CHAPTER IV

AGRICULTURE AND IRRIGATION

INTRODUCTION

Agriculture is the main stay of the people and as such it plays a predominant role in the economy of the district. According to the 1981 census, 70.87 per cent of the total working population of the district was engaged in agriculture as against 61.37 per cent in the state as a whole. Amongst the working population of the district, cultivators account for 47.96 per cent and agricultural labourers 22.91 per cent as against 44.97 per cent and 16.40 per cent respectively for the state. Significantly, the percentage of both cultivators and agricultural labourers is higher in the district than in the state, which clearly indicates that the economy of the district is mainly agricultural.

All efforts are being made to develop the agricultural sector by distribution of improved seeds, fertilizers and pesticides, increasing irrigational facilities and promoting modern techniques of multiple cropping practices and improved agricultural implements. The government is also promoting animal husbandry and forestry which play though subsidiary but an important role in the agricultural economy.

On the whole, the modern farm technology has been widely accepted by the farmers of the district. As a result, productivity of farms per hectare has increased manifold and the approach to farming has undergone almost a radical change. Farming as an occupation has made a big leap forward from merely a way of life to that of well-conceived commercial enterprise.

IRRIGATION

The average annual rainfall in the district is 378.8 mm and is one of the lowest in all districts of the state. Moreover, the rainfall is irregular and the variations from year to year are considerable. This uncertainty of rains necessitates the development of artificial sources of irrigation to take advantage of richness in the soil and to sustain droughts. No perennial river passes through the district.

Irrigation facilities were completely lacking in the district up to the late 19th century. Owing to the depth of water below the surface there was no irrigation from wells in the Bagar (corresponding to the south-eastern corner of the district) and Rohi (corresponding to the north-eastern portion of the district). In the Nali circle (corresponding to the area lying on both sides of

the Ghaggar and enclosed in its arms), there were 82 masonary and 27 kacha wells which provided irrigation in 44 villages and irrigated 892 acres of land in 1879—83.[1]

In 1888-89, the Sirhind canal was extended to this district and irrigated portions of 15 villages near Dabwali. This irrigation was only escape irrigation and in the driest years when water was most needed, very little was available. Still the benefit to the villages was great, for even if they could not be irrigated, they were assured of supply of sweet drinking water for men and cattle. In 1894-95, the Sirsa branch of the Western Yamuna (Jumna) canal was extended to the district and irrigated some 31 villages in the Nali circle, most of which were situated to the east of the Sirsa town. The irrigation was not very extensive and there were frequent closures owing to breaches and other causes, but in spite of this the villages irrigated benefited greatly. In 1897, the Ghaggar canals were dug as a famine relief work. The Ghaggar river was dammed at Ottu below Dhanoor village and two high level canals which were to supply water to villages whose lands had not yet been reached by the Ghaggar floods. Though these canals did not fulfil the high expectations yet they had done some good. Large areas of rice were provided irrigation from these canals and larger areas above dam received flood water than these used to receive water formerly. These canals resulted in the increase of irrigated area which was reported to be 5.9 per cent of the total cultivated areas in 1921-22.

In the district with so little rainfall, variably floods of the Ghaggar were very valuable and great efforts were made to take full advantage of them. When the land was flooded in the rainy season, it was ploughed and sown with *jowar* or *moth* for the kharif crop or with wheat or gram for the rabi. A small area which was above the natural flow of the floods, was irrigated by *jhalars* or *tuyas* erected on the banks. When the height to which the water must be raised was not great, the peasants employed the *chambar*—an apparatus on the principle of the lever or *dhenkli* consisting of a strong beam with the leather bag fastened below one end and a weight of stone placed on the other. For rice cultivation, banked enclosures (*kund*) were made on the low-lying land most subject to inundation by surrounding 50 or 60 acres of land with a bank of earth high enough to keep out ordinarly floods. When the river came down in flood, so much water was let in to the *kund* as was required. So long the flood outside stood higher than the level of the land inside the *kund*, the cultivator could, by knocking a whole in his bank, let in as much water as the crop wanted from time to time and then closed the enterance again. Sometime the level of the flood outside was artificially raised by a water cut from higher up the stream or an embankment lower down or water was brought

1. J. Wilson, *Final Report on the Revision of Settlement of the Sirsa District in the Punjab*, 1879—83, p. 217.

directly by a water cut from one of the lakes or depressions. During the settlement of 1879—83, 146 *kunds* were enumerated which altogether covered 8,957 acres. Later towards the close of the 19th century, the government tried to utilise the flood water of the stream by a dam at Ottu and digging two canals further on.

After the commencement of irrigation from Bhakra Nangal Project, there has been significant improvement in the irrigational facilities in the Sirsa district. The extension of canal irrigation, installation of tubewells and other minor irrigation schemes have led to manifold increase in the irrigated area of the district. Consequently, in 1980-81, 72·6 per cent of the cultivated area in the district was irrigated through various sources.

The following table shows the area irrigated through different sources during 1975-76 to 1980-81 :—

(Thousand Hectares)

Year	Canals	Tubewells and Other Sources	Total	Percentage To Net Area Sown
1975-76 ..	142(86·1)	23(13·9)	165	41·7
1976-77 ..	168(86·2)	27(13·8)	195	49·1
1977-78 ..	195(82·6)	41(17·4)	236	60·0
1978-79 ..	211(82·1)	46(17·9)	257	65·2
1979-80 ..	223(77·7)	64(22·3)	287	72·3
1980-81 ..	225(77·8)	64(22·2)	289	72·6

(*Note.*—Figures in brackets are as percentage of total net area irrigated).

Significantly enough, the share of canals in the total net area irrigated has decreased and that of tubewells increased over the period. The share of canals decreased from 86.1 per cent in 1975-76 to 77.8 per cent in 1980-81 and that of tubewells increased from 13.9 per cent in 1975-76 to 22.2 per cent in 1980-81.

Canal Irrigation

By far the most important means of irrigation in the district are canals and little less than four-fifth of the net irrigated area is served by canals. Canal irrigation in the district is provided by two canal systems viz., the Bhakra Canal and the Ghaggar Canal.

Bhakra Canal System.—Three channels of Bhakra Main Line Canal i.e. Fatehabad branch, Sukhchain distributary of Ratia branch and Bhakra Main branch provide irrigation to the district and were constructed between 1954 to 1966. The Fatehabad branch system irrigates the south-western part of the district.

The Sukhchain distributary irrigates a small portion lying to the south of the Ghaggar, and the Bhakra Main Branch system irrigates the north-western parts of the district.

Ghaggar Canal System.—The Ghaggar Canal System irrigates the south-western portion of the district and is fed from flood water of the river Ghaggar during monsoons. During other months, this system is fed by Bhakra Main Line Canal through Ottu feeder of Rori branch. This system comprises Northern Ghaggar Canal and Southern Ghaggar Canal.

Modernisation of existing channels.—Lot of valuable water was being lost as seepage from *kacha* water courses into sandy lands of the Sirsa district where the losses were as much as 20 to 30 per cent. To save this valuable water from going waste, the government embarked a plan to make water courses pucka by lining them. The work of lining these water courses is done by Haryana State Minor Irrigation (Tubewells) Corporation Ltd. The cost is recovered from the cultivators in easy instalments under the provisions of Haryana Canal and Drainage Act, 1974.

Sprinkler irrigation.—There are certain areas in the district which are uncommanded by the flow irrigation and many of them consist of sand dunes. Sprinkler irrigation was introduced to some of these fields on an experimental basis in 1977-78.

Tubewells

The tubewells are the second most important source of irrigation in the district and 22.2 per cent of the net irrigated area is served by them. Wells are practically non-existent and the few are for domestic use only.

The underground water in most parts of the district being rich in carbonates and bicarbonates is not suitable for irrgation. Before the commissioning of Bhakra Nangal Project, the canal irrigation was not sufficient, and there had been a single crop system. The government started exploring the underground water resources and deep trial boring was done at various places in the district. A ground water testing laboratory was established in 1974. The average depth of water varies from 2 metres to 27 metres. The depth of water increases in the north-western parts of the district particulraly in Dabwali block where it was 27 metres below surface. In the south-western parts, the depth of water ranged from 2 metres to 8 metres. It was found from the exploration that fresh water was available along the Ghaggar popularly known as Nali area and along the courses of unlined canals. A little further on both sides of the Nali area, the ground water was suitable and could be used by blending it with canal water or with a specific doze of gypsum.

