sesamum commonly grown in the district, *viz.*, white, red and black. The white variety yields earlier and is also slightly richer in oil. Sesamum cakes are a good cattle food.

Linseed (*Linum usitatissimum*)—Kannada name: *Agase*. **Linseed**  
The area under linseed cultivation during 1962-63 was 65,173 acres. The production of linseed was 4,147 tons in that year. The area under linseed depends to a very large extent on the success or failure of the kharif crops. If the kharif crops fail on account of untimely rains, the fields are ploughed, harrowed and made ready for rabi sowing of wheat or linseed. Linseed is a rabi crop in Gulbarga district, sown in deep black moisture-holding soils. It is generally grown alone and is the sole crop of the year. It is sown in rotation and never successively. The seed rate for linseed sowing is ten to eleven pounds per acre. The seed is usually sown in September and the crop is ready for harvest in February and March. A good crop will yield about 300 lbs. of seed per acre, just as much as in the United States of America. In Gulbarga district, this crop is grown for its seed which supplies oil and cake. The seed is used in preparing condiments and the oil in cookery and also in preparing paints and varnishes. The residual oil-cake is one of the best cattle foods known and also a good manure. The varieties of linseed grown in the district are mostly the brown bold type and the small seed type.

Castor (*Ricinus communis*)—Kannada name: *Haralu*. **Castor**  
Castor was raised in the district in an area of about 2,933 acres in 1962-63 with an out-turn of 109 tons. There are perennial and annual varieties of this plant. The annual varieties grown in the district are very much smaller in size than the perennial. The latter grows with great rapidity and a year's growth produces a

tree 10 to 15 feet high. Seasonal conditions play an important part in determining the area and yield of the crop. When the rainfall is below normal, the acreage diminishes. Castor oil is prepared out of the seeds and is used for various purposes including lubrication.

### FRUITS AND VEGETABLES

#### Horticulture

The popularisation of horticulture in the district has been well planned and directed. The Directorate of Horticulture has made efforts to instil in the minds of growers, the need to produce fruits and vegetables as a supplement to the day-to-day dietary. Many of the fruit crops like banana, guava, mango and citrus varieties are grown in the area. The cultivation of grapes and figs has made some headway. In respect of vegetables, the common varieties grown are brinjal, tomato, lady's finger, cluster beans, carrot, radish, cucumber and different varieties of gourds. Cabbage and cauliflower are also becoming popular.

The Department of Horticulture initiated a drive in 1960 to create interest amongst the cultivators to take up horticulture in right earnest. In the beginning an attempt was made in the Aiwan-e-Shahi gardens to multiply seed material in order to supply them to the cultivators. The old traditional methods of raising kitchen gardens and fruit plantations were replaced by new scientific methods. The new technique of cultivation propagated by the experts of the department was well understood by the progressive cultivators. A branch of the Mysore Horticultural Society was started in Gulbarga town and the members who constituted it were benefited by the advice of the experts.

During 1965-66, 250 kitchen gardens were laid out and vegetable seeds and seedlings were distributed. Under this scheme, seeds worth Rs. 2,356 were supplied to those who came forward to raise gardens.

A new scheme has been started to popularise the cultivation of arecanut. Under this scheme, 2,000 seedlings have been sown for supplying the plants later to cultivators.

During 1965-66, the staff of the Horticultural Department visited 150 fruit gardens, 306 vegetable gardens and 30 ornamental gardens and gave guidance. Lay-out guidance was also given to 200 fruit orchards, 250 vegetable gardens and 5 ornamental gardens.

Several schemes relating to coconut development and fruit development have been undertaken.

All the development blocks in the district have been asked to follow the technical guidance of the Horticultural Department.

During 1964-65 and 1965-66, horticultural shows were arranged as an incentive to grow more fruits and vegetables. Prizes for the best exhibits were also awarded.

Horticultural classes are being conducted by the technical staff of the department in association with the Jawahar Club. During 1965-66, 30 lady candidates received training in modern methods of growing fruits and vegetables. During the same year, cultivators in the district received 1,000 mango plants, 400 sapota plants, 4,950 lime plants, 450 guava plants, 300 *santra* plants, 2,607 *mosambi* plants, 2,700 coconut seedlings and 3,200 grape cuttings.

