Soils

The soils of the district are generally sandy to sandy loam in texture. In some areas, however, these are loamy and clay loam. For the study of soil structure, the district may be divided into three tracts, viz. Bagar, Haryana and Dadri.

Bagar tract.—This tract covers the Loharu tahsil and the Bhiwani tahsil except a small portion of it in the east. Here the prevailing characteristic is a light sandy soil and shifting sandhills interspersed in places with firmer and in parts loamy bottoms.

In general, the sub-soil water level of this tract varies from 35 to 45 metres. The underground water in the Bhiwani tahsil is brackish and not fit for irrigation. However, in some patches around Jui village of Bhiwani block, the farmers have made attempts to instal tubewells but the water of these tubewells invariably turns brackish within three to four years as soon as the sweet strata of underground water is exhausted. Underground water of Tosham block is totally brackish though the water-table near Tosham is little less than its surrounding areas[1]. There is a water belt in the Loharu tahsil where it has been possible to instal shallow tubewells by farmers and deep community tubewells under MFAL (Marginal Farmers and Agricultural Labourers Development Agency) scheme. But the underground water resources are meagre and as such the discharge of these tubewells is almost 1/3 as compared to those in other districts of Haryana.

According to the *Hisar District Gazetteer*, 1915[2], and the *Loharu State Gazetteer*, 1915[3], the cultivated area is classified as *tibba* (sandhills) and *tal* (hard ground, i.e. the firmer valleys in between). Cultivation in the former is carried on with great difficulty; if there is no rain there is no crop, not even a blade of grass; while too heavy rain will wash the seed out of the soil or choke it in its germination with sand washed down from the neighbouring hillocks, so that cultivators have to re-sow their fields often more than once. Dust storms often change the appearance of the fields; on a field which was quite level yesterday a sandhill appears today. On the other hand, the plough has to be driven afresh over land which had previously been the site of a

1. *Hisar District Gazetteers*, 1892 (p.5), 1904 (p.4) and 1915 (p.4), have mentioned about well irrigation in the neighbourhood of the Tosham hills, where water was nearer the surface. It implies that the underground water belt must be sweet during that period.
2. Ibid, pp.4-5.
3. Ibid, p.12.

sandhill. But against all these disadvantages there are compensating advantages. The labour of ploughing is next to nothing owing to the lightness of the soil; again the light soil requires less rain for the production of a crop than the heavier soils of Haryana, so that there will be a crop, scanty indeed, in the Bagar when the richer soil to the west lies unsown. Once the plant has taken root, it struggles against drought for a long time. With a moderate rainfall the loamy valleys of the Bagar benefit largely by drainage from the sandhills. In *tal* land ploughing is especially difficult. It is done by camels. But the soil, if the rainfall is sufficient, yields fine crops and is preferred to the *tibba*. Both soils produce a single crop in the year, and even this depends upon the rainfall in July and August. The autumn crop is all important, winter crops being only grown exceptionally, should there be good rainfall in September and October. In this event barley, gram and oilseeds will be sown by the better cultivators on the more level pieces of land, and with rain in December or January, a fair crop is reaped.

In *tal* areas, the general practice is to keep about 25 per cent as fallow to conserve moisture for subsequent sowing and the rest of the area is covered under *kharif* crops. If there is sufficient moisture in the soil towards the end of September and during October, the area sown during *kharif* in *tal* also goes under *rabi* crops. In case of timely rainfall, the major area during *kharif* goes for *bajra* and during *rabi* under gram. When there is late rainfall during *kharif*, about 5 to 10 per cent shifting of cropping pattern from *bajra* to *gwara* is normally adopted. While in the event of late rainfall during *rabi*, some gram area, i.e. 5 to 10 per cent, goes under *rabi* oilseeds (*taramira*) and barley.

Now with the commencement of perennial irrigation provided by Jui Canal system in parts of the Bhiwani tahsil and some areas of the Loharu tahsil, the *tal* areas under the command of this canal system do have two crops during the year. There is also some change in the topography of the land as the undulating areas are being levelled every year to utilize the canal irrigation facilities more effectively. Some areas of Tosham block of the Bhiwani tahsil have come under seasonal irrigation provided by the Siwani Canal System. As such some area of *tals* are sown in both the seasons in spite of lack of rainfall for *rabi* sowing. Invariably one protective irrigation during winter is provided for gram sown under canal irrigated conditions.

The light texture of soils of this area enables sowings under scanty rainfall conditions as compared to other parts of the State. The intermittent showers during the growth period of the crops can help to bring the crops

to maturity. During winter, the severe cold waves can cause a total damage to the gram crop sown under rainfed conditions.

The principal crops in the Bhiwani tahsil of this tract are *bajra* and *gwara* during *kharif*; and gram, wheat and oilseeds in *rabi*. Some area during *kharif* goes under pulses and in *rabi* some area is covered under barley on a few tubewells installed in this area. Cotton and gronudnut are being introduced in Jui Canal area. In the Loharu tahsil, besides *bajra* and *gwara*, a sizeable area comes under *kharif* pulses during *kharif*, and in rabi besides gram, wheat and oilseeds, barley is also grown on almost every tubewell.

Haryana tract.—It comprises most of the Bawani Khera tahsil and a small portion of the Bhiwani tahsil in the east. This tract is generally level and sand-dunes are almost rare. The leading feature of the tract is its firm clay soil, locally known as *karri* or *kathi*, as opposed to the light shifting sand of the Bagar. In low-lying spots affected by local drainage, the soil becomes hard and clayey and is called *dakar*.

The soil of this tract is richer than the Bagar tract. It requires more rainfall than that of the Bagar, and with sufficient seasonable rain is very productive; but, on the other hand, no crop can be raised on the scanty falls which suffice for the Bagar; and there is in addition to this the absence of local drainage from sandhills.

The underground water in almost the whole of the tract is brackish except some isolated patches in the vicinity of canal minors. The depth of water level is generally over twenty five metres. The major crop during *kharif* is *bajra* and during *rabi* gram. Unlike the Bagar tract, wheat, sugar-cane and cotton crops are being grown in the area of this tract covered by the Western Yamuna (Jumna) Canal System as it has better irrigation facilities and as such the fallow area during *rabi* is almost half of the Bagar tract. In rest of the area, during *kharif* the fallow is almost equal to Bagar tract. The fallow areas of canal command are generally brought under wheat cultivation.

Dadri tract.—The chief characteristics of the soils of this tract, viz. Dakar, Rausli and Bhud as described in the *Phulkian States Gazetteer (Patiala, Jind and Nabha)*, 1904, are reproduced in the suceeding paragraph.

"The *'dakar'* soil is very stiff loam, blackish grey in colour. It requires a great many ploughings, several waterings and much labour, and hence is locally called *bailmar dharti*, or 'soil which exhausts the bullocks'. As it

takes time to absorb water, the surface moisture evaporates and a few light showers of rain are not enough to fertilize it. Moisture is usually found 3 feet (about one metre) below the surface. After rainfall the ground cracks, and when it is ploughed, clods are formed which have to be broken up by the *sohaga*, or by a light roller, to make the surface compact and level. It requires five or six ploughings and levellings, and gives a good yield of rice if abundantly watered artificially or by constant rain. Generally wheat, gram or *jowar* are raised on it. When the seasonal rains are abundant, even the *barani dakar* produces two crops in the year; *bajra* (millet) being reaped in Asuj (September-October), and wheat and gram sown for the *rabi*. In waste lands of this soil the *samak* grass, which is good fodder, grows. *Rausli* is an intermediate quality of soil containing less sand than *Bhud*, while it is not so stiff as *dakar*. It is grey on the surface and black at a depth of one foot (30 centimetres). When ploughed, no clods are formed but a fine tilth, and so no great labour is required to plough and level it. Hence it is called *rasili dharti* (easy soil) or *thandi dharti* (cool soil). All crops except rice (*dhan*) can be raised on it, and it is a good productive soil with seasonable, if occasional, rain. Moisture being absorbed quickly is very beneficial to it, and is usually found 60 centimetres below the surface. When this soil lies waste, it produces the *samak, palinji, takharia* and *dub* grasses, which are used as fodder. *Bhud* is an uneven sandy soil consisting of *tibbas* or hillocks and level stretches of sand. The hillocks shift under the high winds in Baisakh (April-May) and *Jeth* (May-June) from one place to another. It is generally very unproductive, and is locally called *dad lagi hui*, 'as troublesome as ringworm'. If there are a good many light showers, it yields fine crops of *bajra* and *moth*. *Bhud* absorbs the rain as it falls, and moisture is usually found 1½ feet (45 centimetres) below the surface. It requires no great labour in ploughing. Heavy rain destroys the seedlings, uprooting them and covering them with sand. Strong winds have the same effect. The *kans* and *dachab* grasses grow on this soil."

"The Ataila and Kaliana hills may be taken as the boundary line dividing the better soil from the worse. Towards the south and west of the Ataila hill, is a stretch of *bhud* covered with sandy hillocks though here and there patches of stiff soil, termed *tals* are met with. No cultivation is possible on the hillsides and only a little grass grows on them. The tract between the Ataila and Kaliana hills is mostly *rausli* and *bhud* with a very small area of *dakar*. The tract towards the east, south and north of the Kaliana hill is very chiefly *rausli* and *dakar* with very little *bhud* soil"[1].

The area of this tract now comes under three development blocks, viz.

1. Ibid, pp. 263-64.

Dadri-I, Dadri-II and Badhara. The topography of Badhara block and that of half of the Dadri-II block touching Badhara block is undulating and interspersed with sand-dunes as in the Bagar tract, though water is only 18 to 20 metres below the surface. The rest of the area of this tract is almost level and can be compared with the Haryana tract and the underground water is also brackish. The soils of Badhara block and that of Dadri-II block are sandy to sandy loam except few isolated patches of loamy to clay loam in Dadri-II. The soils of Dadri-I block are sandy loam to loamy in texture except a few isolated patches of clay loam to clay.

The underground water of Badhara block and half of the Dadri-II block is suitable for irrigation but the quantum of water is almost the same as mentioned in the case of the Loharu tahsil.

The problem of shifting nature of sands during summer months in lighter soils of undulating areas is the same as in the Bagar tract. The rain moisture absorption and its effect on sowing and maturity of crops is similar to Bagar and Haryana tracts depending upon the soil texture. The cropping pattern of Badhara block and half of the block and some area of the Dadri-II block is almost identical to the Loharu tahsil. In areas of Dadri-I and Dadri-II blocks, covered by the Western Yamuna (Jumna) Canal System, sugarcane cultivation is also done. In half of the area of the Dadri-I block towards Rohtak and touching boundaries of Haryana tract of the Bhiwani tahsil, cotton is grown though the intensity of this crop is much less than the Haryana tract.

This area has recently been benefited by the seasonal irrigation facilities provided by Loharu Canal System. The undulating topography is changing to levelled fields side by side with the progress of irrigation.

According to the survey conducted by the Haryana Agricultural University, Hisar, the main physiographic units encountered in the Bhiwani district are plains and dunes. These are discussed below :

Plains.—This unit lies to the northeastern side of the district covering about 20 per cent (1,31,988 hectares) of the total area with the following types of soils :—

(i) Coarse Loamy, Calcareous, Typic Canborthids;

(ii) Coarse Laomy, Calcareous, Arenic Canborthids;

(iii) Coarse Loamy, Non-calcareous, Arenic Canborthids;

(iv) Coarse Loamy, Calcareous, Calcic Canborthids; and

(v) Coarse Loamy, Calcareous, Typic Calciorthids.

These are the normal cultivated soils of the arid region. Texture of these soils varies from sandy loam (surface) to loam (down below) except arenic sub-group where it has loamy sand up to 50 cm depth.

