CHAPTER—IV

AGRICULTURE AND IRRIGATION

AGRICULTURE

In the beginning of the twentieth century, the then district of Faridabad was primarily an agricultural district. The majority of its population lived in villages. The people mainly obtained their economic sustenance from agriculture which was much manual rather than mechanised one. During that period, out of total population dependent on agriculture, 93% were owners or their dependents and only 7 per cent tenants. The tenants who consisted of ex-proprietors, who had lost their land owing to poverty or misbehavour, and of menials. Many owners did not cultivate the land they owned; while there were many owners who cultivated land also as tenants. The hired labour was not usually employed for general agricultural operations except by those tribes like the Rajputs whose women did not assist them in the fields. In the cultivation of certain crops like cotton, however, all tribes were compelled to employ hired labourers.

In the post-Independence days, feudal institutions like *jagirdari* and *biswadari* were liquidated. Since then the big landlords began to till their lands. Now the district's economy is basically industrial as well as agricultural. The Faridabad district is hub of industries in the state. A large number of people are now dependent upon industries either directly or indirectly.

On the other hand, as a result of the land reforms, the former landlords had taken to cultivation with their own hands to avoid their lands passing to the tenants. The change has led to mechanised farming. But in the process, many tenants were evicted and in the absence of alternative vocations of their choice, they had to work as agricultural labourers. In most cases, the resources at their disposal were meagre and they could not afford to purchase land even when the law afforded them an opportunity.

Throughout the Haryana, great emphasis is being laid on the needs to adopt modern techniques, i.e. improved implements, better seeds, multiple cropping practices and inputs like chemical fertilizers, green manuring, insecticides and pesticides. In addition to improving irrigation facilities, the Government is anxious to promote rapid mechanisation of agriculture in the State. Much ground has been covered lately; now traditional orthodoxy is not a hindrance in the way. The Government is pressing hard to utilize every inch of land for the purpose of cultivation. The farmers are being helped with finance

to remove the impediments such as water-logging, salinity and alkalinity in the way of good farming.

LAND UTILISATION

The total area according to village papers measured is almost 208 thousand hectares in 1990-91. The classification of land use is given below :—

Classification of land use	Area (in hectares)
(a) Geographical area	2,07,877
(b) Area under forest	1,441
(c) Land put to non-agricultural uses	28,165
(d) Barren and uncultivated	11,127
(e) Permanent pasture and other grazing land	2,610
(e) Area sown more than once	97,065
(g) Total cropped area	2,69,485

Water logging.—The Palwal and Ballabgarh tahsils are affected by water-logging but problem is not very serious. The rise of water-table in some areas of Palwal is still due to canal irrigation. Consequently salts have appeared on the surface. As a sequence to this water-logging, the land is spoiled by *thur* and *sem.*

Kallar is also classed as *thur* which is of two types. First type is white or ash coloured material consisting of harmful salts. It can be checked by proper bunding and good quality of irrigation water. The second type which is of dark colour contains sodium salts and is difficult to reclaim, except by using gypsum and other cultural practices.

The cultivated area which becomes unfit for cultivation due to rise in water table is classed as *sem* or water-logged. Those areas which are badly affected and do not produce more than a four-*anna* crop, are classed as *sem* in revenue records.

The position of water-logging (*thur* and *sem*) in the Ballabgarh and

Palwal tahsils since the creation of Haryana 1966-67 to 1976-77 is as follows :—

Year		Tahsils	Area in hectares	
		Ballabgarh	Palwal	Total
1966-67	*Thur*	1,572	4,217	5,789
	Sem	2	95	97
1967-68	*Thur*	1,571	4,282	5,853
	Sem	2	95	97
1968-69	*Thur*	1,536	4,267	5,803
	Sem	2	95	97
1969-70	*Thur*	1,536	4,267	5,803
	Sem	2	95	97
1970-71	*Thur*	1,603	4,344	5,947
	Sem	2	95	97
1971-72	*Thur*	1,762	4,344	6,106
	Sem	—	95	95
1972-73 & 1973-74	*Thur*	1,274	4,258	5,532
	Sem	—	12	12
1974-75	*Thur*	1,046	3,736	4,782
	Sem	2	2	4
1975-76	*Thur*	1,046	3,736	4,782
	Sem	2	2	4
1976-77	*Thur*	1,046	3,736	4,782
	Sem	2	2	4

The above statement shows that Palwal tahsil was more affected by *thur* than Ballabgarh tahsil. The water-logging due to *sem* was negligible in Ballabgarh tahsil but the land was somewhat affected by *sem* in Palwal tahsil. Due to the vigorous efforts of the Government in this direction, the problem of water-logging decreased to a greater extent. For example, the

Gaunchi Drain, now re-modelled, eased the water-logging and drainage problems. As on March 31, 1991, the land affected by water-logging was 350 hectares.

Salinity and Alkalinity.—In early seventies, an analysis was observed about the quality of underground water. The block-wise per cent distribution of each quality of water was as follows :—

Block	Percentage water samples in each category		
	Good quality	Marginal quality	Poor quality
Ballabgarh	64	28	8
Faridabad	60	25	15
Hathin	22	35	43
Palwal	33	31	36
Hodal	24	28	48

Amongst the marginal quality, the marginally saline waters could be profitably exploited by either using them on light textured well drained soils for growing salt tolerant crops or by mixing them with canal water whereas sodic waters can be utilized by using them along with gypsum. The poor quality waters are unfit for irrigation. There was a acute soil salinity problem in Palwal and Hodal blocks. As on March 31, 1991, the total area under salinity and alkalinity was 5,920 hectares.

Since the salinity and alkalinity problem in the district is primarily due to use of brackish waters, the farmers are being advised to get their tubewell water tested from the Soil Testing Laboratories at Palwal and Ballabgarh before these are permanently installed. In addition to the water quality appraisal , the soil testing laboratories also advise the farmers about the quality of their soil and their efficient management for judiciously exploiting soil water potential. During 1990-91, the area of 118 hectares reclaimed from alkalinity.

The soil and water testing service was started in the Faridabad district during 1971-72. This service is provided by a network of two laboratories located at Palwal and Ballabgarh. Its object is to check the menace of alkalinity and salinity, carry out soil-samples and necessary advice to the farmers about their application of balanced fertilizers, etc. on the basis of soil tests. Each laboratory is under the charge of an Assistant Soil Testing Officer who is assisted by five Junior Scientific Assistants and five laboratory attendants.

The tests carried out by the laboratories have considerably helped the farmers to understand the problem and take steps to check it. Gypsum is given on 50 per cent subsidy for the control and reclamation of alkaline soils.

The Haryana Land Reclamation and Development Corporation, Ltd. was incorporated in March, 1974. The main activities undertaken by the corporation are as under :—

(i) Land reclamation ;

(ii) Custom hiring service for land levelling;

(iii) Seed production programme ;

(iv) Reclamation of saline land; and

(v) Sale of weedicides.

Since its inception, the Corporation has been playing an important role in increasing productivity of agricultural land through better management of limited irrigation resources of the state. Various reclamation techniques followed by the Corporation are : vertical drainage, horizontal sub-surface drainage and biological method (afforestation with salt resistance plant species). The present indications are that the most ideal approach for the reclamation of such soils is to lower down water table at the root zone by constructing sub-surface drainage system. The complete package of technology consists of linking field surface drains with the main flood water drains constructed by Drainage Department, construction of field bunds around each field for holding rain/irrigtion water for leeching of salts, taking up land levelling/land shaping; installation of minor irrigation units whenever necessary to provide adequate amount of water leeching salts and provision of sump and pump system for the disposal of drained water in the main drainage system.

The Corporation is also engaged in producing the quality seeds of various crops for supplying the farmers. The corporation provides custom hiring services to the farmers for land levelling and other farm operations through land levelling centre, Palwal.

Soils

The general description, (covering soils) of Ballabgarh and Palwal tahsils during 1942, is as under :—

"The country is a level plain, except in the extreme north-western corner of Ballabgarh, where are the outer spurs of the low hills which

rise south of Delhi City. Along the river Jumna in Ballabgarh is a stretch of low land about 3 miles in width, which is flooded when the river rises and known as *Khadar;* this strip extends about 5 miles into the north-east corner of Palwal, below which point the high bank rises almost straight from the river and there is very little flooded land. In each tahsil there is a separate *Khadar* assessment circle. These circles are on the whole of a great fertility and grow excellent *rabi* crops provided that the summer floods and winter rains are sufficient and timely. This tract is too insecure for well irrigation. In the west of Ballabgarh stretching from the hills to roughly the main line of the Great Indian Peninsula Railway is an area affected by the hills, and formed into an assessment circle called the *Dabar*. The soil is mostly a stiff clay though along the hills is a narrow belt of sand. Near the hills the water in the wells is sweet, elsewhere it is brackish or salt. The railway, Agra Canal and metalled road from Delhi to Mathura, which run parallel to each other throughout the tahsil have done harm to this circle, since the flood water running from the hills no longer spreads over the plain, but flows uselessly in deep gullies which it has cut, leading to the bridges and culverts under the railway. There are bunds at the mouths of some of the ravines which run from the hills and these, though less important than in the western tahsils of the district, are the cause of quarrels between those villages which benefit by them through irrigation and reclamation and the lower villages who have lost their hearths through flood.

In Palwal tahsil, the water table has risen since the digging of canal and there is a strip of land on both sides of the main channel which is badly affected by saltpetre, as are some depressions along the minor branches. Water-logging has in places been bad, but except in years of unusual rain is controlled by a series of drains".

During 1990-91, this district was sub-divided into three sub-micro regions on the basis of soils, topography, climate and natural vegetation :

Faridabad Undulating Plain.—The region spreads over the north-western parts of Ballabgarh tahsil and some villages of Palwal tahsil. It takes its boundaries with the Union Territory of Delhi in the north, Gurgaon district in the west, Palwal plain in the south and south-east and the Yamuna *Khadar* and the state of U.P. in the east.

The soil found in the region is mainly loam except some rocky surfaces. Silty loam soil is also found near the Yamuna river. Initially the north-eastern part of the region was *Khadar* area but now has come within the limits of Faridabad Complex Administration.

The area is fertile for producing of wheat, sugar-cane and rice. The region has Ochrepts and Aquents-Fluvents types of soils.

Palwal Plain.—The region covers the central, western and south eastern parts of the district. It makes its boundaries with the Faridabad Undulating Plain in the north-west, district Gurgaon in the west and south-west, state of U.P. in the extreme south and Yamuna Khadar in the north-east and east.

The soils of this region are loam (*bhangar*) and relatively sandy loam. Except north-western tip of Palwal tahsil where the relative sandy loam is found; loam is the main soil of this region.

The loam is more fertile and capable of producing a variety of crops like wheat, *bajra, jawar*, pulses and oil seeds as per climatic conditions.

Yamuna Khadar.—The region extends over the eastern side of the district along the Yamuna river. It makes its limit with the state of U.P. in the north-east, east and south, Palwal plain in the south-west and west and Faridabad undulating plain in the north-west.

Loam and silty loam soils are found in the region. The proportion of silt and clay components in silty loam is higher than in loam, hence it has a blocky structure which reduces its water holding capacity. This soil is difficult to work upon when dry and tillage needs more drought power per unit area. It gives good yields under efficient soil management. On the whole, the soils are fertile. Therefore, the variety of crops can be raised on these soils.

The soils particularly loam (*Bhangar* and *Nardak*) and silty loam (*Khadar*) are found in the district.

Generally, four classes of natural soils are recognised in the area :

(i) *Chiknot*—Hard clay

(ii) *Narmot*—Fairly hard loam

(iii) *Megda*—light and somewhat sandy loam

(iv) *Bhur*—Sandy soil

The hard *chiknot*, known elsewhere as *dakar* or *rohi*, requires a good deal of moisture and is therefore a very precarious soil in this area with its uncertain rainfall. In years of good rainfall, it gives a maximum yield, but in dry years it cannot be sown or if sown, yields little or nothing.

Narmot requires less rain than *chiknot*. It is capable of growing all the valuable crops. It is the prevalent soil of Palwal, Hathin (tahsil) and Hodal (sub-tahsil).

Megda is lighter than *narmot* and is the best soil in the seasons of short rainfall but it is incapable of growing such valuable crops as *narmot*.

The *bhur* is sometimes flat and sometimes billowy but in any case it is capable of growing only very inferior crops.

System of Cultivation.—The system of cultivation of unirrigated land is determined by (a) the quality of the soil, and (b) the rainfall. The former determines the class of crop to be sown. If the soil is *chiknot*, *jawar* at the *kharif* or wheat or gram at the *rabi* (sown either alone or as a mixure called locally *gochni*) are the crops usually sown. If the soil is *narmot*, it is sown at the *kharif* with cotton, *jawar* or *bajra* (with the pulses intermixed) and at the *rabi* with *bejhar* (barley and gram mixed) or gram alone. *Megda* yields little but *bajra* and pulses at the *kharif*, and gram at the *rabi*, while *bhur* is usually unfit for anything except *bajra*, *moth* and *guar*.

Agricultural Operations.—The month-wise account of agricultural operations is as under :

Asarh, June-July.—In this month, the farmer hopes for plenty of rain in heavy showers with intervals of sun-shine and westerly wind. As soon as the rain falls, the land is ploughed over, and the sowing of *kharif* commences. If there is too much rain and cloudy weather without breaks of sunshine, the crops do not come up properly.