The area under fruits and vegetables in the district during 1965-66 was as shown in the table below :—

Name of Taluk	Mango	Banana	Grapes	Citrus	Others	Sweet Potato	Onion	Leafy Vegetables
Gulbarga ...	50	241	5	8	17	75	802	89
Chittapur ..	135	7	1	5	15	11	65	100
Yadgir ..	107	24	1	6	707	145	696	427
Shahapur ..	59	30	..	9	8	13	520	112
Shorapur ..	4	10	..	16	21	..	..	..
Jevargi ..	16	32	1	14	18	40	314	24
Afzalpur ..	10	86	2	8	22	24	274	281
Aland ..	26	340	5	36	41	98	50	70
Chincholi ..	6	12	..	3	7	..	58	22
Seram ..	90	5	..	5	7	190	66	346
Total area	503	787	15	110	863	596	2,845	1,471

The total area under fruits and vegetables in the district during 1965-66 was 7,190 acres.

In the old days, the usual implements were the wooden plough, the *bukhar* and seed drills. Owing to the impact of scientific agriculture, iron ploughs are now becoming common. The implements that are in common use are the Desi wooden ploughs, iron mould ploughs, Balram and Kangar ploughs, harrows, levellers, local seed drill, Kirloskar plough No. 100, buck scraper, *bukhars*, *edikunte*, Gator sprayer, foot-sprayer, double barrel foot pump, rotary duster and chaff cutters. For interculturing purposes, the Kolpa is used. The blade-harrow is also used for breaking the clods in the fields. During 1960-61, there were in all 92,477 ploughs of all descriptions and 32,838 country carts.

**Agricultural  
implements**

*Tractors.*—During 1964-65, there were 20 tractors in the district. The Agricultural Department makes arrangements to supply tractors on hire basis. Some of the well-to-do land-owners own their own tractors.

#### **Seed Supply**

Multiplication and distribution of improved seeds are being done by the State Agricultural Department. The nucleus seeds are multiplied in the Agricultural Research Station at Raichur and other research stations and from there the seeds are sent to the seed farms located in the district. The seed farms are located at Kotnur, Aland, Chandapur, Raddewadgi, Hathigudur, Seram and Yadgir. These seed farms in turn multiply the seeds sent by the main agricultural farms and give them to registered seed-growers and they in turn multiply the seeds. The seed multiplication operations are watched by technical personnel. After all these preliminaries, the improved seeds are given to cultivators. In order to encourage the cultivators to multiply the improved seeds, a sum of four rupees per quintal is being paid as subsidy plus Rs. 1-25 per quintal for storage.

#### **Distribution of Fertilisers**

Formerly, the District Agricultural Officer was distributing modern fertilisers to the cultivators on application. But at present, the co-operative societies are entrusted with the task of distribution. In accordance with the Fertiliser Control Order, 1957, licences are given to Taluk Agricultural Produce Co-operative Marketing Societies for distribution of chemical fertilisers. There were 12 wholesale licensees and 95 retail licensees in the district in 1965. Besides, private dealers are also licensed to deal in fertiliser mixtures.

#### **Pests and Diseases**

The major pests affecting the agricultural crops in the district are the tur pod borer, groundnut aphids, thrips on chillies, jowar grasshopper and the red-haired caterpillar on different crops. The diseases are jowar smut, paddy blast, ticca disease on groundnuts, wheat rust and the sugary disease of the jowar. Pesticides are largely used to control the diseases and pests. During 1960-61, a sum of Rs. 67,136 was spent on plant protection. In the year 1965, out of a total area of about 2.50 lakh acres under tur dhal crop in Gulbarga district, over a lakh of acres was affected by the tur pod borer pest. To bring this pest under control, insecticides worth about two lakhs of rupees and plant protection equipment worth about a lakh of rupees were supplied by the Government to the raiyats in the affected areas.

#### **Development Activities**

The aim of the Agricultural Department has throughout been to step up food production in the district. With a view to achieving the targets fixed during the Five-Year Plan periods, the department is paying attention to the distribution of good seeds for the purpose. Ample and constant propaganda is being conducted in regard to the application of manures and fertilisers.