Thus to supplement canal water at critical stages, the installation of tubewells was encouraged. In March 1981, there were 55 dug wells, 1,250 pumping sets, 7,265 tubewells and 55 direct irrigation and augmentation tubewells. The following table shows the number of tubewells and the area irrigated by tubewells from 1975-76 to 1980-81 :—

Year	Number of Tubewells and Pumping Sets	Area Irrigated by Tubewells
		(000 hectares)
1975-76	8,217	23
1976-77	8,781	23
1977-78	9,597	41
1978-79	10,229	46
1979-80	11,016	64
1980-81	13,546	64

The above table shows that the number of tubewells has progressively increased since 1975-76. As a result the area under tubewell irrigation has increased by over 178 per cent.

Land Utilisation

The total area of the district according to village papers measured 4,27,219 hectares in 1980-81. The broad use of the land in 1980-81 is shown below :—

Nature of land Use	Area	Percentage of Total Area
	(Hectares)	
Cultivated	3,68,101	86·2
Uncultivated	57,211	13·4
Permanent Pastures and Grazing	1,907	0·4

The cultivated area (net area sown) is 86.2 per cent of the total area of the district as compared to state percentage of 81.1. Since 86.2 per cent of the total area of the district is under plough, there is hardly any scope to bring more area under different crops for increasing agricultural production. Therefore, all efforts need to be diverted towards increasing per hectare yield through enhanced irrigational facilities, multiple cropping and application of latest farm technology.

Size of Land Holdings

According to Agricultural census 1980-81, total number of operational holdings in the district was 63,458[1]. The average size of holdings in the district was 6.07 hectares (highest in the state) against 3.52 hectares average size of the state. The break-up of operational holdings into different sizes has been given below :—

Size of Group (in Hectares)	No. of Holdings	Area (in Hectares)
0—0·5	5,258	1,517
0·5—1·0	5,810	4,540
1·0—2·0	10,629	18,248
2·0—3·0	8,209	24,152
3·0—4·0	6,531	24,034
4·0—5·0	5,594	27,026
5·0—7·5	8,982	65,359
7·5—10·0	4,720	45,566
10·0—20·0	5,668	1,11,035
20·0—30·0	1,320	34,937
30·0—40·0	495	17,112
40·0—50·0	144	5,807
Above 50·0	98	5,702

About 47.1 per cent of the total holdings are below 3 hectares and the maximum number of holdings lies in the size group of 1.0—2.0 hectares.

[1]. *Statistical Abstract of Haryana*, 1985-86, P. 188.

AGRICULTURE

The economy of the district is predominantly agricultural. After Independence, almost all the area fit for cultivation has been brought under plough and the district has made notable progress in the field of agriculture after the formation of Haryana in 1966 and more so after it was made a district in 1975. This is evident from the fact that the foodgrains production which was 374 thousand tonnes in 1975-76 increased to 419 thousand tonnes in 1980-81, thus registering an increase of 12.00 per cent between 1975-76 to 1980-81. The production of wheat, gram, paddy, cotton and oilseeds also registered significant increase during this period.

Role of Agriculture Department

The Agriculture Department guides the farmers in the latest technological advancements in the field of agriculture. These include intensive methods of cultivation for higher production per unit area through new cropping patterns, preparation of crop plans, agricultural crops and gardens, use of fertilizers and good seeds, and laying out of demonstration plots to show to the cultivators the superiority of new strains and agronomic practices recommended for the district. The village level workers of the department impart training and education to farmers in their respective areas on matters relating to improved seeds, fertilizers and improved agricultural practices.

The Department of Agriculture at the district level is headed by the Deputy Director of Agriculture, who is assisted by six Agricultural Officers, 50 Agricultural Development Officers and other field staff.

Soils

The soils of this district are sandy to sandy loam in texture. These may be divided into two tracts namely, the Ghaggar belt and the Rohi or semi-arid zone. The soils around Ghaggar belt are loamy to clay loam in texture. This belt extends to an area of 3 to 5 kilometres on both sides of the river and at some places it extends to 5 to 7 kilometres. The Ghaggar river passes through Sirsa, Rania and a part of Bada Gudha blocks. The soil of this tract is very fertile and paddy, cotton and wheat are most important crops of this tract.

The soils of the remaining tract are sandy to sandy loam in texture. There are also sand dunes lying on the north-western border of the district which are adjoining Rajasthan. During summer, hot and dry winds blow through-out the day and cause shifting of sand dunes from one place to another. This is a serious problem in some villages of the district.

Crops

The crops in the district are divided into two main categories, viz., kharif and rabi, locally named as *sawani* and *asadhi*. The former is the summer season and later the winter season crop.

The major kharif crops of the district are cotton, paddy and *bajra* while the minor ones are sugarcane and *jowar*. Other minor kharif crops are *moong*, *moth*, groundnut and vegetables. The major rabi crops are gram, wheat and oilseeds and minor ones barley and vegetables.

Major foodgrain crops of the district are gram, wheat and paddy and major cash crops are cotton and oilseeds.

Foodgrains Crops

Gram.—It is a major rabi crop throughout the district. It forms a good diet both for human beings and cattle. It is mostly grown under *barani* conditions and therefore, its acreage shows wide variations from year to year. The area under this crop was 82,810 hectares in 1974-75 increased to 1,56,883 hectares in 1976-77 and dwindled to 1,10,200 hectares in 1979-80 and again increased to 1,55,925 hectares in 1980-81. The percentage of area under gram to total cropped area was 29.82 percent in 1980-81 and was highest for any single crop. The important varieties grown in the district are G-130, A-208 and C-235.

Wheat.—Wheat is another important rabi crop in the district. It is grown mostly in irrigated area. The area under this crop has increased considerably over the years. It was 66,380 hectares in 1974-75 which increased to 97,253 hectares in 1980-81. The increase in area under this crop is largely due to increase in irrigated area and the introduction of new local and exotic high-yielding varieties.

The main high yielding varieties grown in the district are Kalyan, Sona (K-227), Sonalika (S-308), WH-147 and HD-2009.

Bajra.—*Bajra* is mostly grown in *barani* areas of Sirsa block. The area under this crop fluctuates every year depending on the intensity of rainfall. The area under *bajra* was 49,930 hectares in 1974-75, 61,650 hectares in 1975-76, 37,900 hectares in 1977-78 and 8,400 hectares in 1979-80. It was 18,501 hectares in 1980-81. The most common variety grown in this district is BJ-104. Because of high yielding potential, hybrid varieties are rapidly replacing the local varieties.

Paddy.—It is an important kharif crop of the district and is mostly grown in Sirsa and Rania blocks in the area around both sides of the Ghaggar in Sirsa tahsil. The area under this crop has increased over the years, from 12,240 hectares in 1974-75 to 19,956 hectares in 1980-81. The popular varieties grown in the district are PR-108, IR-8 and Jaya.

Commercial Crops

Cotton.—It is the most important commercial crop of the district and is grown almost in all the blocks. The soil and climate of the district are suited

for this crop and cultivation has responded actively to canal irrigation. The area sown under cotton increased from 62,683 hectares in 1970-71 to 98,000 hectares in 1980-81. The increase has mostly been of the American cotton because of its long staple and suitability for the mills. Sirsa district has the second highest proportion of area under cotton and its production in the state as a whole. The main varieties of cotton grown in the district are H-777, G-27 and Bikaneri (J-34).

Rape and Mustared.—It is also an important commercial crop grown in the district. The area under this crop has increased from 13,291 hectares in 1974-75 to 45,777 hectares in 1980-81. It is mainly grown in Dabwali and Bada Gudha blocks.

Table IV, V and VI of Appendix give details about the area under principal crops, the yield per hectare and the production of principal crops from 1975-76 to 1980-81.

Fodder Crops

About 14.5 per cent of the total cropped area of the district is under fodder crops. Apart from these crops, the stalks of *bajra, jowar* and maize and the chaff of wheat, gram and minor cereals are used as animal feed. The forage crops are generally sown in the rainfed areas in the kharif season and irrigated conditions in the rabi. The important among fodder crops are *chari* and *barseem.* The following table gives the area under fodder crops from 1975-76 to 1980-81 :—

Area under fodder groups

(In 000' Hectares)

Year	
1975-76	82
1976-77	62
1977-78	62
1978-79	66
1979-80	60
1980-81	76

Cropping Pattern :

The absence of assured means of irrigation and lack of infrastructural facilities such as transport, marketing, storage and credit had direct bearing on the composition of the crops grown in the Sirsa district in the beginning of the present century. Mainly the inferior foodgrain crops were grown. The area under cash crops was not much significant. The principal crops at that time were *bajra*, gram and barley. Rice and wheat were cultivated only in small area having irrigation facilities, Among cash crops only oilseeds were cultivated. Cotton, now the most important cash crop of the district had just 8 hectares of area under it in 1900—01.