Sawan, July-August.—Rain and sun-shine are still both required, if there is too much rain, the crops are liable to rot or be mildewed. If there is too much sun-shine with westerly wind, the crops dry up. The sowing of the later *kharif* crops, such as *jawar* is completed early in the month; and those formerly sown are weeded. Locusts occasionally attack the crops. Ploughing for *rabi* commences.

Bhadon, August-September.—Occasional heavy rain with intervals of sun-shine is still required much as in *sawan*. The ploughing for the *rabi* and the weeding of *kharif* continue; and the crops have to be guarded from the depredations of birds. There is some danger to the crops from young locusts.

Kuar, September-October.—A few occasional showers do good, but too much rain will blacken the *bajra*, and cause the cotton pods to

drop off. Sun-shine and drying winds are required to ripen the *kharif* crops, but if a hot westerly wind blows, it dries them up. *Bajra* is cut in the latter half of the month, and cotton begins to bear. The *jawar* has to be watched. Ploughings for the *rabi* continue, and the land is gone over with a *mez* (a flat heavy piece of wood), and the surface levelled so as to retain moisture. Towards the end of the month the first sowings of gram and barley begin.

Katak, October-November.—Unless the previous rains have failed, no rain is required in the month. The harvesting of *bajra* and the autumn pulses is finished, the picking of cotton continues and part of *jawar* is cut. The *rabi* crops have to be sown, and those irrigated are watered. There is but little leisure for the farmer during this month.

Mangsur, November-December.—Cotton pickings continue; the rest of the jawar and the *pala* and *pula* are cut. The *rabi* sowings are completed, and the *kharif* crops are thrashed out and stored. Sun-shine, but not with too strong a heat, is needed; rain is not required. The work of irrigating the *rabi* crops starts.

Poh, December-January.—Towards the end of the month the winter rains are hoped for but they should not continue too long together without breaks of sun-shine and drying winds, or the crops will mildew. The ploughings for the *kharif* commence. A southerly wind is considered a good sign of rain in the winter months. If the frosts are severe, they damage the cotton, *arhar* and gram.

Magh, January-February.—In the beginning of the month rain, as in the end of *Poh*, does good. Ploughings for the *kharif* continue, tobacco is planted out; the cotton is cut down. This is a month of comparative leisure to the farmer.

Phagan, February-March.—Gentle westerly winds with sun-shine and no rains are required; hail-storms are feared. Sugarcane is planted out; Ploughings for *kharif* continue, and the *rabi* crops have to be watched and watered.

Chait, March-April.—Drying westerly winds, not so violent as to scorch up or beat down the crops, are required with sun-shine. Rain does harm; the danger of hail-storm continues. During the first half of the month wheat is still watered. The crops have to be watched, and during the latter half of the month, barley, *sarson* and gram are cut. Early cotton is sown on irrigated land.

Baisakh, April-May.—The harvesting of the rabi crops is now completed; and the harvested crops are trodden out and winnowed. Hot westerly winds are desired; rain does harm. Tobacco, early cotton and spring *jowar*, where has been sown for fodder, are watered.

Jeth, May-June.—Until about the end of the month, the same kind of weather is required as in *Baisakh*. The *rabi* crops are now stored; tobacco is cut. Early cotton and *jowar* are watered; if no rain falls, the land is ploughed for the kharif, and *bajra* is sown. The most of *zamindars* have little to do in this month and employ their leisure in putting their houses in order against the advent of the rains.

In *baisakh*, the earth is said to be asleep and should be left to repose in quiet.

CROPS

The crops grown in the district are divided into two main categories, viz *kharif* and *rabi*, locally named as *sawni* and *sadhi*. The former is the summer season and the latter the winter season harvest. Any crop which does not strictly fall within these two harvests is known as *zaid* crop and its harvest is called *zaid kharif* and *zaid rabi*. Toria is cultivated as *zaid kharif* and tobacco as *zaid rabi*.

The major kharif crops are bajra, paddy, maize, *jawar*, *kharif* pulses and *kharif* vegetables, etc. The major *rabi* crops are wheat, gram, barley, *rabi* oil seeds, *rabi* pulses and vegetables. Sugarcane, pulses, oil seeds and fodder crops are the main cash crops of the district.

Foodgrain crops

Rice (Paddy).—Paddy is locally known as *dhan*. The cultivation requires damp climate, heavy medium soils and frequent rains and irrigation. The area under the crop during the year 1979-80, was 6,000 hectares with a total production of 4,000 tonnes which rose to 9,000 hectares and 21,000 tonnes during 1989-90. The average yield increased from 681, kg. to 2,331 kg. per hectare.

The main producing blocks are Palwal, Hathin, Hodal, Ballabgarh and Faridabad. The popular varieties grown are *basmati* 370 and *Jhona* 349.

Bajra.—It is a principal *kharif* foodgrain crop and it is grown mostly in the *barani* areas of the district. It constitutes an important item of food during winter season. The cultivation of this crop needs

hectares and 3,38,000 tonnes respectively during 1989-90. The productivity also increased from 2,257 kg. per hectare to 2,815 kg. per hectare during 1990-91.

Wheat is a crop which require frequent irrigation. High yielding varieties sown under irrigated conditions in the district are Sonalika, S-308, HD-2285, WH-147, HD-2009 and HD-2329. Variety C-306 is sown under rainfed conditions. These new varieties have led to a remarkable increase in the production of wheat with recommended doses of fertilizers and latest technology adopted by the farmers, these varieties are capable of producing as high as 60-65 quintals per hectare. This fact alone can bring about a revolution in wheat cultivation.

Gram.—Gram is locally known as *channa.* It requires dry climate and is sown throughout the district. An important *rabi* food-grain crop, it forms a good item of diet for both human beings and cattle. It is consumed right from the time of germination of grain development stage and is used for a variety of purpose. The area under gram is mostly dependent on the vagaries of weather. Timely rainfall increases its cultivation while late rainfall leads to decrease it. This results in considerable fluctuations.

The area under this crop during 1990-91, was 1,000 hectares. The average yield of the crop has increased from 562 kg. per hectare to 733 kg. per hectare during 1990-91.

Barley.—Locally known as *jaun,* it is grown throughout the district. The area under this crop was 13,000 hectares in 1979-80 with a production of 14,000 tonnes. During 1989-90, the area under the crop decreased considerably to 5,000 hectares. However, the productivity has increased from 1,102 kg. per hectare to 2,178 kg. per hectare.

The popular varieties grown in the district are C-138, C-164 and BG-25.

Cash Crops

Sugarcane is an important cash crop which is locally known as *ganna.* It requires a wet climate and considerable irrigation for its cultivation. The main producing areas are Ballabgarh, Hathin, Palwal and Hodal blocks.

The area under this crop during 1979-80 was 5,500 hectares with the production of 20,000 tonnes (gur). The Government established a Co-operative Sugar Mill in 1985. This gave a new dimension to the programme and the area under this crop increased tremendously since

then. During 1989-90, the area under this crop was 13,700 hectares and production touched the level of 48,000 tonnes (*gur*). The average yield also increased from 2,540 kg. to 4,363 kg. per hectare, during 1990-91.

The recommended varieties of sugarcane of the district are COJ-58, CO-6914, CO-7717, CO-7314 (early maturing group); CO-975, CO-1158, COS-767 (mid maturing group) and CO-1148 (late maturing group).

Cotton (Desi and American).—It is locally known as *kapas* and cultivation of this fibre crop requires wet climate. It is mostly grown in Ballabgarh, Palwal and Hathin blocks.

The American cotton was introduced after Independence. Before Independence, only *desi* cotton was grown only in Ballabgarh tahsil. The area under *desi* as well as American cotton decreased to zero level leaving behind an area under American cotton to 1,000 hectares only. The new varieties introduced in the district are H-14, H-777 (American) and G-27. These varieties are very popular. The phenomenal disappearance of cotton crop from the district may primarily be attributed to the changes in the agro-climatic conditions. Now the cotton crop is mainly sown for domestic purpose only. The pests and disease attacks also increased and adversely affected the quality of the crop.

Oilseed Crops.—The oil seeds crops, locally known as *til ki fasal*, require loam to light loam soils with two showers for *kharif* crops and one shower for *rabi* crops. Rapeseed and mustard are the most important oil-seed crop of the district, whereas *taramira* is sown on inferior land. A newly introduced crop to the oil seeds crop is sunflower and it is categorised as *zaid rabi*.

The area under these crops was 5,500 hectares during 1979-80 with a total production of 3,200 tonnes which increased to 13,700 hectares and 13,000 tonnes, respectively, during 1989-90. The average yield also increased from 582 kg. to 1,312 kg. per hectare during the period. The area under *rabi* oil seed crops during 1990-91 was 17,000 hectares.

PULSES

(i) **Moong.**—Cultivated throughout the district, *moong* crop requires dry climate with occasional rains and sandy or loam soil. It is also grown at places where the canal water or lift irrigation is available. It is partly sown with *bajra* and partly as a pure crop. The extraordinary variation in the area under *moong* results from the timings of the rainfall. The area is more in years of timely rainfall during the period of sowing.

The varieties being grown in this district are :

1. **Pusa Baisakhi or type 44** — It is an early maturing variety and takes about 65-70 days from sowing till harvesting. It is preferred as a summer crop, sown around Baisakhi and harvested before the rains. Its yield is about 4 quintals per hectare. It helps in obtaining three crops a year, i.e. *bajra* followed by wheat followed by *baisakhi moong*.

2. **Moong No. 305** — It is recommended under *barani* conditions of the district and takes about 90 days to mature. Its average yield is 5.50 quintals per hectare though it has potential to yield 10 quintals per hectare.

3. **Moong No. 54** — This variety matures in 85-90 days and is moderately resistant to yellow bean mosaic and bacterial and fungal diseases. On an average, it yields 6.80 quintals per hectare though it has potential to yield 12 quintals per hectare.

4. **Hybrid 45** — A promising variety from the Madhya Pradesh State, it has been released for general cultivation by All India Coordinated Research Project. Its average yield is 8-10 quintals per hectare and its duration is 85-90 days. The grains are bright attractive.

(ii) **Mash.**—Locally known as *urd*, its cultivation, like *moong*, requires dry climate with occasional rains and sandy or sandy loam soil, and is cultivated throughout the district. It is also grown at places where canal water or lift irrigation is available. It is usually sown with *jowar*. The new better yielding varieties introduced in the district are No. 48 and Mash 1—1.

(iii) **Massar.**—Cultivated mostly in the irrigated areas, it also requires dry climate with occasional rains and loam or sandy loam soil. For this item also a new better yielding variety, namely *Massara* 9—12 has been introduced.

(iv) **Moth.**—Cultivated mostly in the dry areas, it requires the

same climatic conditions as have been described for *moong* and *mash*. The new variety of *moth* introduced here is T-3.

(v) **Arhar** (Pigeon Pea).—Its cultivation requires the same climate, soil, etc., as have been described for *moong* and *mash*. It is mostly grown under *barani* conditions.

Cultivation is done with the local seed and no new variety has been introduced. This crop is grown with other *kharif* crops *jowar* and *bajra* as a cash crop. It is a one-year crop, i.e. grown with *kharif* crops and harvested along with *rabi* crops.

(vi) **Soyabean.**—It requires damp climate with occasional rains and sandy or sandy loam soil. It can also be grown at places where canal water or lift irrigation is available. The cultivation of soyabean was totally unknown in the then Gurgaon district. It was started from 1969-70, in a regular way. Demonstration plots were laid out on farmer's fields. These plots proved a success and the crop found its place in the cropping pattern. Subsidies were given for the inputs to the farmers, who were also assured of a support price by the Food Corporation of India. These incentives and the good harvest encouraged its cultivation.

The area under pulses during 1990-91 was 10 thousand hectares (8 thousand under *kharif* 'pulses and 2 thousand hectares under *rabi* pulses). The production of *kharif* pulses during 1979-80 was 636 kg. per hectare. This increased to 710 kg. per hectare during 1989-90. The production of *rabi* pulses during 1979-80 was 475 kg. per hectare. It decreased to 455 kg. per hectare during 1989-90.

Fodder Crops

The area under fodder crops during 1990-91 was 25,000 hectares. The stalks of *bajra, jowar* and maize and the chaff of wheat and gram are used as animal feed. The forage crops are grown under irrigated and unirrigated conditions. The important fodder crops are *jowar*, peas, *guar* and barseem.

Fruits

Fruit cultivation was a hobby of a few affluent persons before Independence. After Independence, the Government took steps to provide facilities under the Five-Year-Plans to those who took to fruit cultivation. To intensify the production of fruits, the Government introduced a number of schemes, such as Applied Nutrition Programme, Intensive Cultivation of Grape and Vine and Garden and Nursery Production work. The results were encouraging. Only model gardens were

at Ballabgarh and Palwal. The lift irrigation supplies water to many gardens in Ballabgarh and Palwal tahsils.

There is a private nursery (approved) at Faridabad. Numerous varieties of decorative plants, shrubs, ornamental trees and flowers and fruit plants are available at this nursery. The varieties of fruits such as citrus, mango, guava, *ber* and others are grown in the district. The area under fruit-cultivation during 1990-91 was 410 hectares.

Vegetables

On account of irrigation facilities, cultivation of vegetables has increased considerably. The increase is notable particularly in or around towns and adjoining villages. The eating habits of the people in the villages are also changing and vegetables are becoming an important part of diet. Consequently, a majority of farmers in the villages having water enough for irrigation have started growing vegetables not only to meet their own requirements, but also to make some additional money out of it. At present large quantity of vegetables is being daily supplied to Delhi from Faridabad, Ballabgarh and Palwal after meeting the local requirements. The area under vegetables during 1990-91 was 3,350 hectares.