Adequate quantities of insecticides and pesticides are being supplied in times of need to the raiyats to fight the infestations. Arrangements were made during 1960-61 to have an area of about 100 acres of tur crop sprayed aerially with insecticides. In order to bring sufficient land under irrigation, action was taken to sink a large number of irrigation wells. About 1,240 pump sets were supplied to the raiyats till the last year (1965) of the Third Plan period. During the Third Plan period, an effective organisation on a uniform basis was set up to fight the ravages of pests and diseases. Nearly 2,500 appliances for plant protection were to be supplied at a cost of Rs. 3.06 lakhs. All the various schemes in operation for advising the raiyats on improved agricultural practices were proposed to be amalgamated into a single organisation in the Third Plan period. Agricultural implements are being supplied to cultivators on a subsidised basis. Crop competitions on various food crops and demonstrations on improved agricultural practices are being conducted.

*Development in fruit production.*—There was a scheme during the Third Plan period for the purpose of developing horticulture in the State. Under this scheme, an adequate technical staff at State, Divisional and District levels was being organised to advise on plant protection measures, agronomic practices and preparation of plans for raising fresh orchards. Sufficient loans were being given for the establishment of new gardens and rejuvenation of old ones. It was proposed to bring 600 acres under new orchards at a cost of Rs. 2.05 lakhs.

*Oilseeds development.*—A comprehensive scheme for the promotion of better oilseeds was launched during the Third Plan period. More area will be brought under oilseed crops by adopting mixed cropping. At a cost of Rs. 3.44 lakhs, it was intended to increase the production of oilseeds by 0.27 lakh tons.

*Cotton Development Scheme.*—During the Third Plan four different schemes were combined into one in order to have a planned co-ordinated programme of development. This scheme included the distribution of improved varieties of seeds suitable for different tracts, grading of cotton and execution of different legislative measures like Cotton Control Act, Cotton Transport Act and the Ginning and Pressing Factories Act at a cost of Rs. 0.75 lakh. An additional 20,000 acres of land would be brought under cotton cultivation thereby getting 10,000 more bales of cotton.

*Bajra Research Scheme.*—Bajra being an important staple crop and the per acre yield being comparatively low, a new scheme is under way to increase the production. It is intended to establish a Research Sub-Station in the Gulbarga sub-division at a

cost of Rs. 2.03 lakhs for which a token grant of Rupees one lakh has already been sanctioned.

*Pulses Research Scheme.*—Pulses form an important proteinous food in the human diet. Measures are under way to increase the production of pulses by evolving high-yielding, superior varieties and also by developing suitable agronomic practices. It is proposed to start a Regional Research Station in Gulbarga at a cost of Rs. 5.64 lakhs.

*Demonstration Plots.*—Each year, about 500 to 600 fertiliser demonstration plots are laid out on the fields owned by the raiyats for convincing them of the efficacy of modern methods of agriculture. Apart from this, a number of varietal trials are also conducted so as to demonstrate the superiority of improved seeds over the local variety. Agricultural Demonstration Centres have been opened on the cultivators' fields at the headquarters of the village level worker. These centres serve as model farms for the benefit of the raiyats.

*Compost.*—The various municipal and other organisations in the district prepare compost on a scientific basis. During 1964-65 a total of 2,123 tons of urban compost and 98,922 tons of rural compost were produced.

*Farmers' Forum.*—During 1964-65, there were 21 young farmers' clubs functioning in the district with 36 life members, 646 active members and 334 ordinary members to inculcate in the minds of the cultivators the need to pursue scientific methods of agriculture. These associations are responsible in bringing together the cultivators by organising seminars and meetings. At these meetings, all problems affecting agriculture are discussed and methods thought of to increase the food production. Technical assistance is offered by agricultural specialists of the department to the cultivators.

**Impact of  
Community  
Development**

As a result of adopting extension methods at the village level, there has been a great awakening among the raiyats in respect of improved seeds, fertilisers, insecticides and development. There are equipments in Aland, Gulbarga and Yadgir blocks for exhibition of films bearing on increased yield. The cultivators visit these shows often to learn new methods and technique. The Directorate of Publicity and Information through its Regional Office in Gulbarga has set up 134 community radio sets, throughout the district through which the cultivators learn a lot about modern methods of agriculture. The rural programme put on the air every evening and the Radio Rural Forum twice a week are heard by cultivators with interest. The Regional Officer, Five-Year Plan Publicity, has his sub-office in Gulbarga. Through this agency, films of interest bearing on improved methods of agricul-



ture are exhibited periodically. During big *jathras* and *uruses*, agricultural exhibitions are arranged to instil in the minds of the raiyats the need to pursue scientific methods in farming.