The following table showing area under principal crops in 1900—01, 1930-31 and 1980-81, brings out clearly the changes in the cropping pattern of the district during the last eighty years :—

Area under Principal Crops

(In Hectares)

Crops	1900-01[1]	1930-31[2]	1980-81
Rice	2,335	2,641	19,956
Wheat	10,175	20,434	97,253
Jowar	9,143	12,221	266
Bajra	62,147	77,381	18,501
Barley	45,043	29,977	6,815
Gram	51,749	1,35,511	1,55,925
Oilseeds	44,289	4,878	45,777
Cotton	8	748	98,100

(*Note.*—Figures for 1900—01 and 1930-31 relate to the then Sirsa tahsil which included the areas of the present Dabwali tahsil. Figures given in acres have been converted into hectares).

The above table shows that between 1900-01 and 1930-31 the area under wheat, *jowar*, *bajra* and gram increased. Increase was more significant for wheat and gram. There was insignificant increase in the area under rice. The area under barley and oilseeds declined considerably during the same period, decrease being more sharp in case of oil seeds. Though area under cotton increased from 8 to 748 hectares but increase was not significant enough to affect the cropping pattern.

1. *Hisar District Gazetteer, Statistical Tables*, 1912, Table 19.
2. Ibid 1935, Table 19.

The period between 1930-31 and 1980-81, witnessed significant changes in the cropping pattern. The area under rice, wheat, gram, oilseeds and cotton increased manifold. Increase was more significant for cotton and oilseeds –two main cash crops of the district. The increase in area under rice and wheat was also significant but increase in area under gram was not much significant. On the other hand area under *jowar, bajara* and barley decreased considerably. The decrease was more sharp in case of *jowar*, which had just 266 hectares in 1980-81 as against 12,221 hectares in 1930-31. Area under barley and *bajra* decreased to 6,815 and 18,501 hectares respectively in 1980-81 from 29,977 and 77,381 hectares respectively in 1930-31. Thus, cropping pattern in the district witnessd significant changes since 1900-01. Among the cereal crops there was a noticeable fall in the area under coarse and low value crops like *bajra* and *jowar* , whereas the area under superior crops like rice and wheat has gone up from 2,335 hectares and 10,175 hectares respectively in 1900-01 to 19,956 hectares and 97,253 hectares respectively in 1980-81. The area under gram also showed an upward trend.

Moreover, with the availability of assured irrigation facilities and consciousness among cultivators, the area under low-yielding and low-value crops has been substituted by cash crops over the period. The area under cotton has increased from barely 8 hectares in 1900-01 and 748 hectares in 1930-31 to 98,000 hectares in 1980-81. The total cropped area in 1980-81 was 5,23,000 hectares of which food crops claimed 3,00,500 hectares or 57.46 per cent, while non-food crops covered 2,22,500 hectares or 42.54 per cent. It is significant to note that cropping pattern in the district has changed in favour of non-food cash crops over the period. Though food crops still occupy large proportion of total cropped area , but the proportion of non-food cash crops in the total cropped area has increased significantly.

These changes in cropping pattern have given an entirely new look and direction to the economy of the district. The tract where earlier mainly *bajra* and gram were grown is now known as cotton belt of Haryana. *Bajra*, the most important crop of the district in the beginning of the present century has now been relegated to sixth place whereas cotton is now second most important crop of the district next only to gram. Tremendous increase in cotton production has given rise to the opening of many cotton ginning factories.

The changes in cropping pattern discussed in foregoing paragraphs have taken place after the beginning of the planning era in 1951. Cropping pattern remained more or less static till then. Most of these changes were apparently due to additional facilities made available under various Five Year Plans in the form of irrigation, chemical fertilizers, better seeds, credit and marketing and better agricultural extension services. Cropping pattern in the district responded favourably to these changes in the infrastructure.

Agricultural Production and High Yielding Varieties

As the 99.5 per cent of the total cultivable area in the district has been brought under cultivation, the agricultural production can be increased only through intensive cultivation. Use of high yielding varieties of seeds of various crops have revolutionised the agriculture in the district. With the adoption of these varieties production has increased manifold and area under cultivation as a proportion of total cultivable area is the highest in the state. The High Yielding Varieties Programme was introduced in the areas now comprising Sirsa district in 1966-67, when Mexican varieties of wheat, high yielding varieties of paddy and hybrid *bajra* were propagated and the maximum area was brought under these varieties. The yearwise area under these varieties since 1975-76 is given below :

(Hectares)

Year	Wheat	Bajra	Paddy
1975-76	70,000	18,000	12,000
1976-77	76,000	15,000	12,000
1977-78	82,000	16,000	13,000
1978-79	1,05,000	22,000	16,000
1979-80	93,000	5,000	18,000
1980-81	94,000	7,000	18,000

Horticulture.

The climatic conditions and soils of the district are suitable for citrus, *ber*, grapes and guava. Sirsa is the leading district in the state, where citrus fruits are grown on commercial scale. Area under fruits can be increased considerably if some fruit preservation industry is set up around Dabwali. It will help the cultivators in getting better price of their produce. The scope of grape cultivation is limited because of the poor marketing facilities. The area under *ber* cultivation can be increased considerably.

Among vegetables, chilly, potato, cauliflower and cabbage, carrot and tomato have good scope.

The approximate area under fruits and vegetables in the district during 1980-81 was as under :

Fruits	Approximate area (Hectares)
Citrus	104
Ber	70
Grapes	4
Guava	30
Mango	6
Miscellaneous	30
Total	244
Vegetables :	
Chilly	200
Sweet potato	1
Singhara	..
Long Melon	..
Others	84
Rabi Vegetables .	
Potato	19
Garlic	..
Onion	4
Carrot	55
Cauliflower	95
Pea	..
Tomato	30
Others	35
Total	523

There are two Agricultural Development Officers (Horticulture) one each at Sirsa and Dabwali. There is also a nursery for fruit plants at Sirsa, where plants of citrus fruits, *ber*, grapes and guava are available for sale.

Agricultural Implements

Improved agricultural implements and machines play a vital role in increasing agricultural production. The farmers are gradually mechanising agriculture and adopting improved implements in accordance with their utility and scope for use. The brief description of agricultural implements used by farmers is given below :—

Plough.—It is made of wood or iron, the wooden one is generally of *kikar* wood. It scratches the soil up to 4 or 5 inches. In small land-holdings, fragmented and non-contiguous holdings, this plough is ideally suited as it does not disturb the level of the land. Of late, the use of iron plough has become more popular as the figures indicate. In 1961 there were 39,814 wooden and only ,841 iron ploughs. In 1977 the number of wooden and iron ploughs increased o 47,125 and 39,755 respectively. The increase in the number of iron ploughs during 1961—77 has been much higher than in case of wooden ploughs.

In 1982, there were 37,000 wooden ploughs and 26,205 that of iron. The armers are switching over to mechanised farming. Consequently there is noticeable decline in plough number.

Tractor.—The use of a tractor, though limited to a few big farmers, is becoming increasingly popular. The district had only 405 tractors in 1961. Their number increased to 3,275 in 1977 and 7,403 during 1981-82. Almost all types of tractors manufactured in the country are operating in the district.

Bullock-cart.—This is the traditional load carrying device of the farmer. It is commonly used for carrying the farm produce to the threshing ground, grains to the homestead and surplus to the market and even as a means of transport. There were 5,188 carts in the district in 1961, 7,910 in 1977 and 11,286 in 1982.

Cane-Crusher.—It is another important agricultural implement used for crushing the cane. Wooden crushers, in vogue before Independence, have been replaced by steel crushers. There were 142 cane crushers in the district in 1961 and their number increased to 755 in 1977, however, it declined to 469 in 1982.

Other implements.—A number of other tools and implements such as spade, *kasola, pora, kulhari* (axe), *dranti* (sickle) and seed drills are used. Although the scope of mechanised farming is limited because of the small land holdings, the modern implements are being gradually adopted by the farmers. The traditional system of threshing wheat under the feet of bullocks has almost been discarded in favour of the mechanised method through power threshers operated by the tractors or small motors. The farmers have adopted the improved implements, such as harrows, power thresher and seed-cum-fertilizer drills.