Dunes.—This unit occupies the south and southwestern part of the district with three physiographic sub-units covering 66 per cent (3,34,988 hectares) of the total area:

(i) Dune tops.—These have loose sandy cover and have regular sand deposit by wind. These are completely barren and shifting type in nature. Soils of these areas are severely Eroded, Non-calcareous, Typic Torripsamments which means natural, immature without any sub-surface horizon, lacking the significant profile development in arid region. These soils have the texture of loamy fine sand or coarser up to one metre depth (called psamments). These are brown to yellowish brown in colour, excessively drained, loosely packed single grain structures.

(ii) Dune slope.—These are loamy sand in texture and are being put under cultivation by the farmers. Soils of these areas have been classified to Moderately Eroded, Non-calcareous and Typic Torripsamments.

(iii) Depressions.—These are closed pockets having closed drainage. Profile study of such areas reveals that soils are well drained, yellowish brown to dark yellowish brown, with sandy loam to loam in texture and weak sub-angular blocky structure with hard layer of calcium carbonate. These soils have been classified as Coarse Loamy, Calcareous and Typic Calciorthids (hard layer of calcium carbonate up to one metre depth of the profile occurring in arid regions).

CROPS

The crops grown in the district are divided into 2 main categories, viz. *kharif* and *rabi*, locally named *sawni* and *sadhi*. The former is the summer and rainy season sowing and the latter the winter sowing. Any crop which does not strictly fall in timing within these two harvests is known as a *zaid* crop and its harvest is called *zaid kharif* or *zaid rabi*, according to the harvest with which it is assessed. *Toria* (an oil-seed) is cultivated as *zaid kharif*; vegetables, melon, tobacco and green fodder as *zaid rabi*.

The major *kharif* crop of the district is *bajra* which occupies about 55 per cent of the cropped area. Among the *kharif* crops mention

may also be made of *moth* and *gwara* almost entirely a fodder crop. *Bajra* grown in the district is particularly good as this crop does well on sandy soil. Vegetables, onions, turnips and cucumber also deserve mention. *Matira*, a kind of water melon, of the Loharu tahsil is well known for its sweetness. It sometimes weighs between 10 and 15 kilograms.

The major *rabi* crop is gram which occupies about 42 per cent of the cropped area. The other *rabi* crops are wheat, barley, oil-seeds and vegetables. Tobacco is grown in some villages of Loharu and Badhara blocks and a few villages of Bhiwani block. The quality of tobacco grown here is particularly good.

Bajra, gwara and pulses (during *kharif*) are comparatively drought resistent and grow well in sandy loam soils. Gram, oil-seeds and barley (during *rabi*) are suitable for these soils for the water requirement of these crops is smaller compared to wheat. The dry and hot climate prevailing in the district is suitable for cotton but its area is limited by the scanty irrigation facilities available during summer. Sugarcane is grown in a very limited area due to the water requirements of this crop. Groundnut has been introduced consequent upon the availability of canal water during the rainy season, i.e. July to September, in almost all the newly constructed irrigation systems.

Some particulars about the crops grown in the district are given below:

Name of crop	Local name	Kind	Soils required	Time of sowing	Time of harvesting
1	2	3	4	5	6
	Kharif Crops				
1. *Bajra*	*Bajra*	Foodgrain/ Fodder	Sandy, sandy loam and loamy	June to July	End of September to October
2. *Gwara*	*Guar*	Fodder	Sandy to sandy loam and loamy	July to middle August	September to October and November to December
3. (i) *Moong* (ii) *Moth* (iii) *Mash*	(i) *Moong* (ii) *Moth* (iii) *Urd*	Pulses	Sandy to sandy loam	June/July	September to October
4. *Jowar*	*Jowar*	Grain/Fodder	Sandy loam/ loamy	April to July	September to October
5. Cotton	*Bari*	Cash crop	All types of soil except purely sandy saline or water-logged	Last week of March, April and May	Middle of October to end of December

1	2	3	4	5	6
6. Sugarcane	*Eakh*	Cash crop	Loam to clay	Middle February	Nobvember to March
7. Groundnut	*Moongphali*	Oil-seeds (cash crop)	Sandy to sandy loam	June/July	October/ November
	Rabi Crops				
1. Wheat	*Kanak*	Foodgrain/ Fodder	Sandy loam to loamy	End of October to end of November	April
2. Gram	*Chana*	Pulses	Sandy, sandy loam and loamy	End of September to 1st week of November	End of March to middle April
3. Barley	*Jao*	Foodgrain	Sandy loam to loam	Second week of October to November	End of March to April
4. (i) *Sarson* (ii) *Raya* (iii) *Taramira*	(i) *Sarson* (ii) *Raya* (iii) *Taramira*	Oil-seeds (cash crop)	Sandy to loam and loamy	October	March

The water requirement of different crops grown during *kharif* and *rabi* seasons are given in detail in Table IX of Appendix.

Cropping pattern.—The cropping pattern adopted in the district during 1972 to 1976 is shown below :

Name of crop	Percentage of area under each crop				
	1972	1973	1974	1975	1976
Kharif					
Bajra	55.5	57.0	59.1	36.0	56.4
Gwara	10.3	10.2	14.0	16.3	14.4
Pulses	1.8	3.0	3.0	4.1	4.4
Cotton	2.0	2.0	2.0	2.1	2.4
Sugarcane	1.0	1.0	1.0	1.0	1.3
Jowar	2.0	1.8	2.0	1.9	1.1
Chari	1.5	2.0	1.5	—	1.7
Others	1.5	1.5	1.5	0.4	0.4
Fallow	24.4	21.5	15.9	37.9	17.6
Total :	100.0	100.0	100.0	100.0	100.0

Name of crop	Percentage of area under each crop				
	1972	1973	1974	1975	1976
Rabi					
Wheat	6.0	6.0	5.0	6.1	7.4
Gram	42.5	43.5	25.5	51.9	45.7
Barley	3.3	2.5	1.8	1.5	0.6
Sugarcane	1.0	1.0	1.0	1.0	1.3
Oil-seeds	7.2	1.2	3.3	2.1	3.0
Others	1.0	1.3	1.0	0.7	0.6
Fallow	39.0	44.5	42.4	36.6	41.3
Total :	100.0	100.0	100.0	100.0	100.0

N.B. There being fractional differrence of percentage against each commodity, the total as a whole may not actually come to 100.

Rotation.—The district is largely *barani* and the choice for crop rotation limited. About 21 per cent of the area is irrigated where farmers do select crops for rotation. As a general practice, the major *barani* crops during *kharif* are : *bajra, gwara, kharif* pulses (*moong*). Invariably these crops are followed by gram sowing in *rabi*. Though some area under pulses and *gwara* is followed by *rabi* oil-seeds (mostly *taramira*) and barley.

In irrigated areas, besides major crops of *bajra* and *gwara*, cotton, *kharif* fodder (*jowar*) and sugarcane are also grown during *kharif*. Cotton is generally followed by gram and wheat in the ratio of 50:50. *Gwara* is commonly followed by wheat and barley. Gram is the major crop sown during *rabi* after *bajra*. In case of sugarcane, the general practice is sugarcane-*ratoon* (sugarcane)-*jowar*/*bajra* (*kharif*)-followed by gram during *rabi*. Another choice for sugarcane rotation is sugarcane-*ratoon* (sugarcane)-fallow-wheat.

About 25 to 30 per cent area is left fallow during *kharif* and it is followed by gram (major area) and *sarson* (some area) sowing in *barani* areas and wheat in irrigated areas.

Fodder Crops

The main fodder crops of the district are *gwara* and *jowar* which are grown during *kharif*. The table given below shows the area and production

of different fodder crops during 1972-73 to 1976-77 :

Crops	1972-73		1973-74		1974-75	
	Area (Thousand hectares)	Production (Thousand tonnes)	Area (Thousand hectares)	Production (Thpusand tonnes)	Area (Thousand hectares)	Production (Thousand tonnes)
Kharif						
Gwara	57	686	46	549	62	749
Jowar	17	409	19	462	15	363
Rabi						
Barseem	1	30	1	36	1	36
Methi	1	9	1	3	1	9

	1975-76		1976-77	
	Area (Thousand hectares)	Producation (Thousand hectares)	Area (Thousand hectares)	Production (Thousand hectares)
Kharif				
Gwara	75	899	66	800
Jowar	9	253	13	325
Rabi				
Barseem	2	65	1	38
Methi	1	8	2	15

It is apparent from the above table that in 1975-76 *gwara* alone covered more than 86 per cent of the total area under fodder crops followed by *jowar*[1] which covered 10.4 per cent. Area under *rabi* fodder crops, viz. *barseem* and *methi* is insignificant. There has not been any appreciable increase in the per hectare yield of these crops.

1. The area under *jowar* includes *chari* because when fed green, *jowar* is called *chari*.

HORTICULTURE

Given irrigation facilities, the agro climatic conditions and the soils of the district are suitable for certain species of fruit plants like *ber*, guava, pomegranate and grapes. However, lime, peach, plum and almond can also be grown successfully. At present, the scope of grape cultivation is limited because of scanty irrigation. Due emphasis on *ber* and guava cultivation is being laid and these two are expected to be very popular among the farmers in the coming years.

Amongst vegetables, potato, chillies, onion and cucurbits have good scope as and when the canals start supplying more and frequent water in different periods of the year.

The approximate area under fruits and vegetables in the dsitrict during 1974-75 was :

	Approximate area (Hectares)
Fruits	
1. Mango	3
2. Citrus	30
3. Guava	35
4. Grape	10
5. *Ber*	60
6. Pomegranate	30
7. Mulberry	15
8. Miscellaneous	20
Total :	203
Vegetables	
1. Potato	90
2. Sweet Potato	85
3. Chillies	90
4. Onion	90
5. Peas	60
6. Tomato	50
7. Brinjal	40
8. Cucurbits	100
9. Miscellaneous	80
Total :	685

The two Horticulture Inspectors, one at Bhiwani and the other at Charkhi Dadri, deal with problems of fruits and vegetables cultivation. The extension programmes are conducted through the existing agricultural agency which propagates horticultural programme along with other agricultural practices.

AGRICULTURAL IMPLEMENTS

The traditional implements commonly used by the cultivators are :

Hal	(plough)
Jua	(yoke)
Por, orna or *nali*	(seed drill made of strips of bamboo and held together by a long narrow piece of leather (*badi*) wrapped carefully round them. It is secured to the *hatha* or upright handle of the plough with its lower extremity just above the ground behind the *hal* and has a wide mouth into which the seed is put, and so drops through the *por* into the plough furrow.)
Kassi	(spade)
Kuhari	(an axe for cutting brushwood and *pala*)
Gandasa or *gandasi*	(choppers of different sizes)
Jheli	(two-pronged pitch fork, the fork is called *sangar* and the handle *nala*)
Tangli	(three-pronged pitchfork)
Kasola	(hoe with a long handle, *binda*, used for reaping and cutting grass)
Khurpa	(short-handled spade or hoe for digging up grass by the roots)
Sohaga	(flat board, used for harrowing by drawing it over the ground)
Dandeli	(rake with 6 or 8 teeth used for collecting cowdung and for making the ridges or *kiaris*)
Chhaj	(winnowing basket)
Gopya	(sling made of rope with which stones are thrown in order to scare away the birds which damage the crops when ripening)
Gadi	(cart)

Any improvement in agriculture is inconceivable without a corresponding

improvement in the implements. Modern implements are being gradually adopted by the farmers. These are also popularised by the Government. A description of agricultural implements in common use is given below :

Plough.—The cultivator's most important implement is the plough, *hal* or *munna*. The two latter words refer primarily to the piece of wood shapped like a boot, into the top of which the pole (*hal*) and to the bottom of which a small piece of wood (*chou*) is fastened ; the latter in its turn carries the *pali* or the iron plough share. The *hal* is perhaps the most important part of the plough, as upon its weight and size depends the adaptability for ploughing various kinds of soil. In the case of sandy soils it is light and is called *hal*, whereas in the case of the firmer soils it is heavier and called *munna*.

In the light soil it is not uncommon to plough with camels. The pole of the plough is fastened with a leather thong to a curved piece of wood called *pinjni*, which again is strapped on to the back of the camel by the *tangar*, a sort of camel harness which is kept in its place by the *palan*, a small saddle on the camel's back.