There is no difference between the varieties of vegetables grown here and that of grown outside the district. The specific mention is made of the type of vegetables which is grown here in abundance. Potato carries a special mention here in the district.

Potato, locally known as *alu*, is grown throughout the district. It was introduced here in the early twenties. But its cultivation was taken up after initiation of the N.E.S. Programme after Independence. The light loam soils with proper irrigational facilities are ideal for its cultivation. High rate of humus and chemical fertilizers are also essential.

The seeds used are : Old varieties—Phalwa, Gola and Sufaida; new high yielding varieties—Kufri Chander Mukhi, Kufri Chamatkar and Khufri Sinduri. Kufri Chander Mukhi matures in about 90 days. The tuber has large size, smooth surface, white skin, flat eyes and white flesh. The average yield is about 100 quintals per acre. Kufri Chamatkar is a medium late variety and matures in about 110 days. Tubers are of medium size, round white with deep eyes and pale yellow flesh. The yield is about 90 quintals per acre. It is resistant to viruses and rate of degeneration is very low. Kufri Sinduri is also a late variety, maturing about 120 days. The average yield is about 120 quintals per acre.

Consequent upon the increased cultivation of potatoes, the cold storages sprang up at Ajraunda, Majesar, Fatehpur Chandila, Lakerpura, Meola Maharajpur and Ballabgarh. It is noteworthy that potato Tubers for use as seed were exported to Patna.

Rotation of Crops.—The farmers of this district are well aware about the advantages of the crop-rotation. The general patterns of the crop-rotation followed by the farmers in canal irrigated, tubewell/well irrigated and *barani* areas is as under :—

Canal irrigated areas

(1)	Sugarcane	Cotton	*Wheat*
	Bajra	Wheat	*Moong baisakhi*
	Bajra	Wheat	
	Maize	Potato	Wheat
	Maize	Potato	*Wheat-Moong baisakhi*

(ii) **Well-Irrigated areas**

	Bajra	Wheat
	Paddy	Wheat
	Maize	Potato
	Maize	Wheat-*Moong-baisakhi*
	Bajra	Peas
	Bajra	*Berseem*

(iii) **Barani areas**

	Bajra	Gram
	Bajra	Barley
	Gowar	Barley
	Bajra	Wheat
	Gowar	Wheat
	Bajra	Rape and Mustard

PROMOTION OF SCIENTIFIC AGRICULTURE THROUGH ADMINISTRATIVE MACHINERY

Even after Independence, the Indian cultivator remained tradition-bound for a number of years in spite of some development programmes.

Gradually, agriculture assumed national importance, as India like other countries, could not hope to feed its growing millions without developing the means to produce enough food for all her people.

Apart from land and irrigation, agricultural operations depend on some other resources which must be scientifically exploited to achieve higher yields. Scientific agriculture requires knowledge of various kinds based on application of fundamental research to local conditions. It is becoming more and more the responsibility of the State to make the knowledge available, to encourage its understanding and to provide financial facilities to cultivators who are getting keener to use scientific methods in their cultivation.

During 1990-91, Deputy Director of Agriculture was assisted by 88 (personnel-technical staff and non-technical staff) at district level to promote and extend agriculture to greater extent.

The Agriculture Department guides the farmers in the latest technological advances in agricultural production. These include methods of cultivation for higher production per unit area through new cropping patterns suited to their conditions. These also comprise preparation of crop plans, control of various pests and diseases affecting 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 Agricultural Development officers impart training and education to the farmers in their respective areas on matters relating to improve techniques resulting in better management for getting more production, use of improved seeds, manures and fertilizers, improved agricultural implements, plant production, horticulture and other agricultural practices.

The Agriculture Extension Agency gives a great push to scientific agriculture through the package field demonstration on a large scale. The demonstrations are laid on the fields by the farmers themselves with the scientific knowledge provided by the Government experts. When the results of field demonstration are found to be of marked improvement, Kisan *Melas* are held on such fields where all the package operations are explained to the farmers. Seminars are also held in these *Melas* and discussions amongst the farmers on various improved agricultural practices are held where the Extension Specialists and the Extension Officers remove such doubts as the farmers may have. With the evolution of high yielding varieties the results have been convincing and widespread.

The administrative machinery not only provides knowledge and practical demonstration but also administers financial and other help under various heads as provided by the State. Let us now review in some detail the position in respect of the various factors of scientific agriculture.

Farmers Advisory Service Centre, Palwal.—One Farmers Advisory Service Centre known as Krishi Gyan Kendra is at Palwal.

The major activities of the *Krishi Gyan Kendra* are meant to disseminate the knowledge generated at Haryana Agricultural University, Hisar or other research institutions in the country to the farmers, farm women and personnel of various departments/organisations engaged in rural development programmes. The major activities undertaken during the year 1990-91 in the discipline of Agronomy, Soils, Horticulture, veg. crops, Entomology, Plant Patn., Nematology, F.M., Agril. Engg., H.Sci., Veterinary Science, Animal Science and Poultry farming are highlighted below :—

Training Camps.—The district level training camps were organised to educate the field extension officers and farmers about the various improved agricultural practices to be followed in *Kharif* and *Rabi* season. As 1,780 participants were benefited through these camps. So far, 4 such camps were held.

The sub-divisional level training camps (total No. 9) were organised at Ballabgarh and Palwal and 631 participants benefited from these camps.

The village level camps are organised in various villages of the district to educate the farming community. So far, 139 camps were organized and 3,543 farmers and farm women benefited through these camps.

Group meetings is one of the important activities undertaken by specialists when they visit the villages to interact with the farming community about their problems. The solution to their problems are suggested on the spot. During 1990-91, 184 such group meetings were organised and 1,630 farmers including farm women benefited.

Field days.—These are organised on the farmer's fields where the specialists conduct the special demonstrations. The farmers are educated about the practices followed on these demonstrations. As on March 31, 1991, 16 field days were organised and 1,150 farmers benefited from these operations.

Film Shows.—To educate the farmers about the improved agriculture technology, films on subjects related to agriculture are shown to the farmers, upto 1990-91, three film shows were organised and 3,000 farmers got benefited.

Campaigns.—In order to generate the mass awareness about the improved agriculture technology to the farming community, campaigns were organised in the selected villages. By 1990-91, 34 campaigns were organised and important programmes like safe use of pesticide, solar heat seed treatment in wheat, mechanical sowing of wheat by sowing machines, safe and efficient use of threshers, lice control, sim growing, deworming and mineral mixture as essential components in dairy-ration were covered under the process. Only, 1,820 farmers benefited from these campaigns.

Method of demonstrations.—The specialists conduct method of demonstration in the villages to educate the farmers about agricultural activity. Only 91 such demonstrations were conducted and 683 farmers and farm women benefited during 1990-91. The specialists conduct result demonstration on the farmers' field to educate them about the results of the technology adopted on that field. During 1990-91, 51 such demonstrations were conducted and 518 farmers benefited.

Special emphasis is laid down by the specialists to meet the farmers on their farms and homes and discuss their individual problems. Upto 1990-91, 1,585 farmers were helped during these visits. Farmers visit the office to consult the specialists about their problems. During 1990-91, 1,955 farmers were attended in the office by the specialists.

Specialists contribute articles in the agriculture magazines and newspapers about improved agricultural technology to create mass awareness. Only 12 articles written by specialists were published in the magazines. The specialists of the subjects are invited by All India Radio and Doordarshan to deliver expert talks in the rural programmes. By now, 14 expert talks were delivered by the specialists. The symposiums were also organised by the specialists on important topics to educate the field extension officers and farmers of the district. In the symposium, viz. efficient use of tractors and diesel engine, efficient use of tubewell, management of insect pests and disease in oil seed crops were organised. It is an important activity where every specialist is required to deliver seminar related to his discipline. Nine seminars were delivered by the specialists during 1990-91.

MANURES AND FERTILIZERS

Crops consume various plant nutrients in substantial quantities from the soil during the course of growth. The continued depletion of plant food elements from the soil leads to low soil fertility and lower agricultural yields. It is, therefore, essential that besides irrigation facilities and the improved varieties of seeds, plant nutrients are replenished through the increased use of manures and fertilizers so that the soil is kept at a high level of fertility and crops continue to give good yields. In recent years, the consumption of manures and fertilizers has increased considerably.

Before Independence, hardly any quantity of chemical fertilizers was used in the district. The people were under the erroneous belief that chemical fertilizers adversely affected the crops and spoiled the land. Even the night-soil and other urban wastes were neglected about 20 years ago, as the people did not like to use them due to special prejudices. But the picture is different now. The laying of demonstration plots at various places has removed their prejudices and the cultivators have realised the benefits of manures and fertilizers.

(i) **Green-manuring.**—As green-manuring with leguminous crops adds to the fertility of the soil, it has been found to be the cheapest among all kinds of manuring practices. Chemical fertilizers give very good results when the fields have in them sufficiently high amounts of organic matter supplied by green-manuring. It is an important practice which increases soil fertility by direct addition of nitrogen and improve soil texture by addition of humps or organic matter. The addition of organic matter improves both heavy and sandy soils for it has a binding effect on the loose particles of sandy soil and makes the tough and heavy soil less heavy. The water-holding capacity of the soil is also increased. Further, it creates better conditions for the increase of useful bacteria in the soil. Green-manuring is very useful from the production point of view, but shortage of irrigation facilities in the district and low rainfall greatly limit its use. It has not been possible for the cultivators of the district to adopt green-manuring because of adverse weather conditions. The Government, however, encourages the adoption of green-manuring by the cultivators in areas where it can be adopted with chances of reasonable success. It distributes free seed packets of *dhaincha* and grants subsidy.

(ii) **Chemical fertilizers.**—The soils in the district are alkaline in nature and are deficient in organic matter, nitrogen and phosphorus. So apart from green-manuring, chemical fertilizers are indispensable for increasing crop yields quickly and these are used in combination with organic manures.

As a result of a large number of village demonstrations, the cultivators have started using chemical fertilizers in increasing quantities.

Previously the District Wholesale Cooperative Marketing and Supply Society received and distributed fertilizers to their depot-holders on cash as well as on credit. The State Government provided *taccavi* to the farmers for the purchase of chemical fertilizers from these depots. Later on, *taccavi* system was stopped and crop loan system introduced, It is working quite effectively. Under this system, short term loans are being advanced by the Central Cooperative Bank to the members of the cooperative societies, for the purpose of purchasing fertilizers.

Now the Haryana Cooperative Supply and Marketing Federation arranges supplies of fertilizers to the Cooperative Supply and Marketing Societies in the district. These societies are located at Palwal and Ballabgarh and have branches at the block level and sub-depots at the village level.

The fertilizer consumption in district during 1990-91 is as under :—

Consumption of nutrients	Figures in tonnes
Nitrogen	15,634
Phosphorus	5,247
K(Potash)	8
Total :	20,889

(iii) **Compost manure.**—Also called farmyard manure of cattle dung manure, it is an all-round good manure to maintain and improve soil fertility. However, the farmyard manure commonly used by the cultivators is poor both in quality and quantity. This is largely due to faulty method of its preparation and incomplete utilisation of the useful ingredients contained in cattle dung. In the context of emphasis on high-yielding varieties programme, it has been inevitable that larger quantities of good quality manure are produced in villages and the Department of Agriculture is making all efforts in this respect. For this reason, the entire district has been notified under the East Punjab Conservation of Manure Act, 1949, whereunder the farmers are required to conserve the cattle dung and other negative wastes in pits of proper dimensions for making the compost.

As already stated, the soil of the district is composed of all types ranging from sandy to clayey. Addition of compost is useful for all the types. In sandy soil, the compost is useful in keeping together the soil particles and in clayey soil humus material is absolutely essential to improve the soil texture. With the increase of irrigation facilities and the adoption of the multiple cropping programme, the use of compost has

assumed a special significance. Whatever compost is prepared in the district is used in agriculture especially for vegetables, sugarcane, cotton, and better yielding varieties of other crops.

In spite of incentives for compost-making, cattle dung is used as fuel in the form of dung cakes. With a view to meeting the farmers' need for fuel, Gobar Gas Plant Project has been initiated. The cattle dung thus can be utilised to supply gas for cooking purposes as also for compost. This project started a decade ago, by the Khadi Board, did not make much headway.

The Faridabad Complex and the Municipal Committees of Palwal and Hodal prepare compost under the supervision of Sanitary Inspectors. These inspectors are trained by the State Biochemist in the preparation of compost. The State Government advances loan to the municipal committees for the purchase of tractors, trollies and other carriers on the recommendations of the State Agriculture Department.

SEEDS

Agriculture Department earnestly pays attention to ensure the multiplication and supply of seeds of improved varieties; good seed is the basis of successful agriculture. It also gives wide publicity in favour of improved seeds. On the other hand, the Seed Development Corporation and Seed Certification Corporation are playing very important role in improving the varieties of seeds in the district.

The Seed Development Corporation has its own three sale outlets at Palwal, Hodal and Ballabgarh. The details of seeds, sold at these sale-counters during 1990-91, is given below :—

Name of Sale Counter	Variety	1990-91	
		Kharif (qtls.)	Rabi (qtls.)
Palwal	Seeds	138.86	3122.29
	Pesticides	—	—
	Weedicide	—	—
Ballabgarh	Seeds	54.16	2586.03
	Pesticides	—	1500 ltr./Kg.
	Weedicide	—	—2 ltr./Kg.
Hodal	Seeds	71.37	2638.48
	Pesticides	—	105 ltr./kg.
	Weedicides	—	1500 ltr./kg.