Seeds

The Agricultue Department plays an important role in publicising the use of improved seeds. It also concentrates on multiplying and distributing improved seeds to the farmers. The better yielding varieties of some seeds used by the cultivators in the district are as under :—

Kharif	
Bajra	PHB-14, BJ-104, HS-I
Moong	Versha, Baisalki, T-9
Gwara	FS-277
Cotton	H-777, G-27, Bikaneri (J-34)
Sugarcane	CO-1148, CO-1158, CO-975
Rabi	
Wheat	C-306, Sonalika, WH-147, Kalyan, Sona, HD-2009
Gram	G-130, H-208, C-235
Barley	BG-25, C-138, BG-105
Raya	A-29 (Prakash), L-18
Sarson	BSH-I
Taramira	ITS-4
Toria	ITS-4
Barseem	Mascavee

The seed is procured from National Seeds Corporation, Haryana Seeds Development Corporation, Haryana Agricultural University, Hisar and the various government seed farms.

The quantities of improved seeds distributed by the Agriculture Department in the district during 1974-75 to 1980-81 are given in the table below :—

Year	Seeds Distributed (Quintals)
1974-75	2,814·23
1975-76	3,404·35
1976-77	6,582·53
1977-78	4,858·83
1978-79	4,444·32
1979-80	7,483·23
1980-81	10,245·59

Manures and Chemical Fertilizers

The use of manures and fertilizers has increased considerably in the past few years. The farmers use compost, farm-yard manure and chemical fertilizers to increase agricultural production. Night-soil and other urban wastes were neglected earlier as the people did not like to use them due to social prejudice. Now these are being used in considerable quantities. Green manuring with leguminous crops add to the fertility of the soil. Among all kinds of manuring practices, green manuring has been found to be the cheapest. Chemical fertilizers are very useful for foodgrain crops.

The following figures regarding the distribution of chemical fertilizers show that the use of chemical fertilizers is becoming more and more popular among the cultivators of the district and it has increased more than three-fold during 1974-75 to 1980-81 :—

Year	Chemical Fertilizers Distributed (Metric tonnes)			
	Nitrogenous	Phosphatic	Potash	Total
1974-75	6,718	501	141	7,360
1975-76	7,855	950	200	9,005
1976-77	12,207	1,637	514	14,358
1977-78	15,799	3,279	839	19,917
1978-79	19,613	3,698	1,042	24,353
1979-80	17,396	3,964	1,263	22,623
1980-81	17,495	4,652	1,596	23,743

Compost Manure

Urban Compost.—Urban wastes are a potential source of plant food ingredients. Efforts have been made in the past few years to conserve these wastes for manurial purpose. The municipalities of Sirsa, Dabwali, Kalanwali and Rania are producing urban compost. Compost produced at these places is sold to the farmers.

Rural Compost.—The preparation of compost manure in the rural areas is also being promoted. The extension workers for manure advise the farmers in villages for the preparation of compost and train them in the technique of scientific composting. The following figures show the compost prepared and compost utilized, both urban and rural, in the district from 1974-75 to 1980-81:—

Year	(In Metric tonnes)	
	Compost Prepared	Compost Utilized
1974-75	1,70,000	1,45,000
1975-76	1,65,000	1,40,000
1976-77	1,65,000	1,40,000
1977-78	76,400	70,500
1978-79	1,23,650	1,20,550
1979-80	69,650	51,930
1980-81	62,620	47,340

Green Manuring

Green manuring is very important for soil fertility as it directly adds nitrogen to the soil. It also improves soil texture by addition of humus or organic matter. The addition of organic matter improves both heavy and sandy soils. The water holding capacity of the soil also increases. The practice of green manuring with sunn-hemp and *dhaincha* is being steadily popularised.

The area under green manuring has considerably increased over the years as is evident from the following figures :—

Year	Area Under Green Manuring
	(Hectares)
1974-75	265
1975-76	280
1976-77	280
1977-78	355
1978-79	365
1979-80	340
1980-81	602

Crop Rotation

Two crops in a year is the common practice in areas of assured water-supply. In *barani* areas single cropping is still in vogue where either kharif or rabi is sown. Mixed crops are commonly grown in *barani* tracts. Gram and wheat or gram and barley with rows of *sarson* or *toria* are sown mixed to provide safeguards against uncertainty of weather. The rotation varies from soil to soil and it differs under irrigated and *barani* conditions. The general rotation of crops followed by farmers in the district is given below:

1.	Cotton—	wheat—	cotton
2.	Cotton—	fallow—	cotton
3.	*Bajra*—	wheat—	*bajra*
4.	*Bajra*—	gram—	*bajra*
5.	Paddy—	wheat—	cotton
6.	*Gwara*—	wheat—	cotton
7.	Gwara—	fallow—	cotton
8.	Pulses—	wheat—	cotton

Barani

1.	*Bajra*—	fallow—	fallow
2.	Fallow—	gram—	*bajra*
3.	*Gwara*—	fallow—	*bajra*
4.	Fallow—	Rape seed— mustard—	*gwara*

Agricultural Pests and Diseases

Crops are occasionally exposed to damage from a variety of diseases and pests. Downey mildew and ergot in *bajra*, *jassid* and pink boll worms in cotton and paddy and root weevil, annalids and blast in rice are some of the major kharif crop diseases in the district. Red hairy caterpillar (*kotra*) is another dangerous pest which creates terror among the farmers during kharif and attacks almost all the crops.

The ergot disease can be controlled by floating the seed in 10 per cent salt solution and downey mildew by roguing diseased plants and spraying by any of the fungicide like Miltox, Blitox, Bolitone and Dithane M-25.

Jassids and other sucking pests can be effectively controlled with systemic insecticides like Dimecron, Metasystox, Anthio and Rogor. Field sanitation combined with insecticidal sprays with Sevin and Zolone against pink-boll worms have proved quite effective and have improved the quality of cotton seed.

Paddy root weevil and annalids are given soil treatment of systemic granules of Thimet, Lindane and Phorate. Blast on rice can be checked by Hinoson Blitox or other copper fungicides.

Red hairy caterpillar can initially be controlled with BHC 10 per cent and later when mature, application of Nuvan and Thiodan spray are effective.

Wilt in gram and termites on wheat are two most serious disease insects affecting rabi crops in the district. Late sowing and conserving moisture have proved beneficial in lessening the incidence of wilt in gram. Seed treatment with Aldrine 30 per cent EC at the rate of 4 ml/Kg in wheat and 10 ml/Kg in case of barley are popular among the farmers.

Oilseeds in rabi are attacked by sawfly larve, painted bug and aphids (*chepa*). BHC 10 per cent and Malathion can check sawfly and painted bug while aphids can be easily controlled by use of systemic insecticides like Dimecron and Metasystox.

Rats are serious pests for wheat and gram. These can be controlled by feeding baits poisoned with Zinc Phosphides, Rodaprin 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 effectively controlled by fumigating the store, containers (grain bins/gunny bags) with Celphos and Ethylene Dibromide.

The Agriculture Department educates farmers regarding 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.

Integrated Cotton Development Project (World Bank)

The Project was started in the year 1976-77 with the financial assistance of World Bank with an outlay of Rs. 110.22 lakh. The project area in Haryana comprised Sirsa and Rania blocks of the Sirsa district and Ratia, Fatehabad and Bhuna blocks of Hisar district.

The main object of the project was to increase cotton production by increasing yield per unit area through the adoption of improved technology.

Area Coverage.—In all the five blocks of project the area under cotton before the start of the project i.e. 1975-76 was 90 thousand hectares, out of this 56 thousand hectares was under American cotton and 34 thousand hectares was under *desi* cotton. The area under cotton sharply declined from 90 thousand hectares in 1975-76 to 39 thousand hectares in 1976-77.

Due to this alarming trend, the project was started and thereafter, there had been a steady increase in the area under cotton which increased from 39 thousand hectares in 1976-77 to 118.39 thousand hectares in 1980-81.

Seed Distribution.—It was proposed to cover the entire project area under American cotton with improved seed of recommended varieties. Necessary arrangements were made for meeting the seed requirements and 3289.54 quintals of certified seed was distributed in the year 1980-81.

Fertilizer Distribution.—The pre-project fertilizer consumption in the project area was estimated at 50 Kg per hectare. It was proposed to raise it to 80 Kg per hectare as per recommendation of the Haryana Agricultural University, Hisar. The maximum fertilizer consumption level was achieved during 1979-80 which was 64 Kg. per hectare. The years 1980-81 and 1981-82 were the most drought affected years when the fertilizer level remained slightly low.

Training Programme.—The farmers and field functionaries are imparted training in improved technology of crop production. During 1980-81, 75,700 farmers were imparted training.

