CHAPTER IV.

AGRICULTURE AND IRRIGATION.

Land.—The district may be divided into four broadly marked tracts, of which the first three are comprised within the Sadar, Barh and Danapur subdivisions, while the fourth consists of the Bihar subdivision. These areas are : (*i*) the *diara* lands along the river Ganga; (*ii*) al ong narrow strip of high land along the banks of the Ganga; (*iii*) a broad belt of low-lying country south of the above upland strip; and (*iv*) the Bihar subdivision. In each of these tracts, agricultural conditions vary considerably, and therefore a brief account is given of each.

The *diara* lands, which are found in the bed of the Ganga, stretch along the whole of the north of the district. They are formed and destroyed, as the main stream of the river changes its course. When silt has been deposited, the soil of the *diara* is extremely fertile, and grows magnificent crops; but if its growth is arrested by the river altering its course so that the flood water does not cover it during the second stage of its formation, it remains sandy and barren. These *diara* lands are the most fertile in the district; they grow *bhadai* crops before the river rises and *rabi* crops in the cold weather, both yielding excellent harvests. In between cash crops such as vegetables, watermelons, etc., are also fully availed of.

The second tract is situated between the permanent bank of the Ganga and the low-lying tract to the south, and comprises all the land lying north of the Eastern Railway line throughout the breadth of the district, with the exception of a small area in the extreme north-west which is liable to inundation in the rains. In this tract *bhadai* and *rabi* crops are chiefly grown, though rice is also cultivated in some places, specially in the neighbourhood of the Patna-Gaya Canal between Khagaul and Danapur.

The third tract comprises the remainder of the Sadar, Danapur and Barh subdivisions and may be further subdivided into three separate areas. The western portion receives artificial irrigation from the canal running for about forty miles near the western border of the district, which serves the whole of the Pali and Bikram thanas and parts of of the Maner, Danapur, Phulwari and Masaurhi thanas. Further to the last the country is intersected by the Punpun and its affluents, the Morhar and the Dardha. These rivers are largely used for irrigation, but when the Ganga rises, their waters are forced back and the land is flooded. The third area consists of nearly the whole of the Barh subdivision and extends from the extreme east of the district to

the south of Patna City. The lands comprised in this belt of country, which are known as *tal* lands, are subject to annual inundation from the Punpun and other rivers, which meander from west to east on their way to the Ganga. To east, however, part of the Mokameh thana is served by irrigation works of the same kind as those constructed in the Bihar subdivision. The whole of this tract produces a comparatively small crop of *bhadai* and rice, but usually yields a good *rabi* harvest.

The Bihar subdivision is divided into the hills in the south and the low country to the north. The whole subdivision is intersected by streams, which in the hot and cold weather contain little or no water, but at the time of heavy rain are filled from bank to bank. The greater part is provided with a system of irrigation works intended to store and distribute the water. Reservoirs called *ahars* are built, some of which are filled with rain-water and natural drainage, while others are replenished by damming the rivers. A number of artificial channels convey the water from the rivers to the reservoirs, and other small channels conduct it to the fields of the cultivators. These irrigation works protect the greater part of the subdivision from any general failure of the crops by drought, but there are two exceptions to the general rule, *viz.*, the Islampur thana (116 square miles) in the extreme south-west, and the south-east corner of the Bihar thana. The former thana contains few efficient irrigation works, and the Phalgu river, which traverses this area, has silted up. Much of the land is high and sandy; while some of it consists of sterile soil, impregnated with carbonate of soda. The latter tract, which is comprised within the Ashthawan thana, has also lost the means of irrigation which it formerly possessed, owing to the silting up of its river channels.

Land Reclamation and Utilisation.—Patna is an extensively cultivated district in the State of Bihar. The following statistics show the utilisation of land at the time of the last Survey and Settlement Operations (1907—12)*:—

Total cropped area (in acres).	*Do fasli* (in acres).	Net cropped area (in acres).	Current fallow (in acres).	Culturable areas other than current fallow (in acres).	Area not available for cultivation (in acres).
13,49,283	3,26,098	10,23,185	42,342	34,066	1,40,972

**Patna Settlement Report* (1907—12), pp. 138-139.

The above statistics show that there was practically no land left for reclamation even about half a century ago. The culturable area other than current fallows includes old fallow, groves not fruit bearing and bamboos and culturable jungle, house-sites, wastes, etc., while area not available for cultivation. Of the total geographical area of the district about 81.2 per cent was found under net cropped area in course of the last survey.