### ANIMAL HUSBANDRY

Cattle wealth is of considerable importance to the sound economy of the district. Bullocks and buffaloes are still essential companions of the cultivators. A good cultivator usually keeps a pair of bullocks, a few cows and one or two buffaloes. Sheep, goats and poultry do not always form part of the livestock wealth of an average cultivator. Rather, the poorer sections among them or the landless labourers keep sheep, goats and poultry. A farmer's standing in agriculture is judged by the number of cattle he keeps. Cattle wealth of any particular area depends on the quality of the breed. It is not considered advisable to multiply poorer breeds of cattle as they would not be conducive to the economy of the area. Judged by these accepted standards, Gulbarga, though it is the biggest district in the Hyderabad-Karnatak area, has not been congenial for raising a better breed of cattle. The low rainfall and fodder scarcity are the causes for this handicap. As a result, the cultivators get their cattle from the neighbouring areas.

Among the cattle of the district, there are two distinct breeds, *viz.*, the *Deoni* variety and the *Khillar* variety. The *Deoni* breed is found in Gulbarga, Chittapur, Seram, Chincholi and Yadgir taluks, while the *Khillar* breed is popular in Jevargi, Shahapur, Shorapur, Aland and Afzalpur taluks. The *Deoni* variety is a dual purpose heavy animal well-known for its milch quality. It has a glossy attractive coat and is robust and heavy. The *Khillar* breed mainly imported from the Maharashtra districts is a spirited and strong animal with red-shot eyes indicative of strength and stamina. But unfortunately, the *Khillar* breed is poor in milk yield. The position of livestock in the district as per Livestock Census, 1961, was as follows:—

**Breeds of  
Cattle**

Cattle	..	6,58,872
Buffaloes	..	1,65,682
Sheep	..	2,79,281
Goats	..	2,16,668
Poultry	..	3,25,693
Donkeys	..	4,502
Camels	..	68
Pigs	..	6,901
Horses and Ponies	..	9,616

**Key Village Scheme**

In addition to the starting of Artificial Insemination Centres, the Key Village Centre offers a good and easy scope to develop good breeds of cattle. The Key Village Centres demonstrate to the rural population, the advantages of improved methods of breeding and efficient management of livestock. Under this new scheme a compact group of five or six villages is placed in charge of a qualified Veterinary Inspector appointed by the State Animal Husbandry Department, whose responsibility it is to pay frequent visits to all the villages for attending to the needs of cattle and other livestock development activities. Apart from demonstrating the advantages of improved methods, these key village centres maintain stud bulls. This is a joint venture by the State and Central Governments and the cost is shared equally by both. The Key Village Scheme was established in the district at a total cost of Rs. 53,000 as a plan scheme in February 1961, with a view to utilising and distributing throughout the area, the superior semen of pedigree bulls on systematically planned basis for upgrading the non-descript cattle. The centre is located in the premises of the veterinary hospital at Gulbarga. In 1964-65 the area within a radius of 10 to 12 miles comprising six villages grouped into six sub-centres was covered by this centre. At this centre, one *Deoni* and one *Murrah* buffalo bulls are stationed for purposes of artificial insemination. To cover the inferior cows and to prevent indiscriminate breeding, 12 *Deoni* bulls have been supplied to private breeders. Mass castration of scrub bulls is undertaken in the entire area covered by the Key Village Scheme in order to enforce controlled breeding as quickly as possible. It is further proposed to extend breeding operations to the other taluks of the district, through the establishment of Artificial Insemination Sub-Centres, whenever additional equipment and buildings become available. For the immediate future, Aland, Afzalpur, Chittapur and Yadgir are selected for the establishment of such centres.

*Breeding operations in rural areas.*—In addition to the Key Village Centre, the Animal Husbandry Department and the NES authorities are both supplying breeding bulls to private professional breeders on a subsidised basis.

*Silo Pits.*—Most of the livestock in the district live on a subsistence level. Their performance is therefore very low. In these circumstances, the development of fodder is of paramount importance, if the breeding programme of livestock is to succeed and show satisfactory results. Fodder development programmes comprise popularisation of fodder crops and grasses, conservation of surplus grasses for the lean periods, economical use of fodders and development of pastures. In order to promote fodder production in the district, silo pits are being constructed. During

1962, 1,55,000 grass slips of Rhodes, Napier, Bluepanic and other known varieties were distributed for propagation. In 1964, 25 kilograms of Anjan seeds were distributed through Block Offices in the district.