Field Sanitation.—For increasing the production of good quality cotton, the hibernation of pink boll worm is required to be checked at proper time. For this purpose the farmers are required to be educated in the importance of field sanitation by removing cotton sticks from the fields and burning the remaining parts (debris) of the cotton plants like unopened bolls, burrs and flowers, etc. By the end of February, the field staff engaged in the project area is put on the special duty for the education of the farmers and ensuring the clearance of the cotton sticks from the fields after shedding their floral parts.

Integrated Pest Control.—Effective pest control in the crop like cotton is only possible through an integrated approach and adoption of all possible pest control measures. An effective pest surveillance is conducted before taking up aerial and ground spray operations. Depending upon the extent of infestation, the farmers are guided to spray their crop only when required with a particular type of insecticides looking to the intensity of particular insect.

The surveillance work has been streamlined in order to know the exact insect/pest situation for quickly taking up suitable remedial measures. In 1980-81, 60 villages were covered under this programme. Under the project entire area under cotton was covered either through ground spray or aerial spray. During 1980-81, an area of 1,85,000 hectares and 25,310 hectares was covered by ground and aerial spray respectively.

Demonstrations.—Practical field demonstrations in the farmers fields is one of the most important tool for making an impact of improved technology.

The farmers only get convinced when they themselves see the effect of applied technology on their own fields. Taking this as a measure for disseminating knowledge of improved technology, the effective result demonstration plots were laid out on the farmers fields and 90 demonstration plots were arranged during 1980-81.

Short Term Credit.—Cotton crop required a heavy investment for its successful cultivation for which the cotton growers need credit facilities. This facility has been provided under the World Bank Cotton Project through co-operative and commercial banks and Rs 518.60 lakh were distributed as crop loan amongst the farmers in 1980-81.

Production.—As a result of the integrated approach under this project, the average yield per hectare arose from 9 quintals in the year 1972-73 to 15 quintals in the year 1980-81. The total production under Integrated Cotton Development Project (World Bank) area stepped up from 1,07,000 bales in 1976-77 to 3,48,000 bales in 1980-81.

Agricultural Research

The Haryana Agricultural University is conducting research in the development of agriculture and has established a Cotton Research Station and a Krishi Gyan Kendra at Sirsa with a view to disseminate the latest findings in agricultural research and to advise the farmers in disease control, soil management, etc.

Cotton Research Station, Sirsa.—A Cotton Research Station was established at Sirsa during 1976. The work was initially started with a view to reconstitute variety 320-F and to restore its original genetic potential. The station develops high yielding early maturing varieties of cotton which are resistant to pests and diseases. High yielding variety H-777 was released during 1978 for the World Bank Cotton Project area. Variety H-665-C, a long staple cotton, was also released for project area during the same year. The variety H-777 has made significant impact on the cotton production of the state. Besides, the station caters to the need of foundation seed of cotton required for organising onward stages of seed multiplication for supplying genetically pure seed to the growers. Further, the staff engaged at Cotton Research Station, Sirsa is to disseminate the research findings to the cultivators. Similarly, Krishi Gyan Kendra established at Sirsa demonstrates the efficacy of research findings at farmers fields.

Before the transfer of research work to Haryana Agricultural University, the then Fodder Research Station at Sirsa developed and released 17 fodder varieties for cultivation in the erstwhile Punjab state. The following were the

more important varieties which were evolved and released by the Fodder Research Station, Sirsa:—

Sr. No.	Crop	Variety	Year of release	Yield (Quintals/Hectare) Green fodder	Dry matter	Seed
1.	*Jowar* (*Sorghum bicolor*)	1. J.S. 20	1937	420	145	12
		2. J.S. 263	1948	450	160	8
		3. J.S. 29/1	1949	450	160	8
		4. S.S.G. 59-3	1960	750	250	2
2.	*Teosinte* (*Euchlaena maxicana*)	Improved Peosinte	1956	600	150	10
3.	*Guar* (*Cyamopsis tetragonoleba*)	Guar No. 2	1956	300	60	13
4.	Cowpea (*Vigna unguiculata*)	1. F.O.S.1	1938	250	53	5
		2. No. 10	1960	270	40	4
5.	*Moth* (*Vignar aconitifolius*)	T-3	1942	225	58	8
6.	*Barseem* (*Trifolium alexanderinum*)	MESCAVI	1930	1,000	175	4
7.	Lucerne (*Medicago sativa*)	T-9 (Sirsa-9)	1942	900	200	1·5
8.	*Senji*--Yellow (*Melilotus parviflora*)	FOS.1	1953	275	62	10
9.	*Metha* (*Trigonella foenum graecum*)	T-8	1951	200	40	6
10.	Oats (*Avena sativa*)	1. Weston—11	1950	400	96	15
		2. Brunker—10	1950	400	96	15
		3. FOS 1/29	1937	450	102	16
		4. Algerian	1937	450	108	17

Many of these varieties are still holding the field and have done well in other parts of the country as well.

Krishi Gyan Kendra, Sirsa.—Haryana Agricultural University has a Farm Advisory Centre at Sirsa, known as Krishi Gyan Kendra. A team of specialists in different subject matters such as agronomy, soil, horticulture, vegetable crops, entomology, farm management, agricultural engineering, home science, veterinary sciences and animal sciences have been provided at this Krishi Gyan Kendra with a Co-ordinator as their Incharge.

The objectives of the Krishi Gyan Kendra are to disseminate the latest technology in the fields of agriculture, livestock farming and home management

to the different functional and rural people, to field-evaluate a research findings and to provide feed-back to the scientists about the field problems of the farmers. The dissemination of knowledge is done by holding farmers' fairs, training camps, demonstrations, campaigns, exhibitions, film shows, etc. Field days on different crops in respect of different package of practices, cattle shows, vegetable shows and calf rallies are arranged through-out the district. The owners of best animals/crop samples and standing crop demonstrations are awarded prizes. The farmers of the district are apprised of the results based on the latest agricultural technology developed by the university scientists from time to time. The university has adopted 5 villages, namely Panniwala Mota, Karamgarh, Chhatrian, Kharekan and Burj Bhangu. The dissemination and adoption of different practices related to agriculture and animal husbandry has resulted in a noticeable development in these villages which have served as a model for the surrounding villages and other a reas of the district.

Agricultural Co-operatives

Increased agricultural production depends on a number of factors like the provision of timely and adequate credit, use of significant inputs, viz. chemical fertilizers, improved seeds and insecticides/pesticides, and facilities for marketing of agricultural produce as well as storage arrangement. The agricultural service co-operatives are aimed at meeting these requirements. It is through co-operative farming that scanty resources of the agriculturists can be pooled, thus bringing to them the gains of large-scale intensive farming Through co-operative marketing, the enormous profits to middle-men can be checked and higher dividends secured to the farmers.

In 1981, the total number of co-operative societies of all types excluding industrial co-operatives was 482 with a total membership of 1,18,724. Their owned funds and working capital amounted to Rs. 6.45 crore and Rs. 39.85 crore, respectively. Almost all the inhabited villages of the district were covered with one or the other type of the co-operative society. For meeting the credit, fertilizers and consumer goods requirements, there were 184 agricultural credit and service societies with the total membership of 78,032 in June, 1981. These societies advanced short and medium term loans to the extent of Rs. 13.05 crore during 1980-81. Besides, these societies distributed 16,812 tonnes of fertilizers through a network of 62 regular sub-depots in the district. Their owned funds and working capital were Rs. 2.40 crore and Rs. 12.99 crore respectively in June, 1981. The Sirsa Central Co-operative Bank Limited, Sirsa with its 12 branches lends funds to member societies.

Joint farming societies have also been organised. The government provides loans and assistance to these societies. The total number of farming societies in district in June, 1981, was 36 with membership of 408.

The other agricultural cooperatives in the field are cooperative marketing societies, garden colonies societies, irrigation societies, poultry societies, dairy and milk supply societies and cattle breeding societies.