It appears that there has been practically little change in the classification of land, except in the area of the double cropped land which has showed spectacular increase due to availability of artificial irrigation.

The following table shows classification of land of this district during 1964-65*:—

	Acres.
(1) Total area	13,85,024
(2) Forest	11,462
(3) Barren and unculturable land	24,613
(4) Land put to non-agricultural uses	2,29,452
(5) Culturable waste	1,851
(6) Permanent pastures and other grazing land ..	861
(7) Current fallows	36,456
(8) Other fallows	8,570
(9) Net areas sown	10,44,146
(10) Area sown more than once	5,42,188
(11) Total cropped area	15,86,334

Forest.—All actually forested area on the lands classed or administered as forest under any legal enactment dealing with forests, whether State-owned or private, is included under this head. If any portion of such land was not actually wooded, that portion is included under the appropriate heading of cultivated or uncultivated land. The percentage of the area under forest to the total area of the district is 0.8.

Barren and unculturable lands.—All barren and unculturable land like hills, etc., fall under this head. Land which cannot be brought under cultivation except at a prohibitive cost is also classed as unculturable waste irrespective of the fact whether such land is in isolated blocks or within cultivated holdings. The percentage of the area under barren land to the total barren and unculturable land of the district is 1.8.

*SOURCE.—*Annual Season and Crop Report* for 1964-65 published by the Directorate of Statistics and Evaluation, Bihar, pp. 50—53.

Culturable Waste lands.—Culturable area not cultivated for more than 5 years is classed under this category. The percentage of the area under this head to the total area of the State is 0.1.

Permanent pastures and other grazing lands.—This represents all grazing lands whether pastures or meadows. The percentage of the area under this head to the total area of the district is 0.4.

Fallow lands. They generally indicate all culturable area not cultivated during the year or not cultivated temporarily for a specified period, i.e., up to five years. Fallow lands are further classified as current fallow and other fallow. The former includes land lying fallow for a period of one year only while the latter includes lands lying fallow for more than one year and up to five years. The percentage of the area under the current fallow to the total area of the district is 2.7 and that of other fallow 0.6.

Total Cropped Area.—This consists of net area sown with crops and orchards and area sown more than once. The percentage of total cropped area to the total area of the district is 116.4.

Consolidation of holdings.—With a view to prevent further subdivisions and fragmentations of holdings, the State Government passed the Bihar Consolidation of Holdings and Prevention of Fragmentation Act, 1956 and the provisions of this Act were enforced in Ekangarsarai, Noorsarai and Islampur Blocks of this district since 1957, 1959 and 1960 respectively. For the purpose of consolidation, all these blocks are constituted into a single unit under the administrative control of a Consolidation Officer with his headquarters at Ekangarsarai.

The commencement of work starts with a notification of the areas where consolidation work has to be taken up and this is announced locally by beat of drum also, the effect being that thereafter no transfer of land can be registered without the permission of the Consolidation Officer. An Advisory Committee consisting of the representative of *raiyats*, under-*raiyats* and landless labourers is formed to assist the Consolidation Officer in fixing the market value of the land in the villages notified. An up-to-date record-of-rights and village maps are prepared in accordance with the procedure prescribed for Survey and Settlement Operations. After this the work is taken up with a view that

a *raiyat* should get substitute for the areas he parts with, as near to his main block of land as possible.

At present (1968) in Ekangarsarai Block, out of 113 villages, consolidation work has been completed in 102 villages. The total number of plots during the last Survey and Settlement Operations (1907—12) was 1,50,026, which rose to 2,13,125 in 1958 when the survey of lands was taken up by the Consolidation Officer. At present, the number of plots has been reduced to 1,21,193.* Out of a total of 65 villages in Noorsarai Block, consolidation work has been completed in 32 villages while in Islampur Block out of 91 villages, only 12 villages have been confirmed.