As a part of a Centrally sponsored scheme, a Poultry Extension Centre was established in the district, within the premises of the Veterinary Hospital, Gulbarga, during 1960-61 at a cost of Rs. 53,000. The strength of the birds at the extension centre on 1st January 1962 was as follows :—

		<i>White Leghorn</i>	<i>Rhode Island Red</i>
Cocks	..	7	5
Hens	..	40	43
Cockerels	..	23	26
Pullets	..	26	28
Chicks	..	137	147

The primary object of this scheme is to saturate the area with exotic breeds on the basis of subsidy and to supply cocks on exchange with that of the local type for breeding purposes. In addition to the Poultry Extension Centre, there are two small poultry units, one at Saidapur in Yadgir taluk and the other at Aland attached to the N.E.S. Block. The strength of the birds in these units was as follows :—

*Saidapur Unit.—*

White Leghorn	..	45
Rhode Island Red	..	21

*Aland Unit.—*

White Leghorn	..	25
Rhode Island Red	..	26

These units have been started for demonstration purposes and to educate the people on scientific breeding.

*Sheep Rearing.—*The local varieties of sheep have not been up to the mark. In order to upgrade the local varieties, the Animal Husbandry Department has launched a vigorous scheme of sheep rearing. Under this measure, 20 stud rams have been supplied to cultivators in order to breed good varieties.

*Milk Supply Scheme.*—During the Third Five-Year Plan, a milk unit for the supply of pure and wholesome milk to the urban population of Gulbarga was taken up at a cost of rupees eight lakhs to be executed on a phased programme.

#### Veterinary Facilities

The District Veterinary Officer is in charge of the departmental activities in the district. He is concerned mainly with the inspection of veterinary hospitals and dispensaries, organising cattle shows and the like. There is a District Veterinary Hospital in Gulbarga which attends to the livestock diseases. This is managed by a veterinary graduate assisted by a compounder. At the taluk level from 1963 onwards there are dispensaries in each taluk managed by Veterinary Inspectors with compounders. Besides, there were in 1965, 15 Rural Veterinary Dispensaries at Kamalapur, Gurmatkal, Saidapur, Farhatabad, Kodli, Sulepet, Hebbal, Shahabad, Gowndagunthi, Mashal, Deval Ghangapur, Wadgera, Kodla, Yadrami and Hunasagi. The Saidapur dispensary is under the N.E.S. staff. After the district was integrated with the new Mysore State, the District Veterinary Hospital at Gulbarga town was upgraded with the provision of additional staff and equipment to cope with the increased work. All the ten taluk dispensaries will in the near future be converted into stationary ones, with the provision of additional staff, so that any serious case may be treated promptly. The artificial insemination centres are located at Gulbarga, Pattam, Aurad, Afzalpur, Savalgi, Sultanpur, Hireinandur and Sanadagi.

*Livestock Diseases.*—The animal diseases generally prevalent in the district are Anthrax, Black-quarter, Haemorrhagic Septicaemia, Sheep-pox, foot and mouth disease and parasitic diarrhoea. Among the non-contagious diseases, respiratory, digestive and generative ailments are common. Mass inoculations and other preventive and curative methods are employed to check the spread of the diseases.

### FISHERIES

There are 210 tanks in the district, of which seven are perennial, 18 long-seasonal and the rest short-seasonal, in addition to minor tanks, irrigation wells and ponds available for fish culture. Since 1959, the fisheries unit at Gulbarga has stocked Bengal Carp in a few selected sheets of water. The major rivers, *viz.*, Krishna and Bhima which are torrential during the monsoon months are reduced in flow during the summer and can only support the local variety of fish seed, *i.e.*, *Labeo fimbriatus*. A Fisheries Development Division was opened in Gulbarga during 1958 under the inland fisheries development scheme. The main

work of the division is to undertake systematic cultivation of quick-growing species of fish, both indigenous and exotic in the impounded waters, such as wells, ponds and tanks, to conserve and exploit river fishes, organise fishermen's co-operatives, to improve marketing facilities and to popularise fish culture. The Directorate of Fisheries has conducted a survey of the fishery resources in the entire district. Ponds and tanks were inspected with a view to finding out their suitability for fish culture. Fry and fingerlings of the local variety were collected and stocked in selected tanks and wells. Fry of Bengal Carps, Catla, Rohu and Mrigal were supplied and the fry were reared in the nurseries. Technical guidance to the village panchayats and other local bodies regarding the construction of fish ponds was given and the necessary training was also imparted in fish culture to the fishermen and gramsevakas.