The number, membership, owned funds and working capital of these socieities in the year 1981 are given below :

Type of Society	Number	Member-ship	Owned Funds (Rs. in lakhs)	Working Capital (Rs. in lakhs)
Marketing	6	3,408	36·48	64·87
Garden colonies	1	11	0·06	0·06
Irrigation	—	—	—	—
Poultry	1	15	0·05	0·01
Dairy and Milk Supply	84	4,788	1·27	1·49
Other Agricultural Non-Credit	2	29	0·01	0·01
Sugarcane	—	—	—	—
Other Processing	1	32	0·03	0·03
Milk Union	1	46	0·57	0·90
Total	96	8,329	38·47	67·37

ANIMAL HUSBANDRY

Animal Husbandry plays a role in district economy next only to agriculture. The famines which had from time to time visited the district proved more fatal to cattle than to human beings. Recurring famines and the shrinking of the grazing land due to increase in cultivated area, the cattle breed in the district did not deteriorate to any noticeable extent. Cattle disease was not very much prevalent in the district and violent outbreak was seldom recorded. The commonest diseases, however, were *Sitla-cow-pox* and *Mun Khur*-foot and mouth disease. The general precaution against cattle disease was to stretch a string across the village gate with an earthen saucer attached to its centre in which a charm had been written. The female buffalo calves (*Jhoti*) were all kept for milk and the cow (*bhari*) was the most indispensable member of the Zamindar's household. The *ghee* made from buffalo milk that he got was his source to get grain, in times of scarcity. In drought conditions when fodder was hardly procurable every effort was made to keep the family buffalo (in milk), however, other cattle could be disposed of to some extent. At the close of 19th century, a good buffalo costed Rs. 70 but inferior ones could be had for Rs. 20 and fair one for Rs. 40—50. Cattle breeding after the spread of cultivation was probably on wane but in Sirsa tahsil breeding still appeared to hold its own.[1]

1. *Hisar District Gazetteer*, 1892, pp. 201-202.

Indiscriminate breeding over the years, however, rendered a good number of bovine stock as non-descriptive. Even in the pure stock, the in-breeding resulted in a large number of low yielders. Unmindful and ill planned breeding practices led to the generally weak and inefficient conditions of the livestock causing a set back in the quality rearing of cattle in the district. Realising the role of livestock in the district economy, the government executed dynamic programmes to develop the cattle wealth for the economic prosperity of the cattle breeders. To carry out all gamut of animal husbandry practices on scientific lines, the veterinary services have been extended in the district after the formation of Haryana. Animal Husbandry in the district is now looked after by the Deputy Director, Intensive Cattle Development Project, Sirsa. He is assisted by Sub-Divisional Officers (Animal Husbandry) one each stationed at Sirsa and Dabwali, officer incharge Semen Bank, Sirsa and veterinary surgeons etc. His main activities relate to cattle breeding, health cover of livestock, improvement of livestock management and livestock production programmes.

Livestock Population.—Animal Husbandry has provided gainful employment to a large number of small and marginal farmers besides landless labourers. Infact, hardly there is any rural household where either of the livestock species is not reared. The livestock population of the district was reckoned at 4.29 lakh in 1977 which increased to 5.34 lakh in 1982. The livestock population of 1982 when correlated with the area of the district worked to about 29 cattle, 41 buffaloes, 23 sheep, 14 goats, 9 camels, 1 donkey and 13 poultry birds per square kilometre. Also there were 175 heads of cattle, 251 buffaloes, 140 sheep and 52 camels per thousand human beings in 1982. The following figures show the trend of growth of livestock between 1977 and 1982.

Category	1977	1982
	(In Hundreds)	
Cattle	1,196	1238
Buffaloes	1,500	1774
Horses and Ponies	8	7
Donkeys	36	31
Mules	1	2
Sheep	644	989
Goats	559	587
Camels	321	367
Pigs	13	19
Poultry	653	572

Cattle and Buffaloes.—Animals especially cattle and buffaloes, play an important role in the economy of the district. Most of the farmers in the district have a pair of oxen to do the ploughing and to draw the cart. Although bullocks are being replaced by motor and electric power in some areas, yet the importance of cattle in the agricultural economy of the district remain unchanged.

In the distribution pattern of livestock population, there was significantly large proportion of buffaloes (about one-third of the total livestock) and cattle (accounted for 23.1 per cent of the total population) in 1982. Broadly cattle and buffalo population on the basis of utility may be classified as working population and breedable population. The working population is the back bone of the rural economy as it is the major draught force in the rural areas. According to 1982, livestock census, there were 177 thousand working animals consisting of 167 thousand cattle and 10 thousand buffaloes. Besides, there were 14,500 camels over four years used as draught animals.

Out of the district's total bovine population numbering 3.01 lakh in 1982, the breedable population was 1.32 lakh (0.53 lakh cows and 0.79 lakh buffaloes). This population is reared for milk production and raising the draught force. Much attention has been given by the government to improve this stock for increasing the milk production and getting the quality draught animals.

Livestock Breeding.—The district has been populated predominantly with non-descript cattle or of mixed breed stock. The cows in general, produce less quantity of milk as compared to exotic breeds. In order to increase the milk production. it was decided to resort to cross breeding in cows and selective breeding in buffaloes. An Intensive Cattle Development Project for improved scientific breeding was launched in the district in 1975-76. The scheme envisaged systematic planned method for best utilisation of superior germs plasma through proper distribution by adopting artificial insemination technique, disease control and fodder management. To provide breeding facilities promptly and effectively and to penetrate the benefits of latest policy of breeding to interior rural areas of the district, 88 veterinary institutions including 12 veterinary hospitals, 13 veterinary dispensaries, 4 artificial insemination centres, and 58 stockman centres were rendering artificial insemination services in the district in 1980-81.

The list of veterinary institutions has been given in Table VII of Appendix. The results of artificial insemination done during 1975-76 to

1980-81 are given below :

Year	Artificial Insemination Done		Calves Born Through Artificial Insemination	
	Cows	Buffaloes	Cows	Buffaloes
1975-76	779	251	24	—
1976-77	2,054	962	188	124
1977-78	5,823	2,325	742	485
1978-79	6,055	2,580	983	555
1979-80	7,276	2,652	1,155	572
1980-81	9,408	2,612	1,218	587

The above compact and extensive programmes have helped for increasing the milk potentiality. The progeny of females served with the semen of exotic bulls have already started coming into milk and there is an appreciable increase in milk yield in F-1 generation. Spectacular increase in milk yield in the first generation of daughters to that of the mothers have been noticed. The cross breed female cattle population in the district recorded in 1982 livestock census is given below :

(In Hundreds)

Cross-bred Female Cattle over 2½ years			Cross-bred Female Calves from one to 2½ years
In Milk	Dry	Not calved	
14	6	2	10

There is a great demand of high yielding milch animals out side the state. The price of quality milch animal in the district varies from Rs. 5,000 to Rs. 9,000.

Gaushalas.—There are 2 *gaushalas* in the district one each at Sirsa and Dabwali. These *gaushalas* were opened out of religious sentiments to house the unproductive cattle. These were run on charity alone but under the Gaushala Development Programme, *gaushalas* at Sirsa and Dabwali have now been developed as cattle breeding-cum-milk producing centres. Apart from providing technical guidance and financial assistance, the animals kept here are provided proper health cover, vaccination and disease control measures.

Sheep Breeding.—Sirsa with a sheep population of 98,900 in 1982 has a fairly good scope for the development of sheep and consequently of wool industry. Three sheep and wool extension centres have been established in the district at Thiraj, Mat Dadu and Bada Gudha. At these centres superior rams have been stationed to provide veterinary aid and other sheep husbandry services. Improved rams maintained at these centres are given to the sheep breeders during the tapping season and taken back when breeding season is over.

With a view to improve the economic conditions of weaker sections, a special Sheep Production Programme was launched in the district in 1976-77. Under this programme small/marginal farmers and landless labourers are given loan and subsidy to adopt sheep breeding as a subsidiary occupation by setting up sheep unit of 20 ewes and one ram. Each unit costs Rs. 4,000. Rs. 1,165 on an average is given as subsidy and the balance is got advanced from commercial banks. 407 such units were established in the district under this scheme.

Poultry Farming

According to the livestock census of 1982, there were 57,200 poultry birds in the district.

One-day old chicks are supplied to the breeders at subsidized rates. The field veterinary staff in the district also provides education to the poultry farmers about the latest techniques of poultry husbandry and also help them in setting up poultry farms. Mass-scale vaccination, debeaking and deworming is also carried out through veterinary hospitals and dispensaries.

Piggery

The district had only 1,900 pigs according to 1982 census. Earlier, no improvement in the breed could be brought about since only Harijans with limited resources keeping only country pigs were engaged in pig breeding. With the introduction of exotic yorkshire and Landrace breeds, pig breeding is getting popular. By crossing the country pigs with the exotic boars, the indigenous pig stock is being gradually replaced by the exotic pure breeds or the cross bred stock.