After some initial misgivings, the cultivators have now begun to appreciate the value of consolidation scheme as the consolidated plots have been brought under intensive cultivation with the help of tube-wells and the yield per acre is much larger than before. Our investigations reveal that people, by and large, are keen that the operations under this Act should be extended to those areas also where work has not yet been taken up.

IRRIGATION.

Rainfall.—Rains are the universal source of irrigation and success of crops largely depends on their adequacy and even distribution throughout agricultural operations. The district receives on an average 992.0 mm. or 39.05" of rain during a normal year. Out of this, the summer rain from the south-west monsoon accounts for about 87 per cent while the remaining 13 per cent is winter rain.†

Agricultural operations normally start during *Rohini Nakshatra* (last week of May to 1st week of June) when *bhadai* crops are sown. Paddy seedlings are sown in early *Adra* (middle of June) and transplantation of paddy normally starts in *Purva Nakshatra* (middle of July) and ends by end of August. The rains have to be adequate right from the time when seedlings are sown in the ground till transplantation is over and then light showers should be intermittent and ultimately the *Hathia* should give plenty of rain to enable paddy crops to mature and also give sufficient moisture to land so that *rabi* crops may be sown in it. Periodic rains from December to February are also essential for a good *rabi* harvest.

*The figures have been supplied by the Consolidation Officer, Ekangarsarai.

†For details *see* "Rainfall" in Chapter I.

Artificial Irrigation.—Rainfall cannot be depended upon as an unfailing source of irrigation. Therefore, artificial irrigation supplements rainfall in varying degree for the success of agriculture. The water resources of the district consist in rivers (most of them except the Ganga almost dry up in summer), artificial reservoirs (*ahars*), channels (*pynes*), embankments* and wells including tube-wells. The soil of a large portion of this district does not retain moisture well. The slope of the district, from south to north, makes the rain water run into the *tal*, extending from Patna to Mokameh south of the railway line and, therefore, conservation of water is essential.

The irrigated areas of this district are proportionately larger than those in other parts of Bihar except Shahabad. At the time of the last Survey and Settlement Operations (1907—12), the percentage of irrigated area to cropped area was 59.6.† At that time the sources of irrigation and the areas irrigated were as follows :—

Sources.	Areas irrigated (in acres).
Government canals	23,982
Private canals	2,32,156
Tanks and *ahars*	2,61,363
Wells	73,133
Other sources	52,929
Total ..	6,43,563

In the post-Independence period with the development of power in rural areas electrically operated tube-wells have become a major source of irrigation. The gross irrigated area in the district increased from 6.26 lakh acres in 1951 to 6.52 lakh acres in 1961, an increase of 4 per cent in a decade‡.

*In 1937-38 when the question of the abolition of Zamindari was mooted by Government, the ex-landlords who had maintained the *ahars*, *pynes* and embankments over past centuries, became indifferent to them and by 1950 when the Zamindari was in fact abolished, these irrigational sources had mostly fallen into disuse.

†J. F. W. James: *Patna Survey and Settlement Report* (1907—12), p. 15.

‡*District Census Handbook, Patna*, 1961, p. Lii.

The following table shows net area irrigated during 1963-64 and 1964-65:*—

Sources.	Areas irrigated.	
	1963-64 (in acres).	1964-65 (in acres).
Government canals ..	1,36,495	1,22,311
Private canals ..	1,723	41
Tanks ..	81,708	59,384
Tube-wells ..	1,48,202	1,22,453
Other wells ..	49,686	60,091
Other sources ..	2,62,051	3,04,884
Total ..	6,79,865	6,69,164

Government Canals.—The Government canals consist of the Patna-Gaya canal and its distributaries, which form a part of the Son canal system. The Patna-Gaya canal branches off from the Main Eastern Canal four miles below the anicut which crosses the Son between Barun and Dehri. It enters Patna district a little beyond Arwal, at the forty-third mile from its offtake. For some distance it runs parallel to the course of the Son; it then turns to the east, passing Bikram and Naubatpur to Khagaul, following an old bed of the Son, roughly parallel to the ancient road from Patna to Delhi. From Khagaul it flows into the canal at Digha, 79 miles from its head. It is connected with the river at Digha by a lock; but the course of the Ganga is here variable, and during the dry season there is often only the sandy bed of the river beneath the lock, so that thorough navigation may be possible only when the river is high during the monsoon. The length of the canal in Patna district is 42¼ miles, that of the parallel channels is 24 miles, and of the distributaries is 160 miles. The Maner distributary acts as a flood bank which protects the Danapur Cantonment areas from floods.