This plough merely scratches the soil up to 4 or 5 inches. The chief defect in it lies in the fact that it leaves ridges of unploughed land between the V-shaped furrows which it makes. The plough also fails to erdicate weeds properly. However, a sturdy and intelligent farmer makes full and efficient use of the plough with a strong pair of oxen, or a camel. In small land-holdings and fragmented and non-contiguous plots, the plough is highly suitable. The following table shows at a glance, the comparative figures for 1973 to 1976:

Particulars	Total number			
	1973	1974	1975	1976
Ploughs	73,707	73,830	83,865	85,111
(i) wooden	66,555	66,445	75,605	76,633
(ii) iron	7,152	7385	8,260	8,478

The iron plough is more popular among the farmers who came from Pakistan and its adoption is changing the outlook of the local farmers.

Tractor.—By and large cultivation is done with the help of animal power, i.e. camels and bullocks though the tractor has also appeared on the scene.

The number of tractors in use in 1973 was 495 which increased to 505 in 1974, 866 in 1975 and 950 in 1976.

Bullock/Camel-cart.—This is usual load carrying device of the farmer. It is commonly used for carrying the farm produce to the thrashing ground, grains to the homestead and surplus, if any, to the market and for other transportation needs. These carts are provided with iron wheels, wooden wheels or inflated tyre wheels. The carts are manufactured locally and are also imported from other districts.

Cane-crusher.—It is used for crushing cane. It is made of wood or iron. There were 6 cane crushers in the district in 1973. No increase was recorded in 1974. There were 8 cane-crushers in 1975 and 10 in 1976.

Ghani (Oil-expeller).—The number of the *ghanis* which was 118 in 1973 increased to 124 in 1974. These are mostly found in urban areas and big villages. There were 129 *ghanis* in 1975 and 135 in 1976.

MECHANISED FARMING

There are about 950 tractors owned by the farmers in this district. The Haryana Agro Industries Corporation and the Haryana Land Reclamation and Development Corportion, which are State Government undertakings, are extending help to farmers in mechanised farming.

Haryana Agro Industries Corporation Limited.— The Corporation set up a Farmers' Service Centre at Charkhi Dadri in 1972. This centre was shifted to Bhiwani in July 1973. The main object of this centre is to provide infrastructural facilities to the farmers to boost overall agricultural production and to assist them in a variety of allied spheres.

With a view to extend facilities of custom hiring, repairs/servicing, etc., the Haryana Agro Industries Corporation has also undertaken a programme of establishing 3 Agro Service Centres per block. The Bhiwani district has been taken up on priority basis. Out of its seven blocks, the Agro Service Centres have been opened at Tosham and Loharu on February 28, 1975 and January 13, 1975 respectively.

All the centres are under the charge of an Assistant Engineer at Bhiwani. He is assisted by 1 Accounts Clerk, 1 Store Keeper and 2 Security Guards on the administrative side and 2 Tractor Operators, 1 Supervisor and 1 Junior Mechanic on the custom hiring side. The number of Tractor Operators and Helpers depends on the number of tractors in the centres for custom hiring work.

The centres provide custom hiring service of tractors and other agricultural implements and machinery for all the farm operations such as ploughing, discing, sowing and land levelling work, to the agriculturists in the district. The other facilities/services being provided by the centre include repair of tractors and implements and aftersale service of tractors supplied by the Haryana Agro Industries Corporation. The centres also sell spare parts, implements, storage bins, etc., manufactured by the Corporation, to the farmers. From April 1976, the delivery of new tractors sold by the Corporation has also been started from Bhiwani centre. Previously this facility was available at one place only, i.e. Agro Engineering Workshop of the Corporation at Nilukheri.

In 1974-75, there was a fleet of 10 tractors (6 at Bhiwani and 2 each at Tosham and Loharu) and two bulldozers with matching implements, operating in the district under the control of Bhiwani, Loharu and Tosham centres. A well equipped workshop is attached to the Bhiwani centre for repairs and servicing of tractors and other agricultural implements and machinery kept by the centres for custom hiring work as well as those kept by the farmers at their own farms.

The financial and physical achievements of the Farmers' Service Centres during 1973-74 to 1976-77 are given below :

Financial Achievements

Item	1973-74 (Rs.)	1974-75 (Rs.)	1975-76 (Rs.)	1976-77 (Rs.)
1. Custom hiring charging	1,87,396	2,52,035	1,91,844	44,140
2. Workshop receipts	2,983	4,004	300	1,053
3. Sale of feed	43,162	1,27,560	1,85 858	3,823
4. Sale of spare parts	6,972	3,628	28,475	5,485
5. Miscellaneous income	43	67	1,299	7
Total :	2,40,556	3,87,294	4,07,776	54,508

Physical Achievements

Item	Unit	1973-74	1974-75	1975-76	1976-77
1. Tractors repaired	(Number)	45	30	30	45
2. Farmers to whom tractor facilities provided	(Number)	835	900	325	225
3. Total area covered by the centre in providing all types of tractor facilities	(Hectares)	1,012	1,174	895	210

The Corporation is also taking steps to provide fuelling facilities to the farmers of the area. A plot for setting up a petrol pump has been acquired on Loharu Road for making available pure lubricants and high speed diesel at reasonable price.

Haryana Land Reclamation and Development Corporation Limited.—

Established in March, 1974 with its registered office at Chandigarh, the main object of this Corporation includes reclamation of alkaline and saline lands and levelling, grading and shaping of uneven and undulating lands in the Haryana State. Most part of the Bhiwani district has uneven topography. The farmers are keen to get their lands levelled and shaped, so that they receive the full benefit of the newly introduced lift irrigation schemes. But it is a costly process and their financial resources are limited. In order to help them the Corporation has set up a Regional Manager's office at Bhiwani and a Manager's office at Charkhi Dadri.

A fleet of 26 David Brown tractors of 55 HP is deployed in the area. All the tractors are equipped with necessary implements/equipment needed for carrying out the job. The levelling work is taken up on cash/loan basis. Needy farmers are helped through loans from the Primary Land Development Banks. The State Government gives subsidy at the rate of 25 per cent on land levelling work. Each Manager has been provided with technical staff who assist the farmers out of their difficulties by rendering guidance in technical matters and in the execution of works. The Corporation recovers service charge for the loans and other service rendered to the farmers in the execution of work.

The land levelling work done through the machinery of the Corporation

in the Bhiwani district is shown below :

Period	Area levelled (Hectares)
July 1975 to June 1976	1,492
July to March 1977	1,402

SEED

Better varieties of seed enhance considerably the yield of agricultural produce. The Agriculture Department concentrates on multiplying and distributing improved seeds to farmers. The better yielding varieties of some seeds are :—

Kharif Varieties

Bajra	Hybrid No. III and PHB—14
Moong	Varsha, Baisakhi and T—44
Gwara	F.S.—227
Cotton	H—14, 320—F, G—27 and Jai
Jowar	J.S. 20 and J.S. 263
Groundnut	Pb. No. 1 and M—13
Sugarcane	Co. 1148, Co. 1158, Co. 975 and Co. L9

Rabi Varieties

Wheat	C—306, K. Sona and Sonalika
Barley	C—164, C—138
Gram	G—130, G.24, S—26 and C—21
Rava	L—18, Raya H—29 (Parkash)
Sarson	B.S.H.—I
Taramira	I.T.S.—A
Toria	I.T.S.—A
Oat (fodder)	Haryana Javi—114
Barseem	Mescavi

There are 2 Government agricultural seed farms at villages Kolhawas and Nawan in the Dadri tahsil where improved seeds are grown for distribution among the cultivators. These, however, meet the demand only partly. The

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farm at Kolhawas was handed over to the Haryana Seeds Development Corporation on March 10, 1962. The farm at Nawan consists of *barani* land and is given to tenants for cultivation. A few other details about these farms are :

Seed farm	Year of establishment	Area	Crops sown for seed
		(Hectares)	
Kohlawas	1959	42	*Gwara, moong*, wheat, *sarson, rava* and *taramira*
Nawan	1959	10.4	*Gwara* and gram

At village Dhanana an agricultural farm measuring 6 hectares has been attached to the Government High School, but it is not meant for seed production. It serves the purpose of agriculture training to students and brings in some financial gain to the institution.

The varieties of improved seed of principal crops distributed by the Agriculture Department and through Haryana State Cooperative Supply and Marketing Federation Limited and the area under improved varieties in the district during 1973-74 to 1976-77 were :

Year	Improved seed distributed (Tonnes)			Area under improved varieties (Thousand hectares)		
	Bajra	Wheat	Gram	Bajra	Wheat	Gram
1973-74	20	45	500	20	21	25
1974-75	42.5	106.2	470	50	20	30
1975-76	84.3	58.5	282.5	75	22	40
1976-77	34.4	90.0	470	60	24	40

MANURES AND CHEMICAL FERTILIZERS

According to a survey conducted by the Haryana Agriculture University about the fertility status of the soils of the Bhiwani district with respect to NPK (nitrogen, phosphorus and potassium) and zinc, the soils in general are low to very low in nitrogen, low in available phosphorus and medium to high in available potassium. Plain soils are low to very low in available nitrogen, low to medium in available phosphorus but are well supplied with available potassium.

Depression areas are poor in nitrogen, medium to high in available phosphorus and well supplied with available potassium .

Survey of the soils with regard to their micronutrients status has revealed that about 60 to 70 per cent of the total cultivable area is deficient in available zinc. In some areas multimicronutrient deficiencies have also been observed.

Next to water and improved seed, manure and chemical fertilizers are the most important inputs for increasing crop yields. In recent years, the use of mannre and fertilizers has increased considerably in advanced areas of the State, but efforts to increase the soil ferility by the farmers of the Bhiwani district with chemical fertilizers have remained limited due mainly to the absence of irrigation. However, the farmers have always been very conscious about the fertility-maintaining factors like keeping the land fallow and to use farmyard manure. They have also been conscious of crop rotation to maintain soil fertility.

Manures.— Cow dung is still extensively used as fuel in preference to its use as farmyard maunre. Efforts are being made to popularise *gobar* gas plants which will be very helpful in minimising the fuel use of cow dung. During 1974-75, a target of installation of 150 *gobar* gas plants was fixed for the Bhiwani district. Against this, 300 plants (double the target) were installed. Though extended to about 100 villages, this programme has been concentrated in some selected villages where more then 10 *gobar* gas plants each have been installed. The farmers seem to be convinced about their utility as a source of good farmyard manure as well as a source of fuel for cooking.[1]

Extension education for compost making has also been intensified for proper use of dung and farm wastes. Regular campaigns are organized to push up this propgramme. The municipal compost is utilized by the cultivators in the vicinity of towns for growing vegetables.

Chemical fertilizers.— Distribution of fertilizers is done by the Haryana Agricultural Marketing Federation through Agricultural Marketing Socities. As the use of chemical fertilizers has reently gained attention with increasing irrigation in this newly developing area, the number of societies and sub-depots has been supplemented by stocking the fertilizers with the Agricultural Inspectors. In this way, the fertilizers are made available

1. *Gobar* gas has made cooking easy for the village house-wife who need not now blow at the domestic oven.

to the farmers at convenient places. The supply of fertilizers to distribution points is regulated by the Deputy Director of Agriculture by coordinating this programme between extension agency and supply agency, i.e. HAFED and Marketing Societies. The following data show the distribution of chemical fertilizers among the cultivators of the district during 1972-73 to 1976-77 :—

Year	Chemical fertilizers distributed (Tonnes)		
	Nitrogenous	Phosphatic	Potash
1972-73	835.6	26.6	6.0
1973-74	1,101.5	46.6	6.1
1974-75	850.0	78.2	9.2
1975-76	1,011.5	40.5	4.2
1976-77	1,485.0	69.5	5.0

The sudden increase in price of fertilizers during 1974-75 gave a set-back to their increased use. However, the Agriculture Extension Agency is constantly educating the farmer community regarding the use of fertilizers in spite of increased cost.