There is no seed farm of HSDC in the district. The seed production programme is arranged through contract growers.

Haryana State Seed Certification Agency.—The Haryana State Seed Certification Agency was registered under the Societies Registration Act-1860 on 6-4-1976 with the headquarters at Chandigarh. The Agency is keeping its staff at Palwal in Faridabad district as per the requirement of certification work under the Regional office, Gurgaon.

The functions of the Agency in detail are given in Seeds Act, 1966 and the rules made there-under. The procedure for certification and standards for field and seeds are prescribed in the book '*Indian Minimum Seed Certification Standard*' prepared and published by Central Seed Certification Board. The Agency certifies seed of notified kinds or varieties only. The programme for certification is offered by various seed producing agencies like Haryana Seeds Development Corporation, Agriculture Department, Horticulture Department, Haryana Agricultural University, National Seeds Corporation, IFFCO. State Farm Corporation of India and other private growers/agencies. The agency through periodical reviews has a management system of having close liaison with various production agencies/ growers so as to timely assess the work load of inspection of seed crop, monitoring quality analysis and ensure action at all stages e.g. field inspection seed processing, analysis of sample taken and issue of certificates (including tags, marks, labels and seals) expeditiously.

Haryana State Seed Certification Agency has been undertaking the certification work in Faridabad district since Rabi 1975-76, when the Agency is working as wing of the Department of Agriculture. In Faridabad district the programme for certification is being offered by Haryana Seeds Development Corporation, National Seeds Corporation, IFFCO, and other private seed growers . During the year 1990-91, following quantities of seeds of different crops was certified by HSSCA in Faridabad district :—

Sr. No.	Name of Crop	Quantity of Seed Certified (in qtls.)
1.	Wheat	15,536.30
2.	Rape-mustard	38.50
3.	Paddy	968.40

As regards seed farms in Faridabad district, Haryana State Seed Certification Agency does not own any seed farm.

The other seed farms were set up at Sarurpur (Ballabgarh block), Bhopani (Faridabad block) and Scoli (Hodal block) in 1958, 1959 and 1959, respectively. Wheat and *jowar* crops are grown at Sarurpur farm for seeds. *Bajra*, gram, *sarson*, wheat and barley crops are grown at Bhopani farm for seeds purpose. Wheat, barley, *bajra* and *jowar* crops are grown at the Scoli farm. In fact all the agricultural practices are being followed at these farms which are also serving as demonstration centres.

The district is notified under the East Punjab Seeds and Seedlings Act, 1949, under which it is an offence to sow varieties of seeds, particularly of wheat and cotton, other than those on the approved list of the State Agriculture Department. The defaulters are liable to a fine which may extend upto Rs. 500/-.

The certified/quality seed distributed during 1990-91 is given in the following table :—

Crops	Quantity (in quintals)
Kharif	331
Paddy	—
Cotton	249
Bajra	16
Moong	10
Mash	133
Arhar	2
Guar	
Rabi during 1990-91	10,773
Wheat	19
Gram	65
Barley	189
Rabi oil seeds	

AGRICULTURAL PESTS AND DISEASES

Occasionally, the crops are exposed to damage from an immense variety of pests and diseases which attack the standing crops and stored

grains. The common pests and diseases occuring in the district are as follows :—

Sugarcane top borer.—The pest appears on the wings towards the end of February. Caterpillars bore into stems on the tops of plants and check their growth. The pest is active from March to November.

Sugarcane stem borer.—This is a very injurious sugarcane pest which destroys young cane shoots during April to June. The caterpillars feed in the stems and cut off the growing points causing the plants to wilt. Such plants never grow further but the dormant buds sprout and produce side shoots some of which are also killed.

Sugarcane pyrilla.—Both the adults and nymphs of this pest are injurious because they suck sap from the leaves of the plants. It deteriorates the quality of juice. The infected leaves become pale. Attack of pest is serious on varieties which have broad succulent leaves. The pest is present throughout the year but does maximum damage during August to October.

Gurdaspur borer.—The shoots of sugarcane attacked by Gurdaspur borer dry up. They get broken with slighest jerk during July to September. These shoots are roughed out during this period at weekly intervals. Affected shoots are destroyed.

Cotton Jassid.—This is a serious cotton pest. Nymphs and adults suck sap from leaves and cause them to turn yellow or reddish brown. The attacked plants wither away and do not produce any cotton. The pest is present throughout the year but maximum damage is done during July to September.

Cotton whitefly.—This is also serious cotton pest. Nymphs and adults suck sap from the leaves and cause them turn yellow. The pest is serious particularly during the month of July and August.

Rice bug.—This is the most destructive pest of paddy crop. It appears generally in August and does maximum damage during August and September. The insect is essentially diurnal and is active in morning and evening. Both adults and nymphs suck the juice from grains in milky stage.

White Grule of Groundnut.—These are serious in some of the localised areas. The grule is white with pale head round in shape. The beetle emerge during June and July with first showers of rains.

Sarson aphis.—This pest appears in December or January and in most active till April. It multiplies at a quick rate and attacks

almost all the cruciferous crop, i.e. *sarson*, cauliflower, cabbage, raddish, etc.

Gram cut-worm.—Cut-worms are serious pests of gram, potato, tabacco and young wheat. When very young they generally feed on leaves, but as they grow, they acquire the habit of cutting the plants at ground level at night. The pest causes serious damage where soil is light.

Tokka or Phirka.—The pest has two broods in a year. It causes considerable damage to germinating cotton. It appears in the months of April and May.

Loose smut of wheat.—This is a serious disease of wheat crop. It burns the grain ears completely into a black powder. Infection is carried through seed.

Earcocle of wheat.—In young plants, the disease is characterised by wrinkling, rolling, twisting and distortion of the leaves, all these symptoms tending to make the plants bushy and considerably dwarfed in size. Plants may die in the seedling stage. Earcockle galls, being lighter than water can be separated from wheat seed by the floatation method combined with solar treatment.

Covered smut of barley.—This is an externally seed borne disease of barley. The inside of the grain turns into black powder which remains covered.

Redrot of sugarcane.—In redrot the rind loses its bright colour and shrinks at the nodes. About this time the upper leaves turn pale, wither at the tip and along the margins. When the affected stems are split open, the tissues especially towards the base are seen to have been reddened, the red colour extending crosswise and they emit an alcoholic smell.

Gram wilt.—It occurs physiologically due to high temperature at the time of sowing and flowering. Deficient soil moisture and unfavourable soil conditions are responsible for the disease. The disease exclusively attacks the root-stem which turns black and is ultimately decomposed. The plants first turn yellow, then brown and ultimately wither and dry up.

Downy Mildew.—The infected plants remain stunted and unthrifty. Leaves turn yellowish and undersurface of the leaves is covered with white powdery mass. The ears transm wholly or partially in to leaf like structures which remain green for longer period.

Ergot .—Pinkish or light coloured thick gummy fluid strats dropping from spikelets of the infected earhead, later on brown to dark coloured sclerotia appear on these spikelets in place of normal grains due to the invasion of ovary by the fungus.

(ii) FRUIT PESTS AND DISEASE

Citrus Psyila.—This is a dangerous pest for citrus plants. The pest begins to breed in February and by March it becomes numerically so strong as to cause tremendous damage. It has about 9 generations in a year and does maximum damage in March and April. Both the adults and nymphs de-sap fresh growth and flowers.

Citrus canker.—This is a bacterial disease of citrus plant. Lime plants are mostly affected.

Lemon caterpillar.—The caterpillars usually feed on tender leaves eating them from edge right up to the midrib. When sufficiently numerous they defoliate the young plants completely.

Mango hopper.—This pest does maximum damage during February to April. Damage is done by nymphs which feed on the sap of the panicle. The attacked panicle withers and dries up and its flowers fall off prematurely. The nymphs also produce honey-dew on which black mould develops and imparts blackish look to the attacked plants.

Mango mealy bug.—Females lay eggs in the soil during April and May. Nymphs come out by the end of December, crawl upon fruit plants and by the end of March all the female nymphs are fixed in clusters on terminal tender shoots. They suck the sap. The attacked branches and flowers wither and the fruit does not set.

(iii) VEGETABLE PESTS

Red pumpkin beetle.—This insect is the most serious pest of cucurbits. Its attack is the severest on germinating seeding in March and April.

Brinjal hadda.—The pest remains active during April to October. Both the adults and grubs do maximum damage during May and June. They are found on underside of leaves where they set out regular areas. The attacked leaf presents a rugged appearance.

Brinjal Fruit and Shoot Borer.—It causes damage during May to September. Infested shoots droop downwards and dry up. Infested fruits have varying number of holes.

Potato and bhindi jassid.—This pest is active throughout the year. It sucks the sap of leaves which then dry up.

Tomato fruit and shoot Borer.—Attacks shoots and fruits, the tips dries and fruits are rendered unfit for human consumption.

Singhara beetle.—This is a perilous pest of *sighara* crop. It eats away both the leaves and the fruit.

Potato blight.—There are two types of blights—early and late. In early blight, brown spots are scattered irregularly over the leaf, often at the tip or at the margin. These spots later show concentric narrow dark lines which give them a target-board appearance. Older spots become dark-brown. Spraying the crop with 0.2 per cent dithene is a preventive operation. In late blight, first symptom of the disease appears on the leaves as small black patches or areas, which may extend and kill the foliage in a few days, if moist weather prevails. Decaying leaves often emit an offensive odour. The tubers underground are also affected and may decay before harvesting. It is, therefore, advisable always to use selected healthy tubers for sowing.

Mustard saw-fly.—Mustard saw-fly larvae attack the young crop, bite holes into the leaves and may eat all the leaves in case of heavy attack. This is checked by applying 10 per cent B.H.C. dust at the rate of 10 kilogram per acre or spraying young plants with 800 gram B.H.C. 50 wetable powder in 200 litres of water per acre.

(iv) STORED GRAINS PESTS

To guard against the damage caused to stored grains by *khapra*, *susri* and *dhora*, the stores are dusted or sprayed with B.H.C. The infested stored grain could be saved by fumigation by making the stores completely air tight. The fumigation is very commonly done by Aluminium Phosphide tablets, one tablet per metric tonne of grain.

Remedies to Control the Pests

The crops are occasionally exposed to damage due to disease and pests. Downy mildew in hybrid *bajra* and wilt in gram are the two most serious crop diseases. 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 alongwith one or two sprays with Miltox/Blitox Dithane M. 45 and Blitox are effective control measures against downy mildew. Efforts have been made to evolve a resistant variety of hybrid *bajra* against downy mildew.

Amongst the other insects and pests is *katra* (hairy caterpillar)

which attacks all *kharif* crops during the rainy season. It causes serious damage to *bajra* and *moong* crops at early stage. This insect can only be controlled by blanket BHC 10 per cent dust in the early stages and by Endosulphon Thiodan sprays at later stages.

During certain years, aphids, mustard saw fly and painted bug cause damage to rabi oil-seeds. These can be controlled by BHC 10 per cent dust, Malathion/Metasyston and Dimecron sprays.

Rats are very serious pests for wheat, barley and gram. These are controlled by feeding baits poisoned with zinc phosphide/strychrine hydrocholoride/Ratifin and fumigation with Celphos tablets. Stored grain pests like *dhora, khapra,* lesser grain borer and rust red flour beetle also destroy a large quantity of grains. These are controlled effectively by fumigating the stores, containers (grain bins/gunny bags) with Celphos Malathion and Methyle Bromide.

The Agriculture Department educates farmers regarding different control measures to reduce damages to crops. Moreover the department has been authorised to take legal action under the East Punjab Agriculture Pests, Disease and Noxious Weeds Act, 1949, against the farmers who do not eradicate weeds, pests and diseases before the maturing of crops. Fumigation work is being done by the department on a large scale through specially recruited staff for the purpose.

AGRICULTURAL IMPLEMENTS

Any improvement in agriculture is inconceivable without a corresponding improvement in the implements used. Modern implements are being gradually adopted by the farmers in accordance with their utility and scope for use. These are popularised by the Government through different schemes. The agricultural implements used in the district are given below :

Old type implements

Hal (Plough)	*Jua* (yoke)
Maij or *Sohaga* (flat clod-crusher)	*Kolhu* (round clod-crusher)
Dranti (sickle)	*Gandasi* (long handled chopper used for cutting sugarcane, cotton sticks and bushes)
Kohari (hatchet)	*Dikri* (drag rake dragged by men for levelling high land)

Gori (leveller)

Kasoli (smaller mattock for weeding and hoeing)

Kasola (large mattock for weeding and hoeing)

Jeli (four -pronged fork)

Chhaj (winnowing basket)

Gharaunchi (stand for oiling card)

Belan (hand ginning mill, also sugar-press)

Baguri (small *khurpa* like implement used for the hoeing of sugarcane at the time of the first and the second hoeing)

Orna (seed drilling tube)

Datrali (used for *wat bandi* in the irrigated areas)

Gandasa (hand fodder cutter)

Rahat (persian wheel used where water table is not low)

Tipaya (stand for winnowing)

Gadi (cart)

Kutti-ki-machine (chaff-cutter)

Unt gadi (camel cart)

Phala (large mattock spade)

Kassi (spade)

Kolhari or lod (store roller)

Khurpa (grass spade)

Garci-ki-machine (wheat thrasher)

Rehru (small cart)

Behli (bullock cart)

Rath (chariot)

Damcha (watchman's controlling station)

Gopia (bird scarer)

Tat (bird scarer.)