The canal, which was opened in 1877, was designed to irrigate the area between the Son and the Punpun. It commands a total area of over 4,00,000 acres. The greater part of the supply of water is utilized for the irrigation of the rice and sugarcane crops. Some water is also used for wheat and other *rabi* crops.

*Source.—*Annual Season and Crop Report*, 1964-65, published by the Directorate of Statistics and Evaluation, Bihar, pp. 54-55.

The irrigated area is divided into blocks, the lease of all the lands in each block being arranged so as to lapse in the same year; and in fixing the period of the leases efforts are made to see that leases for an equal area expire each year. Water is supplied to the cultivators on application on a prescribed form, the year being divided into three seasons, *viz.*, hot weather, *kharif* and *rabi*. A date is fixed for each season, and the lease or permit granted for that season is only in force for that particular period. Besides these season leases, there are long-term leases, or leases for a period up to ten years, which are granted at a somewhat reduced rate*.

The following rates are charged with effect from 1st July, 1966 for the supply of water for the purpose of flow irrigation† :—

Class of lease.	Water supplied.		Rate per acre.	To be paid on or before.
	From	To		
			Rs.	
Long term ..	25th June ..	25th March ..	15	31st January.
Kharif seasonal ..	25th June ..	25th October	16	31st January.
Single *Kharif* watering ..	25th June ..	25th October	9	On demand.
Rabi season ..	26th October	25th March ..	9	31st May.
Hot weather ..	26th March ..	24th June ..	28	30th September.
Hot weather ..	25th February	25th May ..	28	30th September.
Hot weather single watering	26th March ..	24th June ..	10	30th September.
Rabi single watering on *Kharif* leased area.	1st November	End of February	8	31st May.
Hot weather paddy ..	February ..	15th May ..	8	On demand.

Private Canals.—Private canals or *pynes* though by no means unknown elsewhere, are more common in Patna than in other districts of Bihar. The

*Patna District Gazetteer (1924), pp. 96—98.

†Source—State Government notification no. J/R8-2022/65-I-13841, dated 1st July, 1966.

rivers which come into the district from Gaya usually contain little or no water in the dry season, but are full from bank to bank in the rains. In some instances they divide into two or more streams, and thus facilitate the utilisation of their water for irrigation. More or less roughly constructed, canals take off from the river banks at favourable points, and distribute the water over the country. When a flood comes down the river it fills the canals; but in September, if rain fails, dams are constructed across the streams in order to bank up the water, and turn it into the *pyne*. When a *pyne* is full, the dam is cut, and the stream rushes down to the next dam and fills the next *pyne*. These canals are chiefly found in the Bihar subdivision and the two largest are twelve miles south-east of Bihar.

On abolition of Zamindari, Government have taken over the private canals.

Ahars.—An *ahar* is a U-shaped or rectangular tank, which is supplied with water by a *pyne*, or by an artificial catchment basin placed across the line of drainage. Embankments are built on three sides of the rectangle, the highest bank being at the end where the water would ordinarily emerge, while one side is left open to allow the water to enter. If a small *ahar* is built across a drainage channel, a narrow cut is made at the deepest end to let out surplus water; if the *ahar* is a large one, a weir is made for this purpose, so that the water may escape and fill other *ahars* lower down. The water flows through a weir from the *ahar* to the channels leading to the field; when the water is low it is taken from the *ahar* by means of the lifting arrangements described below.

Embankments.—*Gherabandi* is the name for the series of embankments which prevent the water from escaping from the fields. The *gheraw* or outer embankment is about four feet high ; within is a series of smaller embankments, and last of all are the ordinary *ails* round individual fields.

Wells.—Wells are commonly used for irrigation in the high land to the north, and for *rabi* crops in the *tal* land. They are also used for irrigating the land in the neighbourhood of the village sites. Garden produce is almost always irrigated from wells, with an intricate series of water channels leading from the well to the plots to be irrigated.