AGRICULTURAL PESTS AND DISEASES

The crops are occasionally exposed to damage from a variety of diseases and pests. Downey mildew in hybrid *bajra* and wilt in gram are the two most serious crop diseases in the district. The only control measure for wilt is to find a resistant variety which so far has not been evolved. Roguing of diseased plants immediately after appearance of the pest, along with one or two sprays with Miltox/ Blitane Dithane M. 45 and Blitox are effective control measures against downey mildew'. Efforts have been made to evolve a resistant variety of hybrid *bajra* against doweny mildew.

Among the other insects and pests is Katra (hairy caterpillar) attacking all *kharif* crops during the rainy season. It causes serious damage to *bajra, moong* and *gwara* crops at the early stage. This insect can only be controlled by blanket BHC 10 per cent dust in the early stages and by Thiodan sprays at later stages. White ant in wheat, barley, groundnut and sugarcane, if not timely controlled can cause great damage. White ant does attack cotton, chillies and fruit also. Effective control is soil application with Aldrex 5 per cent dust BHC 10 per cent or Aldrin 30 per cent EC.

On cotton, the serious insects are jassid/aphis, whitefly, red cotton bug and pink ball work/spotted ball work. A number of insecticides like Dimecron, Disyston granules, Rogor Malathion, Folithion, Savimol/Sevire DDT 50 per cent can effectively control these insects.

During certain years, phids, mustard saw fly and painted bug cause damage to *rabi* oil-seeds. These can be controlled by B.H.C. 10 per cent dust, Malathion/Metasystox and Dimecron sprays.

Pyrilla and borers are very harmful in the case of sugarcane crops. B.H.C 10 per cent dust at early stage and Malathion/Thiodon spray at the late stage are effective control measures against pyrilla. For borers, besides chemical control like Nuvacron 100, mechanical methods like chopping top portions of affected plants, pulling out dead hearts and pouring chemicals in the leaf whorl, are other effective control measures.

Rats are a serious pest for wheat, barley and sugar cane. These can be controlled by feeding baits poisoned with Zinc phosphide/strychnine Hydrochloride/Ratefin and fumigation with Celphos tablets. Large quantity of stored grains are destroyed by pests like *dhora*, *khapra*, lesser grain borer and rust red flur beetle. These can be controlled effectively by fumigating the store, containers (grain bins/gunny bags) with Celphos Malathion and Methyle bromide.

The Agriculture Department educates farmers as regards different control measures to reduce damage to crops. Legal action under the East Punjab Agriculture Pests, Disease and Noxious Weeds Act, 1949, can be taken against cultivators who do not eradicate weeds, pests and diseases before the maturing of crops.

Marginal Farmers and Agricultural Labourers Development Agency (MFAL), Bhiwani

This project sponsored by the Government of India to improve the socio-economic condition of the rural peasantry particularly the weaker sections namely, marginal farmers and landless agricultural labourers of the Bhiwani Sub-division comprising the three blocks of Bhiwani, Tosham and Loharu, was launched on June 14, 1971 with headquarters at Hisar. After the formation of the new-district of Bhiwani, the headquarters of the Agency was shifted to Bhiwani in February 1973.

The area of the operation was extended to the Dadri and Bawani

Khera tehsils on June 12, 1974, covering the following three categories of beneficiaries :—

Small Farmer: A small farmer connotes a person having a holding of 2.50 acres and less under irrigated conditions and up to 5 acres under un-irrigated conditions.

Marginal Farmer: A marginal farmer connotes a person having a holding below 1.25 acres under irrigated conditions and 2.50 acres under un-irrigated conditions.

Landless Agricultural Labourer: A landless agricultural labourer connotes a person who has a homestead and earns 50 per cent or more of his income from agricultural wages.

The Marginal Farmers Agricultural Labourers Development Agency has since been wound up and merged with the Drought Prone Area Programme from April 1, 1976 and now the Small Farmers Development Agency is in operation in the Bawani Khera tahsil.

The aim of the Agency was to provide loans and subsidies to the small marginal farmers and landless agricultural labourers for the installation of community deep tubewells, pumping sets, *Jhallars/rathats*, pakka channels, land levelling, spraying pumps, subsidy on inputs, crop loans, dairying, sheep breeding, poultry farming and rural works programme.

The project work was looked after by the Chief Executive Officer assited by a skeleton nucleous staff consisting of 3 Assistant Project Officers from the disciplines of animal husbandry, cooperation and development. The Agency acted as a catalyst in activising the existing departments of agriculture, cooperation, development, animal husbandry, public works, forests, etc., to execute various schemes in the project area.

The Government of India has placed a sum of Rs. 1.00 crore at the disposal of the Agency for providing subsidies to participants. The quantum of subsidy varies from 25 per cent to 33 per cent on capital cost. However, for the installation of community deep tubewells, the subsidy is 50 per cent of the capital cost and such tubewells will be owned and maintained by the Haryana State Minor Irrigation (Tubewells) Corporation (MITC), and the Corporation will charge 50 per cent concessional rate from the marginal farmers for 5 years. The loans and subsidies, as detailed below

were abailable for the identified small marginal farmers and landless agricultural labourers:

Name of scheme	Approximate total financial requirement per unit	Percentage of loan	Percentage of subsidy
	(Rs.)		
1. Community deep tubewells	80,000	50 per cent share of MITC	50
2. New shallow wells/ pumping sets	8,000	75	25
3. *Jhallars/rathats*	2,000	75	25
4. Construction of lined/underground channels	2,800	75	25
5. Land levelling	300 per acre	66	33
6. Supply of spraying pumps	250	66	33
7. Subsidy on inputs			Rs 100 per family
8. Crop loan	1,000 per family	Rs. 1,000 per family	
9. Dairy farming	1,800	66	33
10. Sheep breeding	3,000	66	33
11. Poultry farming	2,700	66	33
12. Rural works programme			100

By March 31, 1977, the Agency had enrolled 50,499 members, (8,139 small farmers, 28,753 marginal farmers and

13,607 agricultural labourers). It provided financial assistance to the tune of Rs. 254.71 lakhs. This included short term loans amounting to Rs. 29.071 lakhs, medium term loans amounting to Rs. 11.94 lakhs, long term loans amounting to Rs. 19,29,000 and subsidies released to support various development activities (excluding administrative charges) amounting to Rs. 91.13 lakhs. A total number of 27,661 beneficiaries took advantage of this assistance. This included 1,581 crop loan and 26,080 other than crop loan beneficiaries. The schemewise achievements of this Agency are given in Table X of Appendix.

Despite a number of intial difficulties such as lack of credit flow from the banks as well as lack of marketing facilities for the disposal of milk, wool, eggs and other products, which was a basic condition of the Reserve Bank of India for the advancement of loans for undertaking animal husbandary schemes, the Agency, as is evident from Table X of Appendix, achieved good results in community deep tubewells, crop loans advanced for the purchase of high-yielding varieties of seeds, fertilizers and pesticides, dairy farming, sheep breeding and rural works programme. The Agency spent a sum of Rs. 27.17 lakhs on rural works programme such as digging of water courses, desilting of canals, link and approach roads, afforestation and sand-dune fixation and provided gainful employment to 15, 434 landless agricultural labourers and mariginal farmers. A sum of Rs. 5.57 lakhs has been spent on digging of 212 water courses with a length of 12,99,459 feet (3,89,838 metres) in the command of Jui Canal under Rural Works Programme which extended assured irrigational facilities to 12,500 acres (5000 hectares).

The Agency concentrated on the following schemes which were assessed to have an inherent potential for development:—

Installation of jhallars/rahats.—With the introduction of lift irrigation schemes in this area, there was big hope for the installation of *jhallars/rahats* by the marginal farmers as the fields are at a higher level than the water courses to the extent of 3 feet to 5 feet By March 31, 1977, 305 marginal farmers were covered under this scheme.

Installation of community deep tubewells.—The Loharu block has potential for the installation of 50 deep tubewells in its sweet water belt. The Agency financed 50 community tubewells, which would be maintained by the Haryana State Minor Irrigation (Tubewells) Corporation, primarily for the benefit of the marginal farmers who would be provided water for irrigation at 50 per cent concessional rate for a period of 5 years. The

work is in progress. By March 31, 1977, 27 tubewells had started functioning. With the completion of this scheme in 1977-78, assured means of irrigation would become available to 3,000 acres (1,200 hectares) of land in this block.

Afforestation.—Under this head, sand-dunes fixation on 155 acres (62.7 hectares) and afforestation on 650 Row-kilometres has been done by incurring an expenditure of Rs. 12.54 lakhs. Plantation work has also been carried along the banks of various water channels and roads.

Link roads.—To enable the farmers to transport their agricultural produce to towns/*mandis*, 22 link roads were constructed by March 31, 1977. This involved an expenditure of Rs. 6.93 lakhs.

Rural Artisans Programme.—The Agency helps not only in the development of agriculture but also covers industrial development schemes. This includes training in a number of trades such as electrician, motor mechanic, tractor mechanic, oil engine mechanic, blacksmithy, shoe-making and leather goods. A stipend of Rs. 100 per month is provided to each trainee and on the completion of training, a loan up to Rs. 2,000 is also given to start business. One third of the loan is later on treated as subsidy. By March 31, 1977, the Agency gave stipends of Rs. 0.19 lakh for 24 trainees.

Dairy development.—With the establishment of the Milk Plant at Bhiwani, dairy farming has become quite remunerative for the marginal farmers and landless agricultural labourers. Under the Dairy Development Scheme, a loan up to Rs. 1,800 is provided to a beneficiary for the purchase of a buffalo of refined breed through the Agency. One third of the loan is later treated as subsidy. By March 31, 1977 the agency advanced loans of Rs. 92.71 lakhs of which Rs. 23.78 lakhs was treated as subsidy and supplied 5,045 buffaloes to 5,045 beneficiaries.

Sheep farming.—Sheep farming is one of the popular and remunerative subsidiary occupations among the landless agricultural labourers of the Loharu, Bhiwani and Tosham areas because of the availability of pastures and grazing grounds and the assured market available through the Wool Grading Centre, Hisar (Hissar) which is run by the State Animal Husbandry Department. For the development of sheep, 50 co-operative societies were formed by March 31, 1977. A sum of Rs. 10.43 lakhs was advanced as loan and Rs. 3.42 lakhs as subsidy to 448 beneficiaries.

Crop loan.—Consequent upon the availability of assured means of

irrigation in the area, the high-yielding varieties of seed, fertilizer and pesticide are becoming popular with marginal farmers. For the purchase of these inputs, a sum of Rs. 29.07 lakhs was advanced as crop loans to 1,581 beneficiaries @ about Rs. 1,000 per beneficiary up to March 31, 1977.

Subsidy on inputs.—In addition to crop loan, the Agency gives subsidy for the purchase of inputs like improved seed, fertilizers, and pesticides, subject to a ceiling of Rs. 100 per beneficiary. By March 31, 1977, a sum of Rs. 1.95 lakhs was given as subsidy to 3,542 members.

Cropping pattern guidance.—Personal contacts are being eastblished with marginal farmers, with an assured means of irrigation, and they are advised and induced to adopt the most profitable cropping pattern for achieving 200 to 300 per cent of cropping intensity.

In this way, the Agency worked as a liquidator of poverty.

Demonstration plots.—With a view to induce the marginal farmers to adopt modern agricultural practices, 200 demonstration plots were laid out in 1974-75.

FUTURE PROSPECTS

In the beginning of this Chapter, the distressing conditions of the land and the people have been described. For centuries drought and famine inexorably blended with their fate and destiny. The years of bountiful rainfall were few and far between. Even well irrigation was denied. They struggled for survival on the barest pittance. Sophisticated agriculture and improved farming practices were beyond their natural habitat, and even beyond their imagination. In this situation, lift irrigation projects have brought the beginning of what amounts to a miracle.