The following kinds of fishes are found in the district :—

1. *Labeo fimbriatus*
2. *Labeo calbasu*
3. *Labeo nukta*
4. *Ophicephalus marulius*
5. *Ophicephalus striatus*
6. *Ophicephalus punctatus*
7. *Ophicephalus gachua*
8. *Callichrous bimaculatus*
9. *Wallago ottu*
10. *Mystus aor*
11. *Mystus seeghala*
12. *Anguilla bengalensis*
13. *Mastacembelus armatus*
14. *Notopterus notoptermis*

The total population of fishermen in the district is about 2,000 belonging to the Salager, Kabber, Katubu and Bhoi communities. The fishermen are distributed along the banks of the Bhima and Krishna rivers in Afzalpur, Gulbarga, Shahapur and Yadgir taluks. Fishing is brisk in the hot season. Cast nets, gill nets, drag nets, prawn nets and long lines are used for fishing. There are yet no fish market facilities in the district. Most of the fish catch is consumed locally.

The schemes under the Third Plan aimed at increasing fish production in impounded waters, by stocking fast-growing fish, increasing the catch both from the tanks and rivers by supplying fishing requisites to fishermen and providing them with stocking facilities. The new schemes envisage the supply of fishery requisites such as nylon yarn, cotton twines, floats and the like. It is proposed to construct a fish market at Gulbarga to enable the fishermen to sell their catches in hygienic condition. Ten

lakhs of fish seed, both of indigenous and exotic varieties, have been stocked in impounded waters. As a measure of conservation and for multiplication of fish stocks, a sanctuary at a cost of Rs. 0.10 lakh is to be established on the banks of the Bhima river near Deval-Ghangapur in Afzalpur taluk.

#### Famine and Scarcity

From a long time, the western portions of the erstwhile Nizam's Dominions were susceptible to crop failure and serious scarcity conditions. This area came to be known as the famine zone. Reports of famines and scarcities exist from 1629 as revealed by historical records. Many of these famines were the result of drought; many were brought about by wars and political upheavals. There was a great famine in 1630 A.D. which devastated vast areas in the western region of the Deccan. Twenty years later, another famine occurred which was caused both by wars and by drought. In 1659, there was a famine throughout the sub-continent and the territory now comprising the Hyderabad-Karnatak also faced a difficult situation. Again in 1681, the central portion of India was affected by famine due both to the state of war then prevailing and to a season of drought. Further, the years 1685 and 1713 were also famine years in the Gulbarga area. In 1730, the first recorded famine, since the Asaf Jahi dynasty came into power, occurred and there was great distress throughout the Deccan. The year 1747 was a famine year. Again in 1749, a serious famine occurred in the western portions of the Nizam's Dominions. The same area was affected again in 1787. In 1792-93, distress prevailed throughout the Hyderabad-Karnatak region. This was known as *Dogi Bara* or the skull famine owing to the appalling number of human beings that perished. Famines ravaged Gulbarga district in 1804, 1819, 1833, 1854, 1873, 1877-78 (the great famine), 1897 and 1899-1900 (also severe), 1909 (fodder famine), 1922-23, 1934 and 1945. There can be no doubt that conditions in the area have greatly changed in the last half a century since the last great famine period in 1899-1900. Communications have greatly improved. Labour is more mobile. Employment opportunities are now available on a larger scale and capable of being further augmented in times of scarcity. The development of irrigation has resulted in protection of crops over large areas even in the periods of very scanty rainfall. Lastly, the people have now greater resources and are more self-reliant. Buffer stocks of foodgrains facilitate the meeting of the needs of scarcity areas. Famines are not so fearful now as in the old days.

#### Floods

Even though monsoon inundations occur now and then in the low-lying areas, destructive floods are of rare occurrence. The most distressing floods that occurred in the past were those of 1817, 1825, 1851, 1882, 1954 and 1961. In these years, due to heavy rainfall in the Western Ghats, the Krishna and Bhima rivers were in spate inundating cultivable fields on their

banks. As these two rivers have their origin in the Western Ghats, periodical floods during the south-west monsoon period are of common occurrence. Though floods are common in these two rivers during monsoon months, the damages resulting from these floods are normally not very heavy. At present, there are no flood control measures along these rivers. The Upper Krishna Project, when completed, will help control the floods to a certain extent.

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