Lifting arrangements.—The *latha* is a long beam working on an upright forked post which serves as a fulcrum. The beam is weighted at one end with a log or a stone, and a cone-shaped bucket (*kunri*) is attached by a rope to the other end. The cultivator pulls down the rope till the bucket is immersed, the weight attached to the level then lifts it, and the bucket is emptied into the water channel.

Bullock-runs.—Bullock-runs are most commonly used for irrigating from wells in the west of the district. A large leather bucket is fastened to a rope which passes over a pulley supported by a forked post, and is attached at the other end to the yoke of a pair of bullocks. An inclined plane is dug on the far side of the well, down which the bullocks run when the bucket is filled, and so bring it to the surface. The bucket is emptied into the water channel; the bullocks, now free of weight, climb up the inclined plane, the bucket is again lowered into the well, and the process described is repeated.

Karin.—The *Karin* is a water scoop shaped like a "dug-out" canoe cut in half. It is usually made of a single piece of wood, but iron *karins* are by no means uncommon. The broad open end rests on the water channel which is to irrigate the fields, and the pointed end is dipped into the reservior. The water is raised by a lever overhead with a weight at the end of it. The *karin* is used for raising water from *ahars* or from a lower channel to a higher, where water is plentiful, and has not to be lifted to a considerable height.

Chanr.—The *chanr* is a bamboo basket with raised edges. It has cords attached on both sides which are held by two men. These men swing the basket backwards and then bring it sharply down into the water, carrying the swing on till the basket reaches the level of the water channel by which the field is to be irrigated.

Water cannot be raised to a very great height by the *karin* or *chanr*, and when the level of the reservoir is low, a succession of such appliances is often necessary to lift it to the height required. Irrigation is not easy work in Patna. Even when the means of irrigation are supplied, the utmost industry is required from the *raiyats* who make use of them to raise the water to the level of their fields.

The following table shows the irrigation schemes completed in the district with details of cost, irrigable areas, irrigation potential and utilisation till 1964-65*:—

Serial no.	Name of the scheme.	Estimated cost (Rs. in lakh).	Total irrigable area ('000 acres).	Potential created up to 1964-65 ('000 acres).	Potential utilised up to 1964-65 ('000 acres).
	Schemes already completed—				
1	Patna Canal (Part of Sone Canal)	35.76	1,14.00	1,14.00	1,14.00
2	Patna-Barh-Ekangarsarai-Bihta Emergency River Pump and Technical Co-operation Administration Scheme.	69.83	38.64	38.64	38.39

*Source.—*Master Plan of Irrigation in Bihar* (1960), p. 4 and Reports of Irrigation Department.

Serial no.	Name of the Scheme.	Estimated cost (Rs. in lakhs).	Total irrigable area ('000 acres).	Potential created up to 1964-65 ('000 acres).	Potential utilised up to 1964-65 ('000 acres)
3	Desilting of Bhaisalotan Gopalpur *pyne*.	0.80	7.00	7.00	7.00
4	Panchane Irrigation Scheme	3.36	10.00	10.00	10.00
5	Kulti Irrigation Scheme ..	9.18	8.50	8.50	8.50
6	Sakri Lower Valley (Part) ..	7.46	10.00	10.00	10.00
7	Bharthua Nandan Irrigation Scheme.	6.98	12.00	12.00	12.00
8	74 Tube-wells part of 350 Tube-wells under 1952 T. C. A. Programme in Bihta-Bihar area.	36.82	18.50	18.50	17.40
9	Sirnawa Irrigation Scheme ..	8.19	11.09	11.00	11.00
10	Lokain Irrigation Scheme ..	5.54	28.00	28.00	28.00
11	20 Tube-wells of 35 Tube-wells under 1953 T. C. A. Programme Part.	9.91	5.00	5.00	4.50
12	Sakri Phase II Scheme (Part)..	4.00	2.00	2.00	2.00
13	Panchane Irrigation Scheme (Phase II).	44.11	30.64	30.64	30.64

The following table shows the schemes under execution in 1964-65*:—

Serial no.	Name of the scheme.	Estimated cost (Rs. in lakhs).	Total irrigable area (000 acres).	Potential created up to 1964-65 (000 acres).	Potential utilised up to 1964-65 (000 acres).
1	Sone Barrage Project (Part) ..	3,35.00	80.00	80.00	80.00
2	New Tube-wells	5.25	0.30	0.30	0.30
3	Udresthan Scheme ..	95.98	47.00	47.00	47.00
4	18 New Tube-wells ..	14.00	8.00	8.00	8.00
5	Karaba Irrigation Scheme ..	5.29	2.80	..	..
6	Goithwa Irrigation Scheme ..	9.78	15.00	..	..
7	Sansi Irrigation Scheme ..	2.04	1.05	..	..