Farmers were totally ignorant about irrigated farming which has been introduced in the district only with the canal lift irrigation schemes. They also lacked the knowledge of water requirements of various crops at different stages of growth. They were naturally reluctant to adopt improved agricultural practices and new technology. With the heretofore inconceivable opportunities, they have practically to learn everything anew regarding argiculture and farming patterns and practices. Here the guidance given by the Department of Agriculture and the Haryana Agricultural University, Hisar, has proved vital.

The extension of irrigation which is being strenghened in stages, is bound to boost the production of crops which were previously almost

unknown. Groundnut is likely to occupy a substantial area in sandy tracts during *kharif*. Cotton and wheat will be now introduced in areas to be benefited by lift irrigation schemes and substantial increase in these crops is bound to occur during the next few years. There is also scope for expansion of sugarcane and vegetables (particularly potatoes) and the area under oil-seeds and *kharif* pulses will also increase. The improved and expanded irrigation provides potential for fodder, which will boost dairy-farming.

The use of chemical fertilizer, farm-yard manure and a suitable crop rotation provide promise for increasing the fertility status of soil. Similarly, water management practices have to be followed.

As the crops proposed to be introduced in the area coming under irrigation are quite new to the farmers, all possible precautions will have to be taken by public agencies to convince them by demonstrating the successful raising of these crops. Cotton, oil-seeds and pulses are highly susceptible to attacks of insects, pests and diseases. Therefore, necessary arrangements have to be made for effective and timely plant protection measures. Educating the farmers for an integrated plant protection programme is an important task to avoid the failure of new crops. Area development programmes provided under various schemes are expected to show good results in all fields of agricultural production.

Agricultural Cooperatives

Increased agricultural production depends on several significant inputs, which include the provision of timely and adequate credit, supply of chemical fertilizers, improved seed, insecticides, pesticides and facilities for marketing of agricultural produce as well as storage arrangements. The agricultural service-cooperatives aim at meeting these requirements. It is through cooperative farming that the scanty resources of the agriculturists can be pooled, thus bringing to them the gains of large scale intensive farming. Through cooperative marketing the erosion of profits to middlemen can be checked and higher dividends secured.

The total number of cooperative societies of all types and their membership was 1,208 and 1,04,311 respectively on June 30, 1975. The societies comprised 579 agricultural cooperatives, 295 industrial cooperatives, 147 milk cooperatives and 187 other cooperatives. By June 30, 1977, their number decreased to 939 while their membership rose to 1,12,722. The societies consisted of 341 agricultural cooperatives, 270 industrial cooperatives, 168 milk

cooperatives and 151 other cooperatives.[1] Mainly the decrease was registered in the case of agricultural cooperatives which are discussed here. These societies included :

Type of society	Number as on	
	30-6-1975	30-6-1977
Agricultural Credit Service	493	256
Central Cooperative Bank	1	1
Primary Cooperative Land Banks	2	2
Joint Farming	35	33
Marketing	6	6
Scheduled Castes Land Owning	42	43
Total :	579	341

For meeting credit, chemical fertilizers and consumer goods requirements, there were on the 30th June, 1975, 493 agricultural credit societies with a total membership of 65,454. A number of these societies were not found viable. These were, therefore, amalgamated with the bigger ones. The result was that by June 30, 1977, the total number of these societies decreased to 256 although their membership further increased to 75,317. The table below gives data regarding the number of sub-depots in the district through which these societies distributed chemical fertilizers, the quantity of chemical fertilizers distributed and the value of consumer goods supplied by these societies during 1974-75 and 1976-77 :

Year	Sub-depots in the district	Chemical fertilizer distributed	Consumer goods supplied
	(Number)	(Metric tonnes)	(Rs. in lakhs)
1974-75	52	13.00	20.00
1976-77	32	2.61	40.24

The Bhiwani Central Cooperative Bank Ltd., Bhiwani, which started

1. For industrial cooperatives, the Chapter on 'Industries' may be seen; for milk cooperatives and other cooperatives, the Chapter on 'Other Departments'.

functioning from April 1973, advances short-term and medium-term credit to the various types of cooperatives. It advanced a sum of Rs. 25.47 lakhs during 1-4-1973 to 30-6-1973, Rs. 102.78 lakhs during 1973-74 (July 1973 to June 1974), Rs. 106.44 lakhs during 1974-75 (July 1974 to June 1975), Rs. 321.38 lakhs during 1975-76 (July 1975 to June 1976) and Rs. 477.42 lakhs during 1976-77 (July 1976, June 1977). Its membership on the 30th June, 1973, was 989 with owned funds (share capital) amounting to Rs. 36.54 lakhs and working capital amounting to Rs. 227.67 lakhs. The total amount of deposits held by the bank amounted to Rs. 32.29 lakhs. Similar figures at the end of June 1974, June 1975, June 1976 and June 1977 were as follows :—

	At the end of			
	June 1974	June 1975	June 1976	June 1977
Membership (Number)	958	959	823	737
Owned funds, i.e. share capital (Rupees in lakhs)	44.74	50	50.57	55.97
Working capital (Rupees in lakhs)	311.70	361.31	414.55	487.59
Deposits (Rupees in lakhs)	123.16	101.15	190.41	217.08

The long term credit requirements of the cultivators for sinking of tubewells, purchase of tractors, purchase of land, etc., are met with by the two Primary Cooperative Land Development Banks (one each at Bhiwani and Charkhi Dadri)[1] which have a membership of 6,830 with a share capital of Rs. 28.65 lakhs and working capital amounting to Rs. 372.40 lakhs. During 1973-74, 1974-75, 1975-76 and 1976-77 the banks advanced Rs. 44.79 lakhs, Rs. 65.77 lakhs, Rs. 71.30 lakhs and Rs. 93.10 lakhs respectively as long term credit.

Joint farming/collective farming societies have been organized in order to secure gains of large-scale farming without losing individual proprietorship in land. Government provides financial assistance to such societies and gives various concessions. The cooperative farming societies have, however, not met with success. Most of the societies organized in the district are of landless labourers, and only waste land could be made available to a few of these. The total number of farming/collective farming societies in the district at the end of June 30, 1974, was 35 with a membership of 674. Of these, 30 were joint farming and 5 collective farming societies. The same position

1. The bank at Bhiwani was established in 1968 while at Charkhi Dadri in 1970.

continued during 1974-75. By June 30, 1977, the number decreased to 33 with a membership of 544. Of these, 28 were joint farming and 5 collective farming societies.

The marketing societies supply fertilizer, improved seed and agricultural implements. There were 5 marketing societies on June 30,1973, with a membership of 1,828 and working capital amounting to Rs. 11.58 lakhs. Their number increased to 6 by June 30, 1974, membership to 2,091 and working capital to Rs. 20.99 lakhs. There was no change in the number of societies during 1974-75. However, the membership increased to 2,197 and working capital to Rs. 22.88 lakhs. Even by June 30, 1977, the number of societies remained 6 but their membership increased to 2,337 while working capital decreased to Rs. 19.91 lakhs.

The Scheduled Castes Land Owning Societies are registered for the allotment of nazool land under the Nazool Land Scheme and consist of exclusively Harijan members. On June 30, 1973, there were 42 such societies having a membership of 719 and working capital amounting to Rs. 0.08 lakh. There was no increase in their number, membership and working capital up to June 30, 1975. By June 30, 1977, the number increased to 43 with a membership of 857 and working capital amounting to Rs. 1.30 lakhs.

ANIMAL HUSBANDRY

The Deputy Director, Animal Husbandry, is in overall charge of the district. He is responsible for all kinds of livestock developmental activities, such as cattle breeding, artificial insemination, control of the out-break of contagious diseases, improvement of livestock and provision of veterinary aid. He is assisted by three officers, namely the District Animal Husbandry Officer, Cattle Development Officer and Officer In-charge Semen Collection Station. Besides, there are 27 Veterinary Assistant Surgeons, 66 Stock Assistants, 36 Veterinary Compounders and other miscellaneous staff.

The district is farily rich in livestock. This includes cattle, buffaloes camels, sheep, goats, horses and ponies, mules, donkeys and pigs. Famine and drought prone areas invariably depend crucially on livestock; in bad years, animals being mobile can be taken away thus retaining some capital and means of survival for the family. The break-up of livestock population[1] according

1. The population of livestock has been based on the average number of livestock of each village.

to the 1971 Livestock Census is :

Particular	Number (in lakhs)
Cattle	1.51
Buffaloes	1.25
Sheep	0.52
Goats	0.62
Camels	0.38
Pigs	0.05
Others	0.08
Poultry	0.15

Cattle and buffaloes.—This district is known for world famous breeds of Hariana cows and Murrah buffaloes. Hariana cow is reared generally for its male produce, the bullock, which is well known for its draught capacity and speed; Haryana bullocks fetch premium price. The Murrah buffalo is famous for high milk-yield all over India and is the main milch animal of this district. These breeds resist and can thrive in scarcity conditions.

The cattle and buffalo population which numbered 2.76 lakhs in 1971, accounted for 62.6 per cent of the total livestock. Female population of cows and buffaloes was 0.69 lakh and 0.58 lakh respectively. Their relative figures vis-a-vis those of males were :

(Figures in lakhs)

	Males above 3 years		Females above 3 years				Calves below 3 years	
	Breeding bulls	Others	In milk	Dry	Not calved even once	Others	Male	Female
Cows	0.01	0.14	0.41	0.23	0.05	—	0.28	0.39
Buffaloes	0.01	(a)[1]	0.39	0.15	0.04	—	0.18	0.48

1. (a) denotes less than 1,000.

The ox breed was evolved in the past through strict selection of bulls out of high yielding cows and with true to breed characters. The breeding was through natural service. With the passage of time the villages started letting loose young male calves, out of inferior dams, for breeding purposes on religious grounds, which brought deterioration in the quality of the breed, so that remedial measures, described below became necessary. This district has scanty rainfall and most of it is desert. Rain failures for years together was a common feature. Every third or fourth year was a famine year. There were no roads and it was difficult to supply fodder for the animals from other districts of the State. During famine the villagers used to move their cattle to other districts of the State to save them from starvation but came back when conditions improved. Now with the construction of a net work of roads and canals throughout the district, famine conditions of this kind have disappeared. In case of any such development, Government is prompt; fodder is supplied at subsidised rates. Migrations of men and cattle are now past history.

Rural economy here depends largely on the sale of bullocks and camels. Cattle fairs are well known all over India especially Punjab and Uttar Pradesh. Big fairs are held four times a year at Bhiwani, three times at Charkhi Dadri and Loharu and twice at Siwani. Thousands of bullocks and camels are sold.

Intensive Cattle Development Project, Bhiwani.—Consistent with the latest breeding policy enunciated by the Government of India for introducing an exotic strain in non-descript cattle to increase milk production, an Intensive Cattle Development Project was started at Bhiwani on January 1, 1972. This is the third out of the four such medium-sized projects opened in the State.

Though the district is well known for Murrah and Haryana breeds, a fair majority of these are non-descript types and un-economic. The scheme involves a systematically planned method for the best utilization of superior germ plasm obtained from superior stock, by its proper distribution throughout the district. Artificial insemination is used to maximise utility of the available number of approved bulls. Controlled breeding has been progressively brought through removal of all scrub bulls in the area. To up-grade the non-descript and low milk yielders, Haryana bulls known for their high milk potential are being extensively used for breeding. To provide breeding facilities effectively a Semen Bank at Bhiwani and 4 Regional Artificial Insemination Centres with 50 Stockman Centres are at work. The details are given in Table XI of Appendix. The figures of artificial insemination done

and calves born year-wise are given below :

Year	Artificial insemination done		Calves born	
	Cows	Buffaloes	Cows	Buffaloes
1973-74	3,013	3,111	658	1,152
1974-75	3,469	3,845	991	1,414
1975-76	3,126	3,583	726	1,427
1976-77	3,928	7,824	817	1,596

DAIRY FARMING

In 1974-75, the population of cows and buffaloes in milk was 61,263 and 44,631 respectively. The total quantity of milk produced in the district was estimated as 2,144 quintals[1].