Animal Diseases

The common animal diseases prevelant in the district are haemorrhagic septicaemia, rinderpest, foot and mouth disease, surra, black-quarter, sheep pox and fowl pox. These diseases are controlled with prophylactic vaccinations and curative measures. Regular campaigns of inocultion and vaccination against

these diseases are conducted. The following figures show the progress of the work done for the disease control in the district during 1975-76 and 1980-81 :—

Year	Animals Treated	Vaccinations Done Against Various Diseases	Castration Performed
1975-76	14,775	83,633	428
1976-77	27,996	1,29,983	394
1977-78	21,792	2,98,708	233
1978-79	72,462	3,45,191	715
1979-80	85,000	4,48,100	700
1980-81	77,916	5,41,092	678

The Haryana Agricultural University, Hisar also provides animal disease investigation and diagnostic service to the field veterinarians and livestock owners of Sirsa district. Normally, the field veterinarians carry out preventive and curative treatment of animal diseases but if they are unable to establish a correct diagnosis of a disease outbreak in any species of livestock, including poultry, they refer the matter to the disease investigation staff of the university. The affected animals are examined and post-mortem examination is conducted to establish a correct diagnosis of the disease. In addition to the usual diseases affecting livestock, such as, foot and mouth disease, haemorrhagic septicaemia, black quarter, etc., pica in camels and haemoglobinuria in buffaloes are of particular importance in Sirsa district. These diseases are now successfully treated by the administration of suitable treatment worked out by the university scientists. String halt affects cattle and camels. Surgical treatment, developed by the university scientists, has proved very useful in these conditions.

Veterinary Hospitals.—In 1915, each tahsil headquarters in the then Hisar district had a veterinary hospital.[1] Thus, Sirsa had a veterinary hospital in 1915. A number of veterinary hospitals and dispensaries were opened in the subsequent years. In March 1981, there was a net work of 12 veterinary hospitals and 13 veterinary dispensaries to provide veterinary aid to the livestock. One mobile veterinary dispensary was started in 1976-77.

1. *Hisar District Gazetteer*, 1915, p. 148.

Slaughter Houses.—To ensure the availability of hygienic and disease-free meat for human consumption, the district has recognised slaughter houses at Sirsa, Dabwali and Kalanwali. The number of animals slaughtered in the Sirsa district during 1975-76 to 1980-81 is given below:

Year	Number of Animals Slaughtered
1975-76	9,522
1976-77	10,444
1977-78	12,568
1978-79	9,718
1979-80	11,433
1980-81	12,489

DAIRY FARMING

Milk is derived mostly from cows and buffaloes. According to 1982 livetock census, the milch cows and buffaloes were 48,800 and 70,200 respectively and the density of milch animals in the district was 30 per square kilometre.

Though Haryana has been known for its cattle and dairy products but the production of milk has been in small quantities by individual cultivators. These cultivators adopted cattle breeding as subsidiary to farming. As in other parts of the state, milk trade remained disorganised in Sirsa district and adulteration of milk and milk products was rampant. Their prices ruled high during summer months, when adulteration too was at its highest. The dairying on modern lines was entirely absent. To develop the dairy industry on commercial lines the Dairy Development Corporation was set up in 1970. To bring the entire programme under the co-operative ambit, the whole activities of the corporation were transferred to Haryana Dairy Development Cooperative Federation Ltd., on April 1, 1977.

Presently, a chilling centre at Sirsa with a handling capacity of 20,000 litres per day is functioning which earlier under Desert Development Programme was proposed to be converted into milk plant, with a handling capacity of 1 lakh litres per day, expandable to 1.5 lakh litres per day. Now due to the implementation of operation flood-II programme in the state, National Dairy Development Board has agreed to include this project in Operation Flood-II programme and to provide funds for the same. Keeping in view the revised requirements, it has been decided to set up a liquid milk plant of 60,000 litres, per day. This milk plant will provide assured and standard milk to the consumers and ready market for the milk produce of farmers. A milk chilling centre with a handling capacity of 15,000 liters per day is also being set up at Goriawala.

Earlier the milk union was playing a negligible role in the various activities of dairy development. The job of milk procurement and provision of technical inputs was being done by Haryana Dairy Development Co-operative Federation.

With a view to reorganize and revitalise the dairy development in the state on Anand Dairy Pattern, the HDDCF has launched operation Flood-II programme with a financial outlay of Rs. 37.12 crore. The funds would be made avilable to the HDDCF from Indian Dairy Corporation on loan-cum-grant basis in the rato of 70 : 30. The entire state is covered for replicating Anand Dairy Pattern Cooperatives.

In March 1981, there were 93 milk producers co-operative societies with a total membership of 4,189 in Sirsa district. During the year 1984-85 about 161 milk producers co-operative societies functioned during the flush season with a total membership of around 7,600.

Fisheries

At district level the Fisheries Department is represented by the Fisheries Development Officer, Sirsa. He is assisted by three Fisheries Officers, one each at Sirsa, Ottu and Dabwali and functions under the administrative control of the Director of Fisheries, Haryana, Chandigarh.

The district has unfavourable climatic conditions for fish propagation. Low rainfall, high velocity winds and longer spell of high temperature lead to loss of water by evaporation. The soil is sandy and water is also lost by seepage from ponds. To exploit the fish potential of the area, the department established a Fish Seed Farm at Ottu in 1961-62. Since then it has been providing technical advice on fish farming to the Panchayats and individuals.

A departmental survey conducted in 1966-67 and 1967-68 has revealed that only 115 acres of water area is suitable for fish culture in the district while another 65 acres of water area can be made suitable after improvement of the ponds. During 1980-81 27.5 acres of water area in the district was stocked. It produced 6,500 qunitals of fish during 1980-81, worth Rs. 6.50 lakh. Besides, the department auctioned the fishing rights of notified waters, canals and drains of Sirsa district.

Forestry

The Divisional Forest Officer with heaquarters at Sirsa looks after forestry in the district. He is assisted by four Forest Range Officers, one each at Sirsa, Dabwali, Kalanwali and Ellanabad ranges. Other staff includes 3 Deputy Rangers, 7 Foresters and 37 Forest Guards besides ministerial staff at divisional headquarters. 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 under the administrative control of the Chief Conservator of Forests, Haryana, Chandigarh, through the Conservator of Forests West Circle, Haryana at Hisar.

The area under forests is classified according to the ownership i.e. private and state. Forests owned by co-operative bodies and private individuals are included under private forests. The state forests, on the basis of legal s tatus, are categorised as reserved, protected and unclassed. Reserved forests are permanently earmarked for the production of timber or other forest produce. The right of grazing and cultivation is seldom allowed. In Sirsa district, there is no reserved forest. In protected forests, the rights are allowed subject to certain restrictions. The following area was under forests, in the district during 1980-81 :—

Classification of Forests	Area (Hectares)
A. Government Forest	
(i) Reserved	..
(ii) Protected	3
(iii) Unclassed	90
(iv) Strips (added in the protected forests)	
(a) Rail	557
(b) Roads	1,661
(c) Canals	2,490
(d) Bunds	146
B. Private Forests	
(i) Forest area closed under section 4 and 5 of Land Preservation Act, 1900	..
(ii) Forest area closed under setion 38 of Indian Forests Act, 1927	17

The forests of this district mainly consist of strips on either side of the roads, canals, railways, drains, bunds and some private land classed under section 38 of the Indian Forests Act, 1927. These strips are unfit for agricultural purposes and, therefore, are managed by the Forests Department for afforestation. The area of the forests closed under the Indian Forests Act, 1927 was voluntarily handed over by the owners to the Forest Department, for increasing the density of stock and as a soil conservation measure. The Forest Department is also keen to take the panchayat lands (unfit for agriculture) for afforestation under Section 38 of Indian Forest Act, 1927. According to the National

Forest Policy, about 20 per cent of the total area should be under forests in plains whereas in this district the area under forest is only 1.14 per cent. Efforts are being made to have more area under forests.

The district falls in the arid zone of the state 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 a serious problem. The fertile soil particles, as a result of siltation are transported and scattered over long distances thus imparting soil fertility.

In other situations, coarse and sterile sand particles are carried away with high velocity winds and dust storms and are deposited over fertile soil creating unproductivity. Thus the south and south-western parts of the district are affected by sand blows which threaten the agricultural production. All programmes aiming at agricultural development are likely to be rendered ineffective in case the shifting sands are not stablised. Some area of the district is also affected by water erosion along the Ghaggar river during rainy season.

The Forest Department is, therefore engaged in the implementation of the Desert Control Programme to halt the march of the desert from Rajasthan and to protect the protective bunds of the Ghaggar from water erosion and floods, etc

Considering the deficiency of tree growth, the problems of shifting sands, and to protect the Ghaggar river bunds, 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 and house-hold requirements of the local people. At the same time to make farmers tree conscious, farm forestry is being introduced on a very 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 Sirsa district. These sand-dunes are advancing into the interior parts of the district with strong south-western winds rendering the cultivated lands infertile by accummulation of sand. Sand-dune areas are mostly under agriculture in this district, and an insignificant portion of these sand-dunes is being tackled by Forest Department under planned afforestation of *sarkanda* grass and other tree species like *Accacia tortilis*, *Accacia nilotica*, and castor. Biological barriers in the form of trees and shrubs play a vital role in different operations of desert control. These are the cheapest methods of reducing wind velocity and to control the movement of sand.