Gulail (bird scarer)

Dhainkli (appliance for manual water-lifting suitable for small holdings)

Charsa (leather bucket)

Thela (four wheeler bullock cart)

Bijoudi (seed bag)

Gandola or *Khodna* (digging tool)

Santa (ox goad)

Kuthla (seed storage)

Kothi (indigenous bins)

Modern implements

Anaj nikalney wali machine (power thrasher)

Tubewell

Pumping set

Tractor

Harrow

Cultivator

Nalai gudal wala hal (hoes)

Trolly

Beej-aur-khad-boney-ki-machine (fertilizer-cum-seed-drill)

Triphali (three tined cultivator)

Panch datta (five tined cultivator)

Kapas boney wala hal (cotton drill)

Tar-davai-ki-machine (sprayer)

Sooki-davai-ki-machine (duster)

Mitti Patatney wala hal (soil inverting plough)

The old types of simple implements are in use due to their low initial cost, simple construction, easy availability and also for the reason that some of them can be used for multifarious agricultural operations and these cannot be dispensed with.

The old types of implements are used by the small farmer to a limited manner. A brief description of implements in common use is given below :—

Plough.—It is a primary tillage implement and is commonly used by small /big farmers throughout India because of its easy availability and easy operation in the villages.

It consists of three major parts the beam (*Halas*), wooden body (*Hal*) and the coulter (*Panihari* and *Kuis*). It may be of wood or iron. The plough is very much popular because it is used as a multi purpose tool in agricultural practices such as primary and secondary tillage, preparation of seed bed, sowing and inter culture for standing crops.

According to data collection since 1978-80 to 1990-91 the popularity of the wooden plough has not been affected among the farmers using animal power.

Tractor.—In the field of agriculture the use of tractor is increasing day by day. In the modern technology of agriculture the tractor has its main role, most of the agricultural practices appear to be incomplete without a tractor such as :—

(i) primary and secondary tillage operations for agriculture;

(ii) Seed preparations and sowing with seed-cum-fertilizer drills;

(iii) Inter culture practices in the standing crops;

(iv) Harvesting and thrashing with tractors;

(v) Transportation of farm produce to the market;

(vi) Irrigation.

Bullock Carts.—This is the 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 all other transportation needs. The carts are manufactured locally. Different types of carts are in use in different tracks of the district in consonance with the topography. Wooden as well as rubber wheels are used. But the use of inflated rubber tyre wheels is gaining popularity. There were 11,513 carts in the district in 1979-80 and now increased to 12,313 in 1990-91. This shows the popularity and indispensability of the bullock carts with the not-too-rich-farmers who were in majority and could not afford to replace bullock-carts by auto-vehicles.

Seed-cum-Fert. Drills.—In the intensive agricultural practices very less time is available between the harvesting of matured crops and sowing of next crops. A seed-cum-fertilizer drill is very important time saving machine which also ensure economical use of seeds and fertilizer for obtaining optimum production.

Thrasher.—The machine has also an important role in agriculture. It is a time saving crop thrashing machine and completes the work in

less time. In modern agricultural implements, its demand is very high. It is available in different models and sizes according to power availability with the farmers. It may be operated by tractors, engine or electric motors.

Cultivators.—It is an important agricultural Implement used for primary/secondary tillage and inter culture in standing crops. It is also available in different sizes according to need and power availability with the farmers. It is driven by animals or tractors.

Although the scope of machanised farming is limited because of small land holdings but modern implements are being gradually adopted by the farmers. Scarcity of labour and improved economic conditions of the cultivators have accelerated this approach.

The year-wise figures of implements used in the agriculture from 1987-88 to 1990-91 are as under :—

Implements	1987-88	1988-89	1989-90	1990-91
Ploughs				
(i) Wooden	19,313	16,685	16,500	17,522
(ii) Steel (Iron)	1,545	599	1,875	2,590
Tractors	4,289	4,746	5,796	5,555
Carts	11,033	11,702	10,505	12,715
Seed-cum-Fert. Drills	2,850	2,210	2,560	3,051
Thrashers	4,032	4,112	4,315	4,490
Cultivators	4,115	4,517	4,951	5,155

AGRICULTURAL CO-OPERATIVES

The co-operatives also play an important role in boosting agricultural production. There is only one central cooperative bank in the district. It has been playing a vital role towards the promotion of agriculture sector for the last many years. There has been a constant increase in the advancement of loans both in cash and in kind.

The farmers can get their financial assistance directly from the nearest branch of the mini bank. There are 140 mini-banks in the district. The primary co-operative land development banks are also

functioning at tahsil/sub tahsil levels. All the cooperatives are playing a good role in meeting the requirements of long-term loans and farm loans for minor-irrigation, water-management, farm machinery, land development, farm forestry and all other similar activities. As per the *Statistical Abstract* of *Haryana*, 1990-91, there were 168 primary agricultural credit and service societies in the district.

ANIMAL HUSBANDRY

The animal husbandry activities in the district are looked after by Deputy Director, animal husbandry who is assisted by the S.D.O.(A.H.) Palwal, S.D.O.(A.H.) Faridabad; and Assistant Director MFAL Faridabad in the matter relating to livestock development, viz. cattle breeding, artificial insemination work, control of the outbreak of contagious & non-contagious diseases amongst livestock, improvement of livestock and provision of veterinary aid.

The human population is sharply increasing day by day, so the demand of milk, eggs and meat is also increasing. In order to meet the increasing requirement of milk, eggs, wool and meat the department is carrying out various livestock developmental programmes. The livestock population in the district as per 1988 Census is as under :

Particulars	(The number in 000)
1. Cattle	107
2. Buffaloes	292
3. Horses and Ponies	2
4. Donkeys & Mules	4
5. Sheep	25
6. Goat	39
7. Camels	1
8. Pigs	19
9. Others	44
10. Poultry	106
Total :	533

Cattle and Buffaloes.—Livestock has an important role in human life. It gives us milk, wool, meats, hides, bones, skins and manure, etc. and also

helps in transportation and motive power which is required for agricultural operations. In addition, they provide essential animal proteins for human diet through meat, milk and eggs, fibers and animal excrement which is used as source of energy through direct burning or biogas as a farm yard manure. It also has a special significance in socio-economic reconstruction of the agrarian society; as it has the potential to provide them gainful employment without uprooting their hearth and home.

Measures to improve quality of Cattle Breeds

A key village scheme was started in 1958, which was a centrally co-ordinated project aiming at the improvement of cattle and buffaloes. Pedigreed bulls from the Government Livestock Farm, Hisar were provided for artificial insemination and A.I. centres were set-up. Unapproved bulls were castrated or removed from the key village block and no bull other than the selected one was allowed to breed.

Selected male calves born out of high yielding dams were taken up for subsidised rearing under the scheme. The Government has the first right to purchase such calves, when they matured, for its cattle development activities.

The Faridabad district was formed in 1979, before it was a part of Gurgaon district. A Intensive Cattle Development Project was established under the Delhi Milk Supply scheme at Gurgaon in 1967-68. Under this project one semen bank, 4 R.A.I.C. and 100 stockman centres were established. Since Faridabad remained a part of Gurgaon district-up to 1979-80, so all breeding programmes were launched in Faridabad area. In 1975, a liquid Nitrogen plant was established at Gurgaon and Frozen Semen Bank was started for A.I. After the formation of district Faridabad, the Frozen semen and Liquid Nitrozen gas is being supplied in the district by the Frozen Semen Bank, Gurgaon. A comprehensive plan for increasing the milk production and working efficiency of cattle was launched. It envisaged systematically planned method for the best utilization of superior germ plasms obtained from superior bulls by its proper distribution throughout the district. Technique of artificial insemination is used to maximise the utility of available number of approved bulls through cross breeding in cows and selective breeding in buffaloes, controlled breeding was progressively brought through the removal of scrub bulls in the area. Exotic semen is being used to meet the requirement of semen, bulls of high quality are stationed at Semen Bank from where semen is collected artificially.

To provide breeding facilities effectively 3 Regional Artificial Insemination Centres and 83 Stockman Centres, are functioning in the district.

The figures of artificial insemination and calves born from 1985-86 to 1990-91 are as under :—

(Figures in 000)

Year	Artificial Insemination done		Calves born	
	Cows	Buffaloes	Cows	Buffaloes
1985-86	15.9	13.7	4.0	4.0
1986-87	17.0	15.0	4.6	5.0
1987-88	15.3	13.3	4.5	5.3
1988-89	16.2	15.5	4.3	4.8
1989-90	15.9	15.7	4.9	5.5
1990-91	16.6	16.4	5.2	6.0

Sheep and Wool Development.—Sheep development is also looked after by the veterinary institutions functioning in the district. However, in sheep pockets the department has established sheep and wool extension centres where good quality rams are kept and are supplied free of cost to the sheep breeders during tupping seasons. Besides, they also guide the sheep breeders in the rearing and management techniques. They also help in marketing their produce. In district, the department has established one sheep and wool extension centre at Sohdad.

Piggery Development.— The pig population according to 1988 Census is 0.19 lakh in the district. To improve the piggery the Landrace & Yorkshire pigs are produced at the Government Livestock Farm, Hisar and Pig Breeding Farm, Ambala and supplied to the breeders at subsidised rates. The veterinary Institutions functioning in the district also attend to such work. However, one piggery extension centre is functioning in the district at Agawanpur.

Poultry Farming.—According to 1988 Livestock Census, there were 1.06 lakh poultry birds in the district. Being its proximity to Delhi, the Faridabad district has a great potential for poultry development. The poultry and eggs find a ready market in Delhi. To develop the poultry, there are 2 Poultry Extension Centres at Palwal and Faridabad. The breeders of the district are supplied improved chicks at subsidised rates either from hatchery-cum-poultry farm, Hisar, Bhiwani and Rohtak or Government Poultry Farm, Ambala. Mass scale vaccinations and debeaking are carried out by the poultry extension centres and other veterinary institutions.

Animal Diseases and Veterinary Hospitals.—The common diseases affecting the livestock in the district are haemorrhagic septicaemia, *galghotu*, foot and mouth (*muh khur*), black quarter, rinderpest, surra, sheep pox, caprine pleuro-pneumonia, haemoglobinuria, pica and stringhalt. These diseases generally appear due to unhealthy surroundings and drinking of unhygienic water by animals. With prophylactic vaccination, haemorrhagie septicaemia, rinderpest, foot and mouth, black quarter, surra and sheep pox kave been brought under control. Camels are very susceptible to surra and sufficient quantity of medicine is stocked in veterinary hospitals and dispensaries. Pica in camels and haemoglobinuria in buffaloes which caused high mortality in these animals in the past are now successfully treated. Springhalt affects camels more than the cattle. Surgical treatment development by the Haryana Agricultural University has proved very successful.

The Haryana Agricultural University, Hisar, provides animals disease investigation and diagnostic service to the field veterinarians and livestock owners of the district. The field veterinarians carry out preventive and curative treatment. In case they fail to establish correct diagnosis of the disease outbreak in any species of livestock including poultry, the matter is referred to the disease investigation staff of the university. The Disease Investigation Officer examines the affected animals, carries out post-mortem examination on the carcase of dead animal to detect disease and conducts laboratory examination to establish a correct diagnosis of the disease affecting the animals. Suitable preventive and curative treatment is recommended to control the disease.

Veterinary hospitals.—At the time of the creation of the district (1979-80), there were 11 veterinary hospitals, 3 hospital-cum-breeding centres 9 veterinary dispensaries, 2 regional artificial insemination centres, and 79 stockman centres in the district. Now (on March 31,1991), there was a net work of 11 veterinary hospitals, 19 hospital-cum-breeding centres, 26 veterinary dispensaries, 3 regional artificial insemination centres and 83 stockman centres. A list of veterinary hospitals is as under :—

Sr. No.	Veterinary hospitals
1.	Ballabgarh
2.	Chhainsa
3.	Jawan
4.	Kurali
5.	Faridabad
6.	Chandat
7.	Hodal
8.	Tappa Bilochpu
9.	Aurangabad
10.	Hathin
11.	Palwal

During 1990-91, the number of veterinary personnel in the district was 26 Veterinary Surgeons, 122 Veterinary Livestock Development Assistants 5 Dressers & Farriers & 168 Class IV.

A veterinary hospital generally functions under the charge of Veterinary Surgeon, who is assisted by a Veterinary Livestock Development Assistant besides other class IV attendants. A stockman centre/dispensary is run by a Veterinary Livestock Development Assistant with the help of a class IV attendant.