Milk is mostly produced in small quantites, by animals owned by individual cultivators who keep one or two cows and buffaloes for this purpose. After the installation of the Milk Plant at Bhiwani[2], the whole of the district and Kalanaur block of the Rohtak district have been declared as Milk Shed Areas[3] for it. The marketable surplus milk available with the farmers is procured by 135 Milk Producers Cooperative Societies (95 of the Bhiwani district and 45 of Kalanaur block of the Rohtak district, of which the farmers are the members. These societies were advanced Rs. 23,94,135 during 1973-74 and Rs. 25,01,838 during 1974-75 for the purchase of buffaloes. The farmers who are covered under MFAL (Marginal Farmers and Agricultural Labourers Development Agency) are also getting subsidies @ Rs. 33 per cent[4]. On an average about 11,000 litres of milk per day was procured during the flush season of 1973-74 and 21,395 litres during 1974-75.

The Bhiwani District Cooperative Milk Producers Union Limited,

1. The milk production has been based by taking 60 per cent of cows and buffaloes in milk and 2.5 kilograms and 4.5 kilograms daily average production of a cow and buffaloe respectively. In this way, the estimated buffalo milk production comes to 1,20,503.7 kilograms and the cow milk 93,945 kilograms per day.

2. For details about the Milk Plant, Bhiwani, the Chapter on 'Industries' may be seen.

3. Milk Shed Area means an area or locality from where a milk plant gets its milk supply.

4. In the case of farmers covered under SFDA (Small Farmers Development Agency) which is operative in the Gurgaon and Ambala districts, the rate of subsidy is 25 per cent.

Bhiwani, with 10 Milk Cooperative Societies as its members, was the first to be registered in November 1973. By 1975, its membership rose to 58.

Sheep breeding.—According to 1971 Livestock Census, the sheep population was 0.52 lakh, and there is fairly good scope for the development of sheep and consequently of the wool industry. Sheep provide necessities of vital importance (meat for food, wool for clothing, skins for industrial use and manure for agriculture). Although the number of sheep is large, they are not good quality wool yielders. In order to bring about improvement in sheep stock, six Sheep and Wool Extension Centres have been functioning at Deosar, Kairu, Bahl, Sohansra, Satnali and Jhoju Kalan. Each centre is looked after by a Stock Assistant, under the charge of a Veterinary Assistant Surgeon, trained in sheep and wool development work. Superior rams, kept at the centres, are supplied to the breeders during the tuping season and are taken back after it is over. Veterinary aid and other sheep husbandry facilities have also been made available.

Piggery.—Most of the population is vegetarian; there is no Government owned or private piggery farm where the breeding of pigs could be pursued on scientific lines. Pigs are reared by weaker section ; the breed is indigenous and the animals are poor in constitution and fat. To develop this industry, Yorkshire pigs are produced at Government Pig Breeding Farms at Ambala and Hisar. These are supplied to the breeders at subsidised rates for the improvement of local pigs. The veterinary hospitals and dispensaries attend to the work of disease control of pigs and give technical education for establishing piggery farms. The pig population, in 1971 was 0.05 lakh. Pigs are slaughtered locally for meat and there is no demand for this breed outside.

Camels.—There were 0.38 lakh camels in 1971. The camel is used for ploughing, transportation of goods through camel carts and for riding to cross the sand-dunes. There is no scientific breeding.

Horses and Ponies.—The area is sandy and the camel more useful. The horse is considered of little importance. There are no arrangements for breeding this animal on scientific lines.

Donkeys.—The breed is local and of small size. There is no breeding stud. There is also no donkey stallion in the district.

Animal Diseases and Veterinary Hospitals

In the rural areas camel carts are popular as a means of communication. Camels are also used for ploughing purposes. Unfortunately the camels are

very suceptible to Surra. To protect them from this deadly disease and to treat those affected, medicines are stocked in veterinary hospitals and dispensaries. Amongst sheep, sheep-pox halber is common and prophylactic vaccination is administered to prevent outbreaks of this disease, which has been substantially controlled. Foot and mouth disease is prevalent but prophylactic vaccination is administered in small numbers as it is not feasible to protect all the cattle on mass scale due to the high cost of vaccine. However, cross breed animals are being protected from this disease. For H.S. disease, prophylactic vaccination is done before the summer and winter rains which keeps the disease under control.

Veterinary hospitals.—In the wake of livestock development programme, the subject of disease control for combating the various contagious and non-contagious diseases, assumes great importance. The district has 22 veterinary hospitals, 14 veterinary dispensaries, 4 artificial insemination centres, 50 stockman centres, one poultry extension centre and 6 sheep and wool extension centres for providing treatment and breeding facilities. Their place of location is shown in Table XII of Appendix.

A veterinary hospital functions under the charge of a Veterinary Assistant Surgeon, assisted by a Veterinary Compounder or a Stock Assistant and Class IV attendants, while a Veterinary Dispensary is run by a Veterinary Compounder with the help of Class IV attendants. An artificial insemination Centre is run by a Veterinary Assistant Surgeon with a Veterinary Compounder or Stock Assistant and Class IV attendants. The stockman centre is run by a Stock Assistant with the help of Class IV attendants. A poultry and sheep extension centre is run by a Stock Assistant with the help of Class IV attendants. The Veterinary Assistant Surgeon, Stock Assistant or Veterinary Compounder apart from attending cases brought to a veterinary institution, treat the sick animals during regular tours and administer prophylactic vaccination. Undesirable bulls are castrated.

Slaughter Houses

The district has three recognised slaughter houses at Bhiwani, Loharu and Charkhi Dadri. The animals are inspected by the Veterinary Surgeon before and after their slaughter to ensure that the meat being made available for human consumption is free from disease. From the year-wise number of animals slaughtered, as given below, it is evident that the consumption of meat is on the increase :

Year	Animals slaughtered
1973-74	6,906
1974-75	5,690
1975-76	7,021
1976-77	7,159

Poultry Development

The poultry population according to the 1971 Livestock Census was 0.15 lakh. One day old chicks of white leg horn are produced at the Government Poultry Farm, Ambala and are made available to breeders at subsidised rates. Veterinary hospitals and dispensaries in the district educate the poultry farmers in the latest techniques of poultry husbandry and help them in setting up farms. Mass vaccination, debeaking and deworming are also carried out by these institutions.

Problem of Stray Animals

Haryana State Government formed a Cattle Catching Party to round up wild, stray and useless cattle. The panchayat approaches the Gaushala Development-cum-Cattle Catching Officer having headquarters at Chandigarh and a party is deputed to the affected area for rounding up the animals. The animals are put to auction. The unsold are sent to Gosadans where these are housed till their natural death.

Gaushala Development

According to the old concept, *gaushalas* were institutions inspired by a religious sentiment to house the unproductive and useless cattle and were run on charity. To give new meaning to the old concept, an idea was mooted to convert these institutions into Cattle Breeding-cum-Milk Producing Centres with some financial assistance and technical guidance. The six registered *gaushalas* in the district are at Bhiwani, Loharu, Charkhi Dadri, Satnali, Gujrani and Dhanana. Of these, the four at Bhiwani, Charkhi Dadri, Dhanana and Loharu are aided under the scheme 'Development of Gaushalas'. The income from the sale of milk and animals of the *gaushalas*, helps a lot in running these institutions. These institutions now also serve as Breeding Units.

FISHERIES

The Fisheries Department in the district is represented by the Fisheries

Development Officer, Bhiwani, who is assisted by 2 Fisheries Officers, 1 Extension Assistant, 1 Field Assistant, 5 Fishermen, 1 Accountant and 2 Clerks.

Not much attention had been paid to the development of pisciculture in this area prior to the formation of the new district of Bhiwani. The Department of Fisheries which is a revenue earning and self-supporting organization, established its district level office at Bhiwani in March 1973. Pisciculture, as a cottage industry, provides employment opportunities to the villagers and makes available protein-rich food.

A survey of breeding grounds and culturable water for fish culture was initiated to determine potential. The natural climatic conditions (erratic rainfall, light and sandy soil texture, unsaturated atmosphere and high temperatures for a long periods during the year) led to loss of water by evaporation and seepage from the ponds. Availability of breeding grounds and water for fish culture in the Bhiwani district is shown below :

Year	Villages surveyed	Water Area			
		Available		Suitable for fish culture	
		(Acres)	(Hectares)	(Acres)	(Hectares)
1973-74	250	641	259.4	135	54.6
1974-75	..	..	..	..	..
1975-76	66	186	75.3	62.5	25.3
1976-77	58	429.5	173.8	195.5	79.1

In addition, there are about 31 acres (12.5 hectares) of water area available with the water-works. A number of difficulties like inadequacy of field staff, apathy among the village folk because of their vegetarian habits and religious bias, non-availability of quality fish seed and the funds for the improvement of village ponds, lack of water resources to maintain water in the village ponds throughout the year and lack of jurisdiction of the Fisheries Department over canal and water works areas, will have to be overcome before pisciculture can be established in the district on a sound footing.

The technical advice on fish farming is provided by the department to the *gram* panchayats and private entrepreneurs. In 1973-74, about 9 acres (3.6 hectares) of water area suitable for fish culture was stocked with 10,655

quality fish seed in different panchayat ponds in the district. The figures for 1974-75 were : water area 6.5 acres (2.6 hectares) and quality fish seed 7,500.

During 1975-76, 72,576 fry and fingerlings were supplied to 14 panchayats at a total cost of Rs. 1,567, and during 1976-77, 42,800 fry and fingerlings were supplied to 12 panchayats and Rs. 3,448 was realised.

The following figures show the production of fish at the fish ponds and its income to the *panchayats* in the district :—

Year	Quantity of fish produced	Income to the panchayats
	(Quintals)	(Rs.)
1973-74	6	650
1974-75	80	5,110
1975-76	16	6,820
1976-77	155	36,825

Besides, fishery rights in Loharu Canal and Loharu Feeder were auctioned for Rs. 400 by the Fisheries Department for the first time in 1974-75. Fishery rights in Sunder Branch, Jui Feeder and Loharu Canal were auctioned for Rs. 700 in 1975-76 and for Rs. 1,050 in 1976-77.

To popularise fishing as a hobby, 21 licenses were issued in 1976-77 and Rs. 328 was realised as fee. Cases of illegal fishing registered under the Punjab Fisheries Act, 1914, were charged Rs. 305 as compensation. Moreover 780 decorative fish was sold to the public for Rs. 195. Trichogester fish fetched Rs. 25. This fish consumes mosquito larvae to such an extent that it can be used safely in open water ponds as a measure for malaria eradication.

FORESTRY

The Bhiwani Forest Division which was created on November 10, 1971, covered the Bhiwani, Hansi and Loharu tahsils. After the formation of the new district of Bhiwani on December 22, 1972, its jurisdiction was made co-terminus with the boundaries of the civil district. This division is under the charge of a Divisional Forest Officer (also called Deputy Conservator of Forests) with headquarters at Bhiwani. He is assisted by one Forest Officer and 4 Range Forest Officers (Forest Rangers), one each at Bhiwani, Loharu, Dadri and Bawani Khera Ranges. Other staff includes Deputy Rangers 4,

Foresters 14 and Forest Guards 83 besides miscellaneous and ministerial staff. The Divisional Forest Officer acts as a co-ordinator, with the Deputy Commissioner and other officers at the district level, while at the State level he is answerable to the Chief Conservator of Forests, Haryana, Chandigarh, through the Conservator of Forests, South Circle, Haryana at Hisar.[1]

The area under forests is classified according to ownership, private and State. Forests owned by corporate bodies and private individuals are included under private forests. The State forests, on the basis of legal status, are categorised as reserved, protected and unclassified. Reserved forests are permanently earmarked to the production of timber or other forest produce and in them, the right of grazing and cultivation is seldom allowed. In protected forests, these rights are allowed subject to restrictions. The following area was under forests in the district during 1976-77 :—

Classification of Forests	Area (Hectares)	Area (Hectares)
(A) State		7,396
Reserved		
(i) Nangal Mala	134.76	
(ii) Nawan	173.20	
(iii) Naurangabad	28.73	
(iv) Digrauta	44.11	
	380.80	
	(or say 381.00)	

1. On the whole, the forest administration is under the charge of the Chief Conservator of Forests, Haryana, Chandigarh. Under him the two Conservators of Forests are in charge of the two circles, North Circle at Chandigarh and South Circle at Hisar (Hissar), which cover the whole of the State. Besides, there is a Development Circle at Chandigarh, for the whole of the State which is headed by a Conservator of Forests under the control of the Chief Conservator of Forests.