Raising of shelter belts.—The forestry schemes aim at afforestation of waste strips along rail, road and canal banks. These improve the situation as these act as shelter belts against prevailing winds. 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 land on the leeward side. Moreover, the shelter belts protect the crops from the evil desiccating effect of hot winds.

Farm Forestry.—Plants are raised on the periphery of the fields of the farmers to create wind-breaks so that crops are protected from the desiccating winds. Afforestation works were carried out under the Farm Forestry Scheme including the works carried out under Crash Scheme for Rural Employment. The works carried out under this project from 1971-72 to 1980-81 are as under.—

Year	Kind of Work	Targets Achieved (in Hectares)
1971-72	Plantation of agricultural fields	20
	Plantation in compact blocks	21
1972-73	Plantation in agricultural fields	80
1973-74	Plantation in agricultural fields	55
	Plantation in compact blocks	10
1974-75	Plantation in agricultural fields	22.5
1976-77	Plantation in agricultural fields	10
1977-78	—	—
1978-79	Plantation in agricultural fields	130
	Plantation in compact blocks	54
1979-80	Plantation in agricultural fields	210
	Plantation in compact blocks	72
1980-81	Plantation in agricultural fields	190
	Plantation in compact blocks	42

Afforestation and regeneration are essential parts of forestry in this district. It becomes particularly urgent and important in dry belts of Ellanabad and Chutala. The forests have got to be planted and protected constantly so as to protect the land from erosion, to refertilize the soil, to arrest aridity and to influence the climate.

Forest produce is divided into two categories, major and minor. The major forest produce includes timber and fire wood and the minor forest produce consists of grasses like *sarkanda* and *mallah* (*Palla*). *Shisham* (*Daldergia sissoo*) provides the best timber for furniture. *Kikar* (*Accacia nilotica*) and

jand provide excellent firewood. Tanning industry depends upon the bark of *kikar* trees, *sarkanda* grass is used for *mudha* and *ban* (rope) making. Thatching is done with this grass. The *mallah* and other grasses are used as fodder.

The following figures show the income derived from the sale of major and minor produce for the year 1971-72 to 1980-81 : —

Year	Income from Forest Produce (Total Revenue)	
	Major	Minor
	(Rs.)	(Rs.)
1971-72	1,32,457	1,265
1972-73	1,34,887	1,222
1973-74	97,756	2,275
1974-75	2,56,713	2,630
1975-76	1,14,850	1,580
1976-77	2,03,425	1,480
1977-78	4,27,950	—
1978-79	36,134	3,651
1979-80	3,64,806	3,651
1980-81	3,34,344	2,727

NATURAL CALAMITIES

FAMINES AND DROUGHTS

The first famine of which we have any authentic account is that of A.D. 1783, the *Chalisa Kal* (Samvat 1840). The famine had devastating effect on the areas now comprising Sirsa district. The country was depopulated. It laid the whole country waste. The great herds of cattle which roamed over the prairie died of thirst and starvation, and many people must also have died of famine. The survivers fled to more favoured tracts and the town of Sirsa was wholly deserted. Only some ten or twelve of the larger villages held out. The pastoral tribes who had been accustomed to live on the produce of their cattle, having no stores of grain to fall back upon, perished or were compelled to migrate, and the whole tract was left a desert. It had not recovered itself when 20 years later it was nominally brought under the British rule. From an enquiry made village by village, it appeared that in A.D. 1800, there was not a

single village in the sandy tract south of the Ghaggar valley and in the dry tract north of the Ghaggar and along the Ghaggar valley, there were only 11 villages. One could go for miles without coming near an inhabited village.[1]

Drought conditions prevailed in the district in 1837-38. The kharif harvest was total failure, and owing to the failure of the Ghaggar floods, and of the winter rains, there was almost no rabi and the water and fodder shortage made it difficult to keep the cattle alive and greatly depressed the people. Many sufferers from the scarcity found employment in the restoration of old town of Sirsa, where the digging of the town-ditch and the building of the rampart gave work to some hundreds of able bodied labourers, who were in those hard times satisfied to earn an anna a day.[2]

In common with the whole of the tract between the Yamuna and the Sutlej, the district was visited with severe famine in 1860-61. The harvests of 1858-59 were poor and in 1859-60 the kharif almost entirely failed, and the rabi was far below the average. The crops of both the kharif and rabi harvests failed entirely, and as, owing to the three previous bad years, the district was ill prepared to meet such a scarcity. Much distress was felt here as well as in the whole country between the Yamuna and the Sutlej. Barley, the cheapest grain trebled its price in six months and sold at 13 *seers* (1 seer =0.933 kg) a rupee. Of the kharif demand of 1860, Rs. 58,416 or nearly one-third of the total annual (revenue) demand, was suspended on account of the drought, and many of the people left the district temporarily to seek a means of livelihood elsewhere. Large number of cattle died. An amount of Rs. 16,000 were spent on famine relief and Rs. 23,000 were distributed to 283 villages in advances for the purchase of seed and cattle. Only 53 per cent of the revenue demand was realised during the year, and almost the whole of the balance was remitted.[3]

The districts of Hisar and Sirsa again suffered, more perhaps than any other district in the Cis-Sutlej tract, in the famine of 1869-70. The price of barley rose to 12 *seers* a rupee. Many people left the district, though *taccavi* advances were largely made for wells and ponds to keep them near their villages, and Rs. 33,000 were spent in the relief of about a lakh of destitute persons, many of whom, however, were immigrants from Rajasthan. According to an estimate made at the time little more than a quarter of the horned cattle were left.

Scarcity prevailed in the district in 1877-78. The autumn rains of the former year failed. The kharif of 1877 in consequence failed and there was little rabi in 1878. As usual, cattle suffered severely from scarcity of fodder.[4]

1. J. Wilson, *Final Report on the Revision of Settlement of the Sirsa District in the Punjab*, 1879—83, pp. 27—29.
2. Ibid, p. 42.
3. Ibid, p. 66.
4. *Hisar District Gazetteer*, 1915, p. 187.

The district was again visited by the drought in 1880-81. The out-turn for the whole district was estimated at less than a third of an average kharif. The dry seed-time prevented the people from sowing a large area for the rabi, and a two months' drought in January and February made the out-turn poor, so that the total produce of the rabi was only half an average harvest. Prices rose considerably, the stocks of grain began to be exhausted, and the people migrated in numbers from the dry tract towards the rivers. The grass dried up and fodder sold at famine prices, the cattle became enfeebled by stravation and a good many died.[1]

The district was again hit by drought in 1895-96. The rabi harvest of 1895 was poor and this was followed by poor kharif in 1895 and a very bad rabi in 1896. The monsoon of 1896 failed completely. The prices, which had been rising steadily since April 1895, reached their highest point in November 1896.

Only two years elapsed and the district was again visited by a famine. The kharif of 1898 was bad, and was followed by bad rabi in 1899 and then came one of the worst monsoon on record. The scarcity of fodder caused immense mortality among cattle and the distress among people was intense.

The district remained free from famine for the next three decades. In 1929-30, the district was again gripped by scarcity. Famine conditions prevailed in the district in 1932-33, 1936-37, 1938-39, 1939-40,1940-41, and 1941-42. Of these, the famine from 1938—40 was of severe nature and reduced the district in particular to a state of distress and poverty unknown since 1899. Number of measures were taken to provide relief to the famine affected people. There has been no famine since 1941-42, but scarcity still occurs due to drought conditions and brings economic strains to the agriculturists in particular and the rural masses in general.

After a gap of nearly four decades, the district was again hit by drought during 1979-80. 92 villages during kharif harvest of 1979 and 158 villages during Rabi harvest of 1980 were affected by the drought. Government took several relief measures. Land holdings tax was remitted to the tune of Rs. 12.26 lakh and recovery of *taccavi* was postponed.

Famine is now a thing of the past. Because of better means of communications and transportation, food can easily be transported from one place to another in case of shortage of supply in any part of the country. Moreover, with the extension in irrigational facilities and improved agricultural technology, agricultural production has increased manifold. Increased agricultural production has helped in buffer stocking for lean period and buffer stocked foodgrain has been used to help the people in drought affected areas invariably.

---

1. J. Wilson, *Final Report of the Settlement of the Sirsa District in the Punjab*, 1879—83, pp. 71-72.