During 1990-91, 1.2 lakh animals were treated in the various veterinary institutions. The details about number of inoculations and vaccinations performed in the district are given below :—

Name of Diseases	Number of Animals vaccinated and inoculated during 1990-91 (in lakh)
1. Rinderpest	1.58
2. Haemorrhagic-Septicaemia	3.40
3. Black Quarter	0.03
4. Ranikhet	0.39
5. Fowl Pox	0.19
6. Sheep Pox	0.14
7. Foot & Mouth	0.33
8. Swine Fever	0.06
9. Enterotoximia	0.21
10. Others	—

Slaughter Houses

There are 4 registered slaughter houses in the district located at Faridabad, Ballabgarh, Palwal and Hodal. The animals, like goat, sheep and pigs are inspected by the Veterinary Surgeon before and after their slaughtering to ensure that meat being made available for human consumption is free from diseases. The year-wise number of animals slaughtered for the human eonsumption in the district is given below :—

Year	Animal Slaughtered ('000')
1985-86	40.7
1986-87	123.0
1987-88	97.6
1988-89	45.4
1989-90	49.5
1990-91	53.8

Problems of Stray Animals.—There is a cattle catching party in the state to round up wild, stray and useless cattle which create problems for the farmers. The Panchayats approach the Gaushala-Development-cum-Cattle Catching Officer, having headquarters at Chandigarh, who deputes the cattle catching party to the affected area for rounding up the animals. The rounded animals are put to auction and the unsold are sent to Mandewala Gosadan in Ambala district.

Gaushala Development.—According to the old concept, *gaushalas* were institutions inspired by religious sentiments 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 registered *gaushalas* in the district are given below :—

1. Shri Gopal Gaushala Inderprasth, Area Faridabad, New Delhi-44 ;
2. Shri Krishan Chobsi Gaushala, Hodal ;
3. Shri Bhartiya Sanatan Dharm Mahabir Dal Gaushala, Palwal ;
4. Shri Amar Shahid Kanha Gaushala, Bahin ;
5. Shri Kanya Gurukul Gaushala, Hasanpur.

Milk Chilling Centres.—In 1959, Delhi milk scheme was initiated by Government of India to cater to the milk requirements of Delhi in an organized manner. It was also to provide a fair remunerative market for milk producers in areas in the neighbourhood of Delhi.

The scheme commissioned its first milk collection and chilling centre in the district at Ballabgarh in August, 1960. In November, another centre was started at Palwal.

These milk collection and chilling centres are equipped with modern plants and machinery to receive, chill and store milk in hygienic conditions. The centres are equipped with laboratories to test the milk for its hygienic quality and purity. Milk was collected from the areas around these centres through the medium of contractors who gave money as loans to the producers of milk for buying cattle. They pocketed unproportionately huge profits by procuring milk at much cheaper rates from these loanees. Gradually, cooperative societies of milk producers, were formed which supplied milk directly to the scheme and they have thus been saved from exploitation by private contractors.

Milk produced in areas in the vicinity of the milk collection and chilling centres is received directly at these centres. From far-off places, however, Delhi Milk Scheme itself collects milk through transport provided by it. The suppliers are also provided with sanitary milk cans and ice for chilling the milk in order to maintain its freshness till it reaches the milk collection and chilling centres. Milk is further chilled to lower temperature and stored in insulated storage tanks and is then despatched to the Central Dairy of the Delhi Milk Scheme in Delhi in insulated road tankers.

This department is conducting sample surveys for estimation of milk production. The figures of annual milk production and per-capita availability of milk are given as under :—

Year	Annual Milk Production (in '000' M.T.)	Per capita-Availability of Milk (In gms.)
1982-83	141.4	370
1983-84	121.7	309
1984-85	166.5	412
1985-86	167.2	403
1986-87	133.0	313
1987-88	157.7	361
1988-89	177.2	399
1989-90	174.4	385
1990-91	289.7	541

DAIRY DEVELOPMENT

Haryana as the saying goes has been the 'Milk Pail' of India. Keeping of milch cattle is part and parcel of rural economy because more than 80% of State's population depends on agriculture and allied sectors. The land once flowing with milk and honey as the saying goes, is again on the threshold of a white revolution. To acquaint the Haryana ruralites with the modern techniques in dairying and to enable them to increase the yield of milk and derive economic benefit in greater measure, are the main functions of the Dairy Development Department.

The Dairy Development Department, Haryana, since its creation has been playing a vital role in bringing dairying on modern commercial lines. The main schemes being implemented by the department include training in dairying, milk yield competitions, testing of milk and milk

products. Above all these programmes, the department has also launched a special scheme 'Mini Dairy' for providing self-employment opportunities to the rural educated/semi-educated unemployed youths. The progress made during the year 1988-89 under plan and non-plan schemes are discussed briefly as under :—

'Mini Dairy Scheme' aims at providing gainful self-employment opportunity to the rural educated/semi-educated youth to retain them in the rural premises so that they may not rush to the urban areas for seeking white collar jobs. The unemployed rural youths who are interested in adopting dairying as a vocation are assisted in securing loan.

During 1987-88, 329 persons were trained in dairy development. The achievements under mini-dairy scheme are as under :—

(As on March 31,1990)

Scheme	Milch Cattle	
	Unit	Number
5—Milch Cattle Scheme	303	939
3—Milch Cattle Scheme (G.C.)	148	326
3—Milch Cattle Scheme (S.C.)	307	658
3—Milch Animal Scheme (taken up by widows only)	19	48

During 1990-91, there were 75 units and 246 number of milch cattle under all the 4 categories.

FISHERIES

Introduction

Fishery industry provides ample opportunity for increasing protein rich food essentially required for under-nourished growing population. Fish culture as a cottage industry finds a source of employment opportunity and creates a new avocation ; raising socio-economic status of village folks; helping in rural re-construction besides improving health and sanitation. In the recent years fisheries have drawn attention of sportsman for development of angling as a healthy game. Indoor decoration with ornamental fish in aquarium is also getting popularity.

Fisheries Resources.—Despite unfavourable soil and climatic conditions influencing heavy water losses both by seepage and evaporation, Faridabad district has still vast potential untapped water resources for development of fisheries. These water resources consist of natural waters,

i.e. notified public waters, man-made lakes and village ponds. Their details are as follows :—

(i) Notified waters.—These consist of river Yamuna and its tributaries, Bhuria Nala, Johar Nala, Agra Canal, Gurgaon Canal, Gaunchi Drain, Ujina Diversion Drain, Badkhal Lake, Dhauj Bundh & Pea-cock lake (Suraj Kund).

Fishing rights in these natural waters vest with the Fisheries Department. All the notified waters of the district are put to open public auction annually in the month of July for a period of one year. Income derived from the auction goes to the State Government.

(ii) Lake-Fisheries.—Small lakes i.e. bunds viz. Badkhal lake, Suraj Kund and Dhauj Bundh were constructed for flood control, soil conservation and Irrigation purposes. These bunds were later on stocked with fish seed of Indian Major Carps. The fishing right in Badkhal lake and Suraj Kund vests with the Tourism Deptt., Haryana at present. These waters are now auctioned by the Tourism Deptt., for fish culture. Angling licences are issued by the same and revenue goes to the Tourism Department.

These bundhs serve as an ideal angling spots. The spot fishing licences are issued to the anglers with a bag limit of three fishes.

(iii) Pond Fisheries.—Nearly 650 hectares of water area in the shape of village ponds is available in the district which consists of seasonal, long seasonal and perennial ponds. At present, the ownership of these ponds vests with the Panchayats. These water bodies have an area ranging between 0.4 hect. to 5.0 hect. There exists a provision in the Panchayat Act to lease out these ponds for the purpose of fish farming for a period of ten years but most of the Panchayats give lease of these ponds for 3 to 5 years to the fish farmers.

Administrative set up in the District.—The administrative set-up of the Fisheries Department in the district is as under :—

The Staff under Fisheries Development Officer

Sr. No.	Post	Number
1.	Marketing Asstt.	1
2.	Commercial Fisherman	1
3.	Farm Assistant	1
4.	Field Assistant	2
5.	Fishermen	2
6.	Extension Assistants	—

There is a Fisheries Officer at Palwal whereas Fisheries station at Hathin is under the Assistant Fisheries Officer.

Main activities of the Department

Fisheries activities in the district is broadly based on :

(a) Conservation and

(b) Development Programmes

Conservation and Augmentation of Natural Fisheries.—Fishing in the public waters of the state is regulated under the Punjab Fisheries Act, 1914 and rules framed there under. The fishing rights of public waters are auctioned out every year during the month of July-August and the fishing licence is issued w.e.f. Ist September to 31st August of the following year with a provision of "close season" for two months during July and August. During the close season fishing is allowed only with rod and line. The Fisheries Act, 1914 also empowers the department to check illegal fishing such as fishing without licence, fishing with the use of dynamite, fish poison and erecting fixed engines or employing nets of under-sized mesh to save killing juvenile fish stock of the public waters.

Revenue received by the department as a result of auctioning the notified waters of district is as below :—

Year	Income (Rs. in lakh)
1988-89	4.82
1989-90	4.86
1990-91	7.82

Fishing rights in Badkhal lake, Suraj Kund and Dhauj Bundh were also auctioned for a period of 2-3 years for the purpose of fish farming as well as fishing. Detail of auction is as under :—

	Badkhal lake	Suraj Kund	Dhauj Bundh
Period	8-4-90 to 31-3-92	9-4-90 to 31-3-92	1-9-88 to 31-8-91
Amount	Rs. 1.9 lakh	0.65 lakh	1.8 lakh

Development Programmes.—Development programmes under various Plan and Non-Plan Schemes are being implemented in the district. This has resulted in providing full time as well as part time employment to about 500 persons besides providing subsidiary occupation to about 10,000

persons. Delhi being very nearer to this district, it has additional advantage for the disposal of fish.

The department of Fisheries established one Fish Farmers Development Agency in the district during the year 1985-86 aiming at creating a class of fish farmers in the district and achieved a great success. The agency is headed by the Chief Executive Officer and has its separate office and establishment at Badkhal lake, Faridabad. One fish seed farm at Badkhal lake has been handed over to the agency for producing quality fish seed for meeting the increasing demand of fish seed in the district. Fish seed is supplied to the fish farmers by the department at the subsidised rate of Rs. 50/- per thousand. Fish seed is also being supplied by the Fish Farmers Development Agency in Faridabad district.

At present the ownership of village ponds vests with the Panchayats. Therefore, in large number of ponds fish culture practices are not being adopted or ponds are leased out for a small period. In case the ownership of these village ponds are transferred to the Fisheries Department, most of the ponds will be brought under fish culture resulting in higher production of fish and full utilization of water resources. Intensive Development of Fisheries in village ponds is one of the most important programmes in the district besides promoting excavation of new ponds in the own land by the fish farmers. Fisheries Department as well as Fish Farmers Development Agency is helping fish farmers to obtain financial and technical assistance.

Financial and Technical Assistance

The Fisheries Department is providing financial and technical support to the fish farmers to adopt fish farming in their own ponds or leased ponds under various plan schemes. This has helped in utilising the available water resources, increase in fish production and generation of employment opportunities specially in rural sector.

The financial aid and its pattern is as under:—

Item	Unit	Ceiling (Rs.)	Subsidy (Rs.)	Loan from Bank or Self Finance (Rs.)
Excavation of new ponds	Hect.	50,000	12,500	37,500
Renovation of pond (limit four hectares)	Hect.	16,000	4,000	12,000
Inputs (Ist & IInd dose) (limit four hectares)	Hect.	5,000	1,250	3,750

1	2	3	4	5
Installation of tubewell (limit one hectare)	Each	30,000	7,500	22,500
Purchase of nets	Per person	4,000	1,000	3,000
Installation of Airator system (limit one hectare)	Each	15,000	3,750	11,250
Establishment of fish shop	Each	30,000	7,500	22,500
Excavation of pond in Marshy land	Hect.	50,000	12,500	37,500
Establishment of fish production unit	Hect.	80,000	20,000	60,000

Block-wise waters brought under fish culture in the district alongwith other achievements with regards to seed production and fish production are as under :—

(Tonnes)

Name of block	Unit	Years		
		1988-89	1989-90	1990-91
Faridabad	Hect.	14.00	94.0	24.40
Ballabgarh	,,	67.00	66.90	61.70
Palwal	,,	104.90	94.50	115.50
Hathin	,,	174.61	51.10	97.00
Hodal	,,	116.80	78.23	39.60
Blockwise fish seed stocked in ponds				
Faridabad	Lakh	2.11	6.14	12.25
Ballabgarh	,,	7.76	11.46	11.30
Palwal	,,	12.15	15.29	13.98
Hathin	,,	31.34	8.19	13.28
Hodal	,,	15.056	13.87	7.94
Fish Production in the district				
1988-89	Tonnes			2769.5
1989-90	,,			1906.8
1990-91	,,			2627.5

* 25% Subsidy is being provided to General Category.

** 33% Subsidy for Scheduled Caste Families.

Training & Extension Programme.—The Fisheries Science-technology has advanced to a great extent. Under this programme, it is envisaged to create an economically sound class of fish farmers in the district who shall adopt the advanced fisheries technical know-how in their ponds. Fish farmers are imparted training on different fisheries discipline for a period of 15 days. Fish farmers are paid Rs. 25/- per day as stipend during the training period.

Mewat Development Agency's Programme.—Special project has been taken up by Mewat Development Agency, Gurgaon for development of fisheries in the Hathin block for the renovation of community ponds, excavation of new ponds of Panchayats and construction Inlet/outlet at the village ponds. Fish seed, free of cost, is supplied to Panchayat ponds in Mewat area to increase income of the Panchayats.