A circle is divided into controlling areas called forest divisions, each under a Divisional Forest Officer. A Forest division is divided into sub-divisions and ranges or executive charges which are further sub-divided into blocks comprising beats or protective charges. The charge of a range is ordinarily held by a Forest Ranger. The charge of a block is held by a Deputy Ranger or Forester and of a beat by a Forest Guard.

Classification of Forests	Area (Hectares)	Area (Hectares)
Protected		
(a) Compact Blocks		
(i) Loharu	36.42	
(ii) Rawaldhi	6.22	
	42.64 (or say 42.00)	
(b) *Strips*		
(i) Rails	449.00	
(ii) Roads	2,750.00	
(iii) Canals (including drains and minors)	3,747.00	
(iv) Bunds	27.00	
	6,973.00	
(B) Unclassed		2
(C) Private		1,516
Closed under Section 38 of the Indian Forest Act, 1927	949.00	
Closed under Sections 4 and 5 of the Land Preservation Act, 1900	567.00	
Grand Total :		8,914

The forests of this district mainly consist of waste strips on either side of the roads, canals and railways and some private land closed under Section 38 of the Indian Forest Act, 1927 and Sections 4 and 5 of the Land Preservation Act, 1900. These strips are unfit for agricultural purposes and therefore are managed by the Forest Department for afforestation. The area of the forests closed under the Indian Forest Act, 1927, was voluntarily handed over by the owners to the Forest Department, partly for increasing the density of

stock, and partly as a soil conservation measure. The area under Sections 4 and 5 of the Land Preservation Act, 1900, was compulsorily closed in the interest of soil conservation. But with the introduction of lift irrigation schemes, the owners are keen to get these lands back for agriculture. The Forest Department on its part is not only keen to retain these lands but also proposes to acquire some of the panchayat lands for afforestation.

Cottage industries such as production of silk, rope-making, castor oil, lac, eucalyptus oil and tanning, are direcly dependent upon forests. These industries are practically non-existent in this district which is short of good forests and indeed forests of all kinds.

The district falls in the arid zone having extremes of temperature. The south and south-western parts are an extension of the Rajasthan desert. Sand-blowing caused by high velocity wind poses serious problems. The fertile soil particles, as a result of saltation, are transporated and scattered over long distances thus impairing soil fertility. In other situations coarse and sterile sand particles are carried away with the high velocity winds and dust storms, and are deposited over fertile soil creating unproductivity. Thus the greater part of the district is exposed to serious sand-blows which threaten the entire agricultural economy. All programmes aiming at agricultural development like the use of fertilizer, compost, improved seed, pest control etc., are likely to be rendered ineffective if the shifting sands are not stabilized. Research in developed countries has conclusively established that a permanent vegetal cover brings about substantial reduction in wind velocity and forms the foundation of entire programmes of agricultural development. The Bhiwani Forest Division is therefore engaged in the intensive implementing of the Desert Control Programme to halt the march of the desert from Rajasthan, and to protect the economy and other infrastructure, like newly constructed canal systems, roads, railway lines, etc. Considering the deficiency of free growth and the problem of shifting sands, the policy of the Forest Department is to raise shelter belts and wind breaks in the area, for protective and productive purposes, and to meet the fuel requirements of the people. At the same time to make farmers tree conscious, farm forestry is being introduced on a large scale in irrigated areas. The main projects are discussed below :

Fixation of sand-dunes.—Sand-dune formation is a common phenomenon all along the Rajasthan border of the Bhiwani district. These sand-dunes shifting in nature, are advancing into the interior of the district with strong south-westerly winds rendering the cultivated lands infertile by accumulation of sand. The total area affected by sand-dunes in the district is about 30,000

hectares which is being tackled by the Forest Department under planned afforestation of *sarkanda* grass and other tree species. Biological barriers in the form of trees and shrubs play a vital role in different operations of desert control. They are the cheapest method of reducing wind velocity to control the movement of sand.

Raising of shelter belts.—The forestry schemes aim at afforestation of waste strips along rail, road and canal[1]. These improve the situation, as they act as shelter belts against prevailing winds especially wherever these exist perpendicularly to the wind direction. A dense belt of trees against the strong sand bearing winds check velocity and thus the sand is accumulated towards the windward side instead of encroaching upon the cultivated lands on the leeward side. Moreover, the shelter belts protect the crops from the evil desiccating effects of hot winds.

The programme of road beautification was taken up during 1973-74 under MFAL (Marginal Farmers and Agricultural Labourers) Scheme. It provided employment to landless labourers, and also aimed at increasing the beauty of roads connecting Bhiwani town. To begin with, work was taken up on four roads, viz. Bhiwani-Rohtak Road, Bhiwani-Tosham Road, Bhiwani-Hansi Road and Bhiwani-Chang Road. In all, 190 RKM (Row Kilometre) plantation under this programme has been raised. The ornamental plants (*parkinsonia, siris, goldmohar, jacranda, amaltas*, etc.) improve the landscape and break the monotony of travel. Environmental pollution is reduced as the plants purify the air. This programme is further to be extended on other important roads connecting Charkhi Dadri, Tosham, Loharu and Bawani Khera.

Farm forestry.—Plants are raised on the periphery of the fields of the farmers to create wind breaks so that crops are protected from desiccating winds. Afforestation works were carried out under the Farm Forestry Scheme including items done under C.S.R.E. (Crash Scheme for Rural Employment). The division has done the following :—

1. It is root system of shrubs and trees planted which plays a significant role in holding together loose soil or sand. Such plants serve as biological barriers even if the canals, roads, railway lines and drains along which they stand, may not necessarily lie perpendicular to the wind direction.

Year	Kind of work	Targets achieved
10-11-1971 to 31-3-1972	Plantation in agricultural fields	10 hectares
	Plantation in compact block	34 hectares
	Total :	44 hectares
1972-73	Plantation in agricultural fields	90 hectares
	Plantation in compact block	40 hectares
		130 hectares
1973-74	Plantation in agricultural fields	97 hectares[1]
	Plantation in compact block	10 hectares
	Total :	107 hectares
1974-75	Plantation in agricultural fields	15 hectares
	Plantation in compact block	20 hectares
	Total :	35 hectares
1975-76	Plantation in agricultural fields	—
	Plantation in compact block	16 hectares
	Total :	16 hectares
1976-77	Plantation in agricultural fields	—
	Plantation in compact block	18 hectare
	Total :	18 hectares

Afforestation and regeneration are essential parts of forestry in this district. It becomes particularly urgent and important in dry areas, like Loharu, Satnali and Tosham. The forests must be planted and maintained constantly so as to protect the land from the ravages of erosion, to refertilize the soil, arrest aridity and influence the climate. The following works have been carried out under different schemes to check effectively and efficiently the advance of the desert :—

1. 25 hectares under Farm Forestry Scheme and 72 hectares under CSRE (Crash Scheme for Rural Employment).

Name of the scheme	Particular of works	Unit	Yearwise targets achieved					
			1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
1	2	3	4	5	6	7	8	9
1. Industrial and commercial uses—Raising of economic plantation along rail, road and canal strips	Sowing and planting	Row kilometre	220	655	380	475	300	100
2. Raising of economic plantation on national highways/link approach roads	-do-	-do-	370	145	—	—	—	—
3. FT. 3 Farm Forestry village fuel plantation	*Afforestation in*							
	(i) agriculture field	Hectares	10	—	25	15	—	—
	(ii) Compact block	-do-	34	40	10	20	16	18
4. SCF. 3 Desert Control	Afforestation	-do-	10	30	50	100	70	80
	Fixation of sand-dunes	-do-	20	20	65	200	65	80
	Shelter belts	Row kilometres/ Hectares	50 (Row kilometres)	—	50 (Hectares	135 (Row kilometres)	75 RKM	100 RKM
5. FT. 5 communication and buildings	Construction of buildings	Number	1	—	1	—	2	2
6. Crash scheme for rural employment	Wind breaks	Hectares	60	50	35	—	—	—
	Fixation of sand-dunes	-do-	30	5	—	—	—	—
	Farm forestry	-do-	—	90	72	—	—	—
	Afforestation	-do-	—	—	30	—	—	—

1	2	3	4	5	6	7	8	9
7. MFAL (Marginal Farmers and Agricultural Labourers Seheme)	Afforestation	Row kilometres	—	415	—	—	100	—
	Plantation of ornamental shady trees	Row kilometres/ Hectares	—	— (Row Kilometres)	190	18 (Hectares)	—	—
	Fixation of sand-dunes	Hectare	—	62	—	—	250	—
	Pasture development	–do–	—	—	—	60	—	—
8. Pasture development	Pasture development in panchayat lands	Hectare	—	—	—	—	100	—
9. Loharu Canal System	Raising of shelter belts	Row Kilometres	—	500	970	—	—	—
10. Mixed Plantation on Panchayat, Waste lands (Centrally Sponsored Scheme)	—	Hectares	—	—	—	—	—	40
11. D.P.A.P. Scheme	Afforestation	Hectares	—	—	—	—	120	549
	Sand-dunes fixation	–do–	—	—	—	—	120	338
	Pasture Development	–do–	—	—	—	—	—	130
	Improvement of water resources	–do–	—	—	—	—	—	26
12. Afforestation on panchayat land financed by panchayats		Acres	—	—	—	—	—	134
13. City plantation		Row kilometres	—	—	—	—	10	—

Forest produce is divided into two categories, major and minor. The major forest produce includes timber and firewood. Minor forest produce consists of grasses, like *kana, mallah (palla),* gum, etc. *Shisham (Dalbargia sisoo)* provides the best timber for furniture. *Kikar (Acacia nilotica), Israili kikar (Acacia tortilis), neem, siris* and *jand* provide firewood and timber. *Sarkanda (kana)* grass is used for *mudha* and *han*-making. Thatching is also done with this grass. The grasses and *mallah (palla)* are used as fodder. Lopping of *prosopis cineraria (jand)* provides fodder during winter. The following figures show the income derived from the sale of major and minor produce for the years 1973-74 to 1976-77 :—

Year	Income from forest produce (total revenue)		
	Major	Minor	Other receipt
	(Rs.)	(Rs.)	(Rs.)
1973-74	2,11,639	11,374	—
1974-75	4,77,487	13,532	—
1975-76	4,12,209	17,400	14,187
1976-77	3,60,275	1,17,023	2,66,576

NATURAL CALAMITIES

Famine and Drought

The Bhiwani district falls in the arid zone with scanty and erratic rainfall. Most of it, particularly the south and south-western parts, is an extension of the Rajasthan desert. Without adequate rain and means of irrigation, this area has from time to time suffered severely from famine and drought.

The district has been formed by merging three separate units :— (i) Bhiwani and Bawani Khera, which formed a part of the Hisar (Hissar) district, (ii) Dadri, which was formerly part of a princely State and later the Mahendragarh district and (iii) Loharu, which was a princely State and later merged with the Hisar (Hissar) district after Independence. The authentic accounts of the famines and drought visiting these areas are found in the respective gazetteers covering these three units and are briefly discussed here :

Bhiwani and Bawani Khera tahsils.—No accounts are available prior to

the dreadful *chalisa* famine (Bikrami Samvat 1840; A.D. 1783-84), about which the *Hisar District Gazetteer*, 1915, gives a vivid description :

> "The preceding year had been dry and the harvest poor, but in 1783 it entirely failed. The country was depopulated, the peasants abandoning their villages and dying by thousands of disease and want. Only in the neighbourhood of Hansi did the inhabitants hold their own, but even here the smaller villages were deserted by their inhabitants who took refuge in the larger villages, until the severity of the famine should be passed. In other parts of the district (Hissar) none remained who had the strength to fly. No reliable statistics of the mortality are extant, but there can be no doubt that the people suffered terribly. Some died helplessly in their villages, others fell exhausted on the way towards the south and east, where they thronged in search of food and employment. Nor was the mortality confined to the inhabitants of the district, for thousands of fugitives from Bikaner (Rajasthan) flocking into Haryana perished in the vain endeavour to reach Delhi and the Jumna (Yamuna). The price of the commonest food-grains rose to five and six *sers* per rupee. Fodder for cattle failed utterly, and the greater part of the agricultural stock of the district perished. But for the berries found in the wild brushwood the distress would have been even greater. Stories are told of parents devouring their children, and it is beyond a doubt that children were during this fatal year gladly sold to any one who would offer a few handfuls of grains as their price. The heat of the summer was intense, and all through July and August the people looked in vain for relief. At last, in the month of Asuj (latter part of September and beginning of October) copious rain fell here and throughout the province. There were not many left to turn the opportunity to account and the few who were found in the district were, for the most part, immigrants from Bikaner (Rajasthan), who had been unable, after crossing the border, to penetrate further eastward. These, however, seized upon the deserted fields and cultivated patches here and there. The result was a spring harvest in 1784 of more than ordinary excellence. The country gradually became repeopled, but principally, from the west, comparatively few of the original inhabitants returning to seek their old homes.

Many who did return, found their old fields cultivated by recent immigrants. In some cases the immigrants were ousted; in others they submitted to pay a quit rent to the former proprietors. The district has been re-colonized, but it cannot be said that the traces of the famine yet have all disappeared. The present parched and dried appearance of the country is popularly said to date from the disastrous effects of the drought of 1783; that fatal year is the era from which every social relation of the people dates. Few villages have a history which goes back uninterruptedly to a period before the famine, and there probably is not one which does not date its present form of tenure from the time when cultivation was resumed."[1]

Famine and drought had become a living reality with the people of the area and with each occurrence both the people and cattle suffered alike. Each time many migrants from Bikaner (Rajasthan) emigrated and the poor who were unable to buy grain supported themselves on the fruit of the *karil*, which was unwholesome when eaten in any quantities, and on the leaves of the *jal* or *pilu*. But whether the Jungle fruits were wholesome or not, they were the means of saving many lives. Cattle suffered heavily from scarcity of fodder. The Government started regular relief measures from the famine of 1860-61. This was done by undertaking famine relief works and providing wages for work out of public funds, and charity to old and infirm persons and the opening of poor-houses for the distribution of food, for the most part out of sums raised by private subscriptions. The raising of the *kachcha* road from Hansi to Bhiwani, was a part of the relief work taken in hand in January 1869.

The years of famine and drought beginning with the dreadful *chalisa* famine were :[2]

Year	Nature of drought
1783-84	Severe famine
1860-61	Severe famine
1869-70	Severe famine
1896-97	Famine
1899-1900	Famine
1929-30	Famine
1932-33	Famine

1. *Ibid*, pp. 180-81.
2. (i) *Hisar District and Loharu State Gazetteer (Hisar District)*, 1915, pp. 180—89.
(ii) *Punjab District Gazetter*, Volume I, *Part* B, *Hisar District Statistical Tables*, 1935, pp. i-iii.

There was a famine in the Hisar (Hissar) district during 1938-39. No details of human deaths with starvation or loss of livestock are available. Since it was a famine, there must have been livestock damage to a large extent. In general, distress was most acute in *barani* and weak *nahri* villages. It has been recorded on page 6 of the *Report on the Famine Relief Operations in* the *South East Punjab* (*Hisar, Rohtak* and *Gurgaon*), 1938—1940, that of the three famine affected districts of Gurgaon, Rohtak and Hisar, the last was far and away the worst hit. In Gurgaon, it was not found necessary to declare "scarcity" in the Famine Code sense of the word; in Rohtak, two tahsils were declared "scarcity areas" in April 1939. In Hisar, however, as early as December 1938, the whole district was declared a "famine area", and relief operations were considered necessary to an extent and for a period unprecedented in the history of the district.

A sum of Rs. 1,91,65,282 was spent on various types of relief works in which the areas comprising the present Bhiwani and Bawani Khera tahsils were included. The Government arranged relief listed beloew[1] :

Kind of relief	Total cost
1	2
	(Rs.)
(A) Relief from Government revenues	
(i) Indirect Relief	
1. Dues remitted	16,33,082
2. Suspension and loans	88,62,198
Total :	1,04,95,280
(ii) Direct Relief	
3. Test and relief works	62,32,059
4. Village works (including cost of construction and repairs to water channels)	3,84,459
5. Gratuitous relief	13,09,533

1. *Source* : Deputy Commissioner, Hisar (File No. D-6-6/1-52).

1	2
6. Spinning centres	1,77,026
7. Cattle concentration	2,91,780
8. Subsidies for stud bulls	24,876
9. Expenditure on water-supply staff	8,701
10. Expenditure on staff detailed to the minor beat (salaries and establishment)	52,411
11. Transport charges for labour	1,213
12. Public health measures	1,11,735
Total :	85,93,793
Total (i) and (ii) :	1,90,89,073
(B) Relief from charity funds through Government	
1. Indian Peoples Famine Trust Fund	44,753
2. Hisar Charitable Relief Fund (for *razais*, clothing, wheat, *charkhas*, etc.)	31,456
Total :	76,209
Total (A) and (B) :	1,91,65,282

Besides, a sum of Rs. 29,01,727 (Rs. 1,21,509 in cash and Rs. 27,80,218 in kind) was advanced as *taccavi*.

Drought also occurred in the Hisar (Hissar) district in 1951-52. The areas now comprising the Bhiwani, Bawani Khera and Loharu tahsils, then

formed a part of the Hisar (Hissar) district. The failure of rains in 1951-52 caused grave distress to both men and cattle; 180 villages of the Bhiwani, Bawani Khera and Loharu tahsils were affected. Ponds in *barani* areas dried up and not a single blade of green grass was seen in the fields. Drinking water was not available in many villages. A large number of people went out of employment and demanded immediate relief. The whole tahsil of Bhiwani including Bawani Khera was seriously affected by the drought. Due to Government relief no human death following starvation was allowed. Cattle, however, persished, but their number is not available.

A number of relief measures were taken to alleviate the distress of the people. These included the construction of the Loharu-Bhiwani Road, on which about 500 people were employed daily. An amount of Rs. 36,000 was spent in the first phase. The earth work was completed on Bhiwani-Jui Road. Fodder *taccavi* was distributed and ration arrangements were made in drought affected villages. Digging of ponds, opening of spinning centres, maintenance of stud bulls, expansion of labour cooperatives and gratutious relief were some of the other relief measures.

This area has been repeatdly visited by drought in the subsequent years. Some details about these droughts and the relief measures afforded in the Bhiwani tahsil during 1958-59, 1960-61, 1963-64, 1964-65, 1965-66, 1967-68, 1968-69, 1972-73 to 1976-77 are given in Table XIII of Appendix.

Dadri tahsil.—The dadri tahsil had suffered more than any other part of the earstwhile Jind State from famines which had from time to time afflicted the country, and its people (the Bagris especially) were often obliged to leave their homes owing to scarcity of water and food. The first famine about which information is available, was that of A.D. 1783, known as the *"chalisa kal* or famine of Bikrami Samvat 1840. A large part of the State was depopulated. The previous two years (B. S. 1838 and 1839) had been dry and the harvests poor, but in B. S. 1840, these failed entirely. The tanks and ponds (*johars*) ran dry, thousands of cattle died of starvation and thirst and most of the villages were deserted, only the larger ones here and there retained a few inhabitants. The people lived on *kair* fruit (*tind*) and a fruit called *barwa* in lieu of grain and the cattle were kept alive on the leaves and bark of the *jal*, *kair*, *beri* and other trees.

Each time the Dadri tahsil was visited by a famine or scarcity, the relief measures including the construction works and distribution of alms were undertaken by the State authorities to ameliorate the distress of the

people, but the poor people perished from starvation while a large number of cattle died owing to the scarcity of fodder. The famines which afflicted this area are mentioned below[1] :

Year	Nature of drought
1783-84	Severe famine
1803-04	Severe famine
1812	Famine
1824	Famine
1833	Scarcity
1837	Scarcity
1860-61	Famine
1862	Famine
1869-70	Severe famine
1878	Severe famine
1879	Scarcity
1883	Scarcity
1896	Severe famine
1897	Scarcity
1899	Severe famine

No information regarding the famines and droughts that visited this area during the period 1900 to 1937 is available. However, severe drought visited this tahsil during 1938-39 to 1941-42, 1948-49, 1963-64 to 1965-66, 1968-69 and 1972-73 to 1974-75. The relief measures afforeded during these years, according to the *Lal Kitab*, are given in Table XIV of Appendix.

Loharu tahsil.—Famines were not uncommon, for the crop depended on rain. No accurate records existed of famines before A.D. 1833 (Bikrami

1. For a detailed description of famines, see the *Phulkian States, Gazetteer* (*Patiala, Jind* and *Nabha*), 1904, pp. 297-304.

Samvat 1890) but the famine in that year was proverbial under the name of *Nabia-ka-kal* ; 1867 and 1880 were also years of scarcity. In 1899 hardly any rain fell, and the distress was very severe. Large number of cattle were lost, many of the population died and many emigrated. Relief works were opened, and in the following year *taccavi* to the tune of Rs. 27,800 was distributed to enable the people to resume cultivation. Scarcity again prevailed in 1901, relief works were again opened, and a *pakka* tank and metalled roads in Loharu town were constructed. A loan of Rs. 55,000 was granted by Government to the State to enable it to meet the emergency. The *kharif* of 1907 was poor but grazing was abundant. Suspensions of land revenue were made, and relief works were started on a small scale. Some suspensions of land revenue were also made in 1911 on account of the drought in July and August but the situation soon changed because exceptionally heavy rains fell in September followed by a few more showers in the winter. The people consequently sowed and reaped a good rabi.[1]

In 1938-39, famine visited this tahsil. No record is available about the loss of human and cattle life and the damage caused otherwise. The Bikaner Railway Line was under construction at that time and thousands of people were employed on this work.. In 1939-40, the position eased because of good rains.

This tahsil was hit by a drought in 1951-52. At that time the Loharu-Bhiwani Road was made *pakka* and other relief measures, *i.e.* digging of ponds, opening of ration depots, etc., were also initiated. No loss of human life took place by starvation. Information about loss of livestock is not available.

Drought again visited this tahsil in 1957-58 and 1958-59 and a sum of Rs. 1,40,000 and 1,96,000 was distributed as *taccavi* loans. In 1972-73 and 1974-75, the drought relief given is shown in Table XV of Appendix.

The new district of Bhiwani was created in December 1972. The following data gives the amounts of *taccavi* loans, subsidies and grant for relief works disbursed to the people of drought affected areas :—

1. *Punjab States Gazetteers, Volume II A, Loharu State, Part A*, 1915, pp. 14-15.

(Rs. in lakhs)

Year	Taccavi loans advanced	Number of beneficiaries	Subsidies given	Number of beneficiaries	Grant for relief works	Number of people given work	Total amount disbursed
	(Rs.)		(Rs.)		(Rs.)		(Rs.)
1972-73	23.2	31,994	7.0	30,645	—	—	30.2
1973-74	1.4	4,879	0.6	2,521	—	—	2.0
1974-75	56.2	39,289	12.0	23,462	10.0	79,543	78.2
1975-76	41.99	25,058	2.00	7,056	0.17	205	44.16
1976-77	17.90	5,126	1.92	855	0.5	113	19.87