The following natural fish faunae have been recorded in the district :—

1. **Major Carps.**
   - (*i*) *Dabeo* — *rohita*
   - (*ii*) *Catla* — *catla*
   - (*iii*) *Cirrhina* — *mrigala*
   - (*iv*) *Labeo* — *calbasu*
2. **Common Carp.**
   - (*i*) *Cyprinus* — *carpio*
3. **Cat Fish**
   - (*i*) *Wallago* — *attu*
   - (*ii*) *Mystus* — *singhala*
   - (*iii*) *M.* — *sor*
   - (*iv*) *M.* — *cavasius*
   - (*v*) *M.* — *vittatus*
   - (*vi*) *Silondia* — *silondia*
   - (*vii*) *Bagarius* — *bagarius*
   - (*viii*) *Eutropychthys* — *vacha*
4. **Eal**
   - (*i*) *Mastacembleus* — *armatus*
   - (*ii*) *M.* — *pancalus*
5. **Air Breathing Fish.**
   - (*i*) *Channa* — *marulius*
   - (*ii*) *C.* — *punctatus*

1	2
(iii) *C.*	*gachua*
(iv) *C.*	*striatus*
(v) *Heteropneustas*	*fossilis*
(vi) *Clarius*	*batrachus*
6. Feather Backs	
(i) *Notopterus*	*notopterus*
(ii) *N.*	*chitala*
7. Weed Fishes	
(i) *Puntius*	*ticto*
(ii) *P.*	*stigma*
(iii) *Chela*	*bacaila*
(vi) *Ambypharyngodon*	*molitrix*
(v) *Rasbora*	*damiconius*
(vi) *Ambassis*	*ranga*
(vii) *A.*	*nama*
(viii) *Colisa*	*faciatus*
8. Minor Carps	
(i) *Labeo*	*bata*
(ii) *Cirrhina*	*reba*

FORESTRY

The Faridabad Fores Division comprised two forest ranges, i. e. (i) Palwal range (ii) Ballabgarh range. These ranges are further sub-divided into blocks and beats. The charge of a range is ordinarily held by a Forest Range Officer, and the charge of a block is held by a Deputy Ranger or a Forester, whereas a beat charge is supervised by a Forest Guard. The technical and executive staff looks after the existing fresh areas belonging to the Government as well as private individuals which are notified as closures under section 38 of the Indian Forest Act, 1927 and under sections 4 and 5 of the Punjab Land Preservation Act, 1900 as applicable to Haryana. The staff is also responsible for the execution of afforestation works.

During 1990–91, the total area under forest was 1,441 hectares. The administrative control at district level lies with the Divisional Forest Officer. During 1990-91, the plants numbering 19,15,095 were distributed

free of cost to Government and non-Government institutions and earned Rs. 34,537 as on March 31,1991.

IRRIGATION

Gone are the days when the rain-god displeased with the people and the farms remained parched for want of rain. Government has provided a net-work of irrigational channels. Despite the fact rain factor is important to some extent in some block where the irrigation is scanty.

The district gets uniformly light rainfall and nearly the whole of it falls between June and September. The little rainfall in the winter is most welcome since it benefits the rabi-crops. It is, however, scanty and uncertain. The unirrigated *khadar* circle of Palwal requires rain for its *rabi* crop. The success of *rabi* crops depends on adequate showers between mid-December and mid-February. If there is, too, little rain in winter or spring due to west wind, the crops dry up. The first half of September is the critical period for the ripening of the *kharif* and the sowing of the *rabi* depends on the rainfall during this period. Since the problem of inadequate and uncertain rainfall can be solved to some extent by artificial irrigation.

CANAL IRRIGATION

Two types of system, i. e. canal irrigation and tubewell irrigation cover mainly the irrigation resources of the district. Canal irrigation is done through the Agra Canal and Gurgaon Canal Project.

Agra Canal.—An important irrigation source is Agra Canal which is under the control of Uttar Pradesh Government. The canal was opened in 1874 and irrigation commenced from it in the following year. The canal passes straight down through Ballabgarh *Bangar* into the Palwal tahsil and thence into Uttar Pradesh. Its course is fairly parallel, with the Yamuna throughout and varies from 5 to 20 kilometres from the river bank. The canal has its outfall in Terminal Distributary near village Jodhpur on the southern border of the Mathura district (U. P.) which after about 48 kilometres finally joins the Utanghan river.

Gurgaon Canal Project. —This project represents a bold experiment in the inter-basin transfer of river waters. It provides the transfer of Ravi-Beas waters across the basins of the Satluj and Ghagghar rivers to the Yamuna basin. This is a flow-cum-lift project and envisages the extension of canal irrigation to the areas of Gurgaon district and Rajasthan State besides the areas of this district.

The work on the Gurgaon canal project was started in 1960-61, but abandoned in 1962 owing to the Chinese aggression. It was resumed in April, 1964 but again the Pakistan aggression in 1965 and the non-availability of funds slowed down its scheduled progress. It was completed in 1968.

The lined Gurgaon Canal Parallel Feeder has been built from kilometre 8 to kilometre 24 of the Agra Canal along its right bank to feed the Gurgaon Canal. For the block on the left on the Agra Canal, two distributaries, Chhainsa and Rampur have been provided which would ultimately be fed directly from the Parallel Feeder through crossings to be built under the Agra Canal. At present, they are supplied water from the Agra Canal by a mutual arrangement. The rest of the command area has been and would be covered by the distributary system of the main Gurgaon Canal. The lined Rajashan Feeder carries 500 cubic feet of water per second for Rajasthan areas from the tail of the Gurgaon Canal. On the commissioning of the Project finally, the Gurgaon Canal would become essentially a perennial canal.

The important distributaries which provide water for irrigation purpose, are given below:—

(i) Chhainsa Distributary system

(ii) Rampur Distributary system

(iii) Ballabgarh Distributary system

(iv) Sikri Distributary system

(v) Pehladpur Distributary system

(vi) Janawali Distributary system

(vii) Palwal Distributary system

(viii) Bhangar Distributary system

(ix) Hathin Distributary system

(x) Hodal Distributary system

(xi) Rajasthan Feeder

Besides these distributary systems, there are many minors which play an important role in irrigating the areas of this district. Large number of bunds also extend irrigation facilities to the district. Some of the important bunds have been given in Chapter—I, *General.*

The progress of irrigation before the formation of the Faridabad district is as follows:—

Net irrigated area in thousand hectares

Year	Palwal tahsil	Ballabgarh tahsil
1	2	3
1960—61	20	11
1965—66	32	18
1970—71	40	24
1972—73	37	18
1975—76	34.2	24.5
1976—77	34.1	25.5

After the formation of this district, the successive government spent a lot of money for building irrigation channels. The progress of irrigation through different sources during 1979-80 to 1990-91 is given below:—

(Net area irrigated in 000 hectares)

Year	Government Canals	Tubewells	Total
1	2	3	4
1979—80	38	50	88
1980—81	18	61	79
1981—82	14	76	90
1982—83	34	57	91
1983—84	36	56	92
1984—85	25	65	90
1985—86	26	65	91
1986—87	38	63	101
1987—88	39	92	131
1988—89	39	83	122
1989—90	44	65	109
1990—91	—	—	—

GROUND WATER

The general topography of the area is from north to south. The surface elevation of the area varies from 190—234 mtr. above sea level. Yamuna river constitutes the main drainage system of the area. Besides, there are two main canals viz. Agra Canal (unlined) and Gurgaon Canal (lined). Gurgaon Canal covers Western part of the district whereas its north-eastern part is covered by three link canals i. e. no. I, II & III. Agra Canal passes through the central part of the district from north to south.

Realising the importance of ground water development, Ground Water Cell in the Department of Agriculture at Faridabad was established in the year 1980-81 with a prime object of planning and budgeting of ground water resource available in the district. The section keeps a strict vigil to avoid over exploitation in the area, so that ground water balance could be maintained for getting the normal discharge from the overall ground water structures.

ACTIVITIES

There are 93 observation wells, 8 piezometric tubes and five key observation wells selected throughout the district to monitor the behaviour of water level. The field work undertaken for investigation, development and assessment of ground water resource in the district is as under:—

1. Setting up of grid observation wells at regular interval;
2. Determination of reduced level of observation points;
3. Selection of water samples for determining the quality of ground water;
4. Pump test and pump efficiency test to know the aquifer parameter and efficiency of pump;
5. Collection of hydrological data for computing ground water assessment;
6. Census of M. I. Units;
7. Geophysical survey to identify the potential pocket in problematic area;
8. Observation of draft sites to know the draft of existing units;
9. Monitoring of hydro-meteorological sites;
10. Block-wise micro level survey in dark area;
11. Preparation of hydrological maps.

The total area of the district is 21,05 sq. km., out of which during June, 91, 38% falls under fresh, 46 under sub-marginal to marginal and rest in saline/hilly area. In general, depth of water varies from 2 mtr. to 19 mtr. below ground level. The average being 7.6 Mtr. 89% of the area lies within 0—10 meters depth zone while rest of the area falls between 10—20 mtr. The average fluctuation of water level in the area from June 1981 to June, 1991 is 0.78 Mtr.

Commendable growth of tubewells has taken place from 1979-80 to 1990-91. The number of minor irrigation structure have increased from 16,905 in 1979-80 to 26,339 in 1990-91 reflecting an increase of 36%. The average density of shallow tubewell in the area is 13 units/ sq. km. Progress of minor irrigation during 1979-80 to 1990-91 is as follows;—

Year	Wells	Tubewells		Total
		Diesal Units	Electric Units	
1	2	3	4	5
1979—80	1,298	6,235	10,670	16,905
1980—81	37	5,558	12,098	17,656
1981—82	30	6,189	14,604	20,793
1982—83	17	6,206	14,713	20,919
1983—84	17	6,563	15,064	21,625
1984—85	—	6,563	15,272	21,835
1985—86	—	6,563	14,924	21,487
1986—87	—	6,563	15,495	22,058
1987—88	8	7,824	15,820	21,644
1988—89	8	7,655	15,791	23,446
1989—90	4	7,891	16,292	24,183
1990—91	4	9,860	16,479	26,339

The net ground water recharge in the area is 54,605 ham. and the net draft is 21,592 ham. leaving a ground water balance of 33,012 ham. as on June, 1991. The %age of ground water development varies from

30% (block: Hathin) to 63% (block: Ballabgarh). All the five blocks of the district fall under white category (%age of Ground Water Development less than 65%).

The average %age of ground water development in the district is 47. The blockwise %age of development and category under which they fall are as under;—

Sr. No.	Name of Block	%age of Development
1	2	3
1.	Ballabgarh	63
2.	Faridabad	41
3.	Hathin	30
4.	Hodal	45
5.	Palwal	58

FAMINES AND DROUGHTS

Owing to uncertainty of rain and the large percentage of cultivation dependent entirely upon it, the district from time to time suffered severely from famines and droughts, beginning with the dreadful *chalisa* famine. The years of droughts and their nature are shown below:—

Year	Nature of drought
1	2
1783—84	Severe famine
1803—04	Scarcity
1812—13	Scarcity
1817—18	Scarcity
1824—25	Scarcity
1833—34	Severe famine
1837—38	Severe famine
1843—44	Scarcity
1850—51	Scarcity

1	2
1860—61	Famine
1868—69	Scarcity
1869—70	Famine
1877—78	Famine
1883—84	Scarcity
1896—97	Scarcity
1899—1900	Famine
1905—06	Scarcity
1907—08	Scarcity
1929—30	Famine
1930—31	Famine
1939—40	Famine
1951—52	Scarcity
1959—60	Scarcity
1964—65	Scarcity
1965—66	Scarcity
1968—69	Scarcity

No details are available about the earlier droughts. In 1781 and 1782, there had been little rain and so the harvest was poor; and the winter rain of 1782—83 completely failed. Hence with no *rabi* crop of April, 1783, a severe famine broke out in the then Punjab. The drought which had been raging for the past two years, and had become most acute in that year, known as the *chalisa* because it occurred in the year 1840 Bikrami Samvat. So terrible was the visitation that thousands of persons died of absolute starvation.[1]

The effects of the famine of 1860-61, scarcity of 1868-69 and famine of 1869-70 were greatly mitigated by the timely relief afforded by Government. In 1877-78, the famine was more severe in the district

1. Hari Ram Gupta, *History of Sikhs* Volume II, *Cis-Sutlej Sikhs* (1769-1799), 1944, pp. 145-146..

than in any other part of the State and hundreds of people were reduced to semi-starvation. It was dreadfully fatal to the cattle. Some 30,000 plough bullocks and 1,20,000 cows and young stock were estimated to have perished. With the rains of *kharif* 1878, the apparition of famine disappeared.

The six preceding harvests, with the exception of 1883 harvest which was average, had been poor and consequently the people were exceptionally impoverished. Scarcity was seriously felt and distress prevailed more or less throughout the district. The scarcity of 1895 97 was succeeded by the famine of 1899-1900, and large-scale relief measures were taken up. The loss of cattle was, however, very severe and was estimated at two-thirds of the total number in the district.

The district experienced famines again in 1929 30 and 1930 31. In these years, the people were confronted with the problem of fodder famine. About 1,17,000 *maunds* (43,670 quintals) of fodder was procured from distant areas for distribution in the affected areas of the district. The condition of the sufferers was further aggravated by damage done to crops by locusts. Naturally, the distress was most acute in the unirrigated tracts. To help the poor people, five test works were opened in November, 1929 ; one in each of the five out of the six tahsils of the then Gurgaon district. The number of works was steadily increased to 19 and the daily average of persons benefited to 58,277. These were closed in September, 1930, due to the timely and sufficient rainfall in July, 1930. These operations cost roughly Rs. 5½ lakh.

September, 1930, was again a rainless month and as the *rabi* crop could not be sown satisfactorily, it was a failure to the extent of 55.6 per cent. In 1931, four test-works were reopened. More works had to be opened bringing the total number to 14.

To the drought of 1930-31 were added crop calamities in the form of *roli* (rust) and *chepa* (an insect); the former considerably damaged barley and wheat while the latter practically destroyed the *sarsaf* (*sarson*) crops. The expenditure on test and relief works during 1931 was to the the tune of Rs. 1,50,000. Gratuitous relief was also provided to a certain extent in the affected areas.

During 1929-30 and 1930-31 *taccavi* loans in addition to remissions and suspensions to the extent of Rs. 7,43,664 and Rs. 7,37,645, respectively were distributed to tide over distress. The land revenue and canal *abiana* were remitted to the extent of Rs. 2,59,496. The following

amounts of *taccavi* were suspended from *kharif* 1928 to *kharif* 1930 :—

Kharif 1928	Rs. 4,81,162	(This relief relates to the whole of the then Gurgaon district)
Rabi 1929	Rs. 4,47,307	
Kharif 1929	Rs. 5,05,162	
Rabi 1930	Rs. 3,64,926	
Kharif 1930	Rs. 3,75,709	

The Famines of 1929-30 and 1930-31 were succeeded by the famine of 1939-40. In these years also the first problem was fodder. Relief was provided from both direct and indirect sources. In fact this area had been very unlucky in having a series of bad years and there was no indication of the termination of the repetition. Since 1928-29, no harvest touched the settlement average.

These famines were often followed in subsequent year by exceptionally heavy rainfall. Malaria, which existed in an endemic form, broke out and took a heavy toll of people already enervated by hunger and want. An enquiry conducted by the Board of Economic Enquiry, Punjab sometime in the thirties, showed that 46 per cent of the landowners of this region died without leaving male heirs. This was probably due to the low vitality of the people.

There had been no famine since 1939-40, but scarcity still occurred. The scarcity conditions prevailed during 1968-69.

Now with better means of transport, Government is well equipped to cope with any emergency and food can be rushed immediately to the affected areas. However, it cannot be said safely that famines would not reappear. The existing irrigation facilities are not sufficient to cope with the drought conditions in case of failure of rains. On the completion of various development programmes, particularly extension of irrigational facilities through a network of canals, tubewells/pumping sets, it is hoped that recurrence of famines would be prevented. But even if famines come, they will not raise their old ugly spectre.

FLOODS

Heavy rains increase the volume of water in river Yamuna and cause floods along the western bank of its course, that is in the *khadar* areas of the Ballabgarh and Palwal tahsils. The situation in the riverain villages sometimes becomes too alarming. Floods cause heavy damage to standing crops, life and property and also necessitate the shifting of some *abadis*,

especially in villages Lalpur (tahsil Ballabgarh) and Solra and Bholra (tahsil Palwal). However, this problem is often not so acute for the water flows away automatically with the receding of the level in the Yamuna. But at some places the accumulated water stays for months together and minimises the possibility of the following *rabi* sowing. The villages generally affected in this way are as follows:—

Part A

Akbarpur, Sheikhpur, Mauzamabad, Harphala, Nanglia, Jodian, Mohana, Khanakpur, Qabulpur, Bangar, Samepur, Majori, Sabupura, Ladhalo, Shahpur Kalal, Bhahalpuri, Bashkula, Mohabatpur Yakubpur, Lalpur, Dadsia, Dalelpur, Sherpur, Ismailpur, Aganpur and Chandpur.

Part B

Bhond, Bagpur Khurd, Bholra, Solra, Rajpur Khori, Dostpur, Hassainpur, Thanthri, Hasanpur and Bagpur Kalan. Ring Bunds have been constructed in the following villages for protection against the floods in river Yamuna:—

Ismailpur, Agwanpur, Dalalpur, Lalpur Bholra, Nangla Sunehri, Nangla Brahman, Nangla Peruke, Shekhpur, Rajpura, Dostpur, Bhond Kherli, Basantpur, Sherpur and Mohabatpur.

Up to Independence (1947) and even for quite a few years thereafter, there were a large number of depressions round Palwal town which used to get filled up during heavy rains. The existence of a network of canal distributaries south of Palwal had also widened the natural course of the drainage towards the Yamuna in many places causing water-logging and *reh*. Some 14 drains and drainage cuts were provided by the Agra Canal authorities to prevent the deterioration by water-logging. However, these drains were not designed to deal with abnormal floodings In the west of the Palwal tahsil also, there were a disconnected seriec. of depressions which too got flooded in heavy rains to cause havoc in the whole of surrounding area. At that time the drainage of these depressions was not considered appropriate as any attempt to do so would merely transfer the danger, greately enhanced on the way, to the Mathura district and the then Bharatpur State (Rajasthan). However, syphons were provided where irrigation channels interfered with the natural drainage of flood water.

The matter was seriously taken up only after Independence and the problem was tackled through the Gaunchi Main Drain and its

system which serves an area of 257 square miles (665.63 square kilometres) lying between the left side of the Gurgaon Canal (comprising the Ballabgarh and Palwal tahsils and a part of the Nuh tahsil) and the right side of the Agra Canal. The drain starts from village Gaunchi and crosses the Gurgaon Canal through a syphon at RD 2,24,200 and ultimately falls into the Yamuna in the Uttar Pradesh after traversing a distance of 46 miles (74.03 kilometres).

The construction of Gaunchi Main Drain in its first phase was started in 1959-60 with a small pilot section. Later on, in 1962-63, its capacity was increased to 5 cusecs per square mile (2.5 kilometres) run off factor and link drains Sarahala, Pirthala, Palwal, Ranika, Dhatir and Khirbi were also constructed. Inadequacy of the main drain and its link drains was still felt in the subsequent years. Therefore, during 1966-67, the work of increasing the capacity to 10 cusecs run off factor was taken up. The work had been completed in almost all parts of the drain. Between 1964-65 and 1970-71, new link drains, viz. Janauli, Manpur, Hathin, Ratipur, Mitrol Nos. I and II, Banchari, Sondh, Siha, Dighot and Bamni Khera were constructed. After the heavy floods of 1971, it was experienced that the drain and its system still did not provide the desired relief against flood waters. In the seventies, the annual rainfall in this area had been more than 20 inches (508 millimetres). Accordingly, it was decided to remodel the main drain and other drains like Dighot-Pingore System, Banchari, Sondh and Gailab. Four more link drains, viz. Tumasra, Khatela, Gudhrana and Kot Bahin were also excavated. Pump houses were constructed at the outfall of Kot Bahin, Banchari and Sondh link drains as the flood waters of these drains could not flow into the main drain by gravity when it was running full. Other measures in the offing include the raising and strengthening of the banks of the drains to check damage from over flowing of water and providing inlets to clear local depressions. Relief is also provided by making relief cuts of allowing outflow of water through the existing inlets when the level in the Gaunchi Main Drain subsides.

All these measures are expected to go a long way in checkmating the recurrence of floods in the Ballabgarh and Palwal tahsils.

Floods are also caused by cuts in drains and breaches in bunds, which are deliberately made by the villagers to save their own lands from the ravages of excessive water. It mostly happens in the Palwal tahsil.

The efforts were made by the Government to mitigate the sufferings affected by the natural calamities (floods, hailstorms, drought, fire and lightning).

In case of floods, the Government provides the relief on the following items:—

(i) Free or concessional supply of food;

(ii) Cash payments to indigent persons for purchase of necessities;

(iii) Cash doles to disabled;

(iv) Free or concessional supply of clothing and blankets;

(v) Free or concessional supply of fodder;

(vi) Free or concessional supply of seed;

(vii) Measures for prevention of cattle epidemics;

(viii) Provision for drinking water;

(ix) Provision for transport facilities for goods to be moved on relief account;

(x) Repairs to houses damaged by the calamity; and

(xi) Relief works such as major, medium and minor irrigation works, soil conservation, forests, road and rural works.

The seed is supplied to the affected persons on the subsidised rates i.e. 50 per cent of the cost of the seed. In sanctioning the seed grant, the grantees' amount of loss of the *kharif* crops and capacity of sowing *rabi* crops is kept in mind. Mostly, Deputy Commissioner decides the eligibility and scale of the relief.

Scale of rations and essential commodities is as follows:—

Rations.—Free rations may be supplied to the affected families upto 15 kgs. of flour per affected family weekly till the village is again in a position to get its supply line restored.

Free Concessional Food.—Where any village/area is marooned and the population has been evacuated to a safer place, i. e. camps, *chaupals*, *dharamshalas* etc, preferably cooked food should be supplied. However, if the supply of cooked food is not feasible, only then free *atta* be supplied to such population till the time they are in the relief camps.

Free Concessional Fodder.—Where any village/area is surrounded by water and water has entered the *abadi* area but the cattle as well as the persons are staying in their villages and have some means of transportation to move out of the villages, subsidised fodder is supplied and subsidy may be upto 50% of the cost of fodder. The scale of fodder

has been fixed as 40 kg. green or 13 kg. dry fodder for adult animal and this would be half in case of minor. This provision of fodder help is maintained till such time the village is again in a position to get its supply line restored.

Where any village/area is marooned and the population (human as well as cattle) has been evacuated to a safer place (camps *chaupals, dharmashalas* etc), the free fodder will be supplied till such time the animals are staying in the camps.

Provision of Essential Commodities to the flood-affected Persons.— Other essential commodities such as kerosene, sugar, *dal*, milk, match boxes, salt, *ghee* etc worth Rs. 7 are supplied per family per day. The supply of free rations in the marooned villages is based on the situations and local availability of material.

House Repair Grant.— The grant is allowed at the rate of Rs. 400 per katcha house and Rs. 600 per *pucca* house to those persons whose houses have been substantially damaged and who are left with any habitable accommodation. The damage would be considered substantial if it is assessed above 25%. Compensation is paid only to the head of the family.

Supply of Sirkis for temporary help.—*Sirkis* are also provided to the deserving flood-affected persons.

Compensation for the loss of cattle and human life.— There is a provision of Rs. 10,000 as an *ex-gratia* grant for the loss of one person in a family due to drowning in flood water or due to house collapse in the heavy rains.

On the death of the following animals due to floods, collapse of house under the heavy rains, the gratuitous relief is given at the scale against each:—

Name of the Cattle	Rate of relief
	Rs.
He Camel/She Camel	1,000
Horse/Mare	1,000
Bullock/Buffalo	1,000
Cow	1,000
He donkey/She donkey	150
Mule	400
He Buffalo(more than three years of age)	700
He Calf/She Calf (upto 3 years of age)	100
Sheep/Goat	100

The above relief is admissible to those persons who cannot resort to insurance and are unable to bear the loss.

For the loss of standing crops.—The damage affected by the hailstorms is assessed on the basis of actual loss to the standing crops and the payment thereof be made for each damaged acre on the following basis :—

(i) Where the loss to the standing crops exceeds 75%	Rs. 400 per damaged acre
(ii) Where the loss to the standing crops exceeding 50% but does not exceed 75%	Rs. 300 per damaged acre
(iii) Where the loss to standing crops exceeds 25% but does not exceed 50%	Rs. 200 per damaged acre

An amount equal to 5% of the total amount given as compensation for hailstorm damage to the farmers in any village is given in cash to the agricultural workers of the village.

On the death of animals due to hailstorms, the same compensation is given as admissible in case of floods.

Financial relief in case of fire and lightning

In addition to workers of poorer classes, the relief is given to deserving petty traders and farmers (in rural and urban areas) who cannot resort to insurance and who are unable to bear the loss. The gratuitous relief to the fire and lightning sufferers is to be granted at the scale noted below :—

For the loss of personal property		Rate of relief
On first Rs. 2,000	..	50%
On next Rs. 3,000	..	25%
On next Rs. 5,000	..	15%
On next Rs. 5,000	..	10%
On next Rs. 15,000	..	7%
Above Rs. 30,000	..	Nil

The gratuitous relief is also granted to the damage caused to crops in the following kinds of eventualities :—

1. The Standing crops
2. The harvested and stacked crops

3. In case of loss by fire to the standing crops

The relief be granted per damaged acre as follows :—

1. Where the loss to standing crops exceeds 75%	Rs. 300 per acre
2. Where loss to the standing crops exceeds 50% but does not exceed 75%	Rs. 200 per acre
3. Where loss to standing crops exceeds 25% but does not exceed 50%	Rs. 100 per acre

In case of occurrence of loss to harvested and stacked crops by fire, relief is granted 20% of the total loss subject to a maximum of Rs. 6,000 in an individual case.

Damage to Crops by Electric Sparks.—Many cases have come to the notice of Government from the whole state where stacked crops/harvested crops were destroyed by electric sparks thereby causing a great loss to the farmers. In such eventualities S.D.O. (Civil) recommends to the Government the quantum of relief.

Financial Relief/Other help in case of drought.—Relief works such as major, medium and minor irrigation works, soil conservation, forests, roads and rural works are started on the occurrence of drought to provide gainful employment to the affected people. *Taccavi* and other sorts of financial help is provided to the people.

Fodder is also supplied on subsidised basis.

The distribution of financial relief in case of all the natural calamities is made by the Tahsildars and Sub-Divisional Officers (Civil) under the supervision of Deputy Commissioner.

The State of Haryana was adversely affected by drought during 1986-87, 1987-88 and by floods during 1988-89. With a view to give relief to the affected farmers whose crops were hit by these calamities, large scale financial assistance by Central as well as State Government was given to them. The assistance was provided in the form of subsidies on the cost of agricultural inputs such as seeds, fertilisers, weedicides etc,