*Source.—*Master Plan of Irrigation in Bihar* (1960), p. 4 and Reports of Irrigation Department.

Medium Irrigation Schemes.—A number of Medium Irrigation Schemes have been taken up and executed in the district to ensure a regular source of water-supply. The schemes are intended to assure irrigation to paddy and other crops. A medium scheme normally costs above Rs. 5,000 and is capable of irrigating more than 100 acres of land. Its success depends on rainfall and suitable catchment area. A dam has to be fixed up for holding the water.

The Medium Irrigation Schemes executed in the district till 1965 are given in Appendix I at the end of this chapter.

Unified Minor Irrigation Schemes.—Prior to 1960, the irrigation schemes in the district were carried out by three separate agencies, namely, Revenue Department since 1948; the Agriculture Department since 1946; and the Community Development Department since 1954-55. Since 1960 these works are carried out by one agency, namely, the Unified Minor Irrigation Division under the Agriculture Department.

The Unified Minor Irrigation Division since 1960 has taken up 501 schemes out of which 442 schemes had been completed up to August (1965). About 13,276 acres of land are claimed to be irrigated by these completed schemes and after the completion of all the schemes 16,276 acres would be benefited*.

The following Table shows the subdivisionwise break-up of these schemes :—

Name of the subdivision.	Number of schemes.	Estimated cost in Rs.	Area in acres expected to be benefited.
Danapur	53	2,24,575	1,533
Biharsharif	196	2,23,721	5,156
Barh	88	3,45,742	4,742
Sadar including Patna City	164	5,05,261	4,845

Lift Irrigation Division.—The main function of this division is to irrigate fields by tube-wells run by electricity on a prescribed charge. There is an Executive Engineer to look after its working in the four subdivisions of the district. He is under the direct control of the Chief Engineer, Irrigation Department, Patna. There are four Assistant

*Source.—Unified Minor Irrigation Office, Patna.

Engineers and eight Sectional Officers under the Executive Engineer. The following are some of the important schemes of this division:—

Patna-Bakhtiarpur-Bihar-Ekangarsarai-Bihta Scheme.—This scheme was taken up in 1945 as "Post-war Grow More Food Campaign Scheme". Its construction began in 1946 and was completed by 1955. There are 144 tube-wells in this scheme, each well having an irrigation potential of 450 acres. About 40,154 acres of land were being irrigated by 1964-65.

Technical Colombo Aid Programme, 1952.—This scheme was taken up in 1952, but the construction was started in 1954 and completed finally in 1957. There are 74 tube-wells each well having an irrigation potential of 450 acres. By 1964 about 15,906 acres of land were being irrigated.

T.C.M. Programme of 1953.—This scheme is known as Technical Co-operative Mission Programme forming part of the American sponsored Economic Project. There are 35 tube-wells in this scheme. The irrigation potential of each tube-well is 450 acres and by 1964-65 about 2,588 acres of land were being irrigated.

15 *New Tube-well Scheme.*—This is a supplementary scheme and the construction was taken up in 1960 and finally completed in 1963. There are 15 tube-wells under this scheme and each having an irrigation potential of 450 acres. 2,170 acres of land were being irrigated by 1964-65.

Hundred Tube-well-Technical Colombo Aid Bihar and Bihta Scheme.—This was executed in 1953. Out of 100 tube-wells under this scheme 74 are under Lift Irrigation Division, Patna and 26 under Arrah Division. In 1964-65, 7,886 acres of land were being irrigated in this district.

The statement below shows the revenue collected by the Lift Irrigation Division from 1955-56 to 1964-65*:—

Year.	Revenue in rupees.
1955-56	6,41,517
1956-57	6,89,342
1957-58	7,92,348
1958-59	4,97,929
1959-60	4,32,162
1960-61	4,92,163
1961-62	4,37,588
1962-63	4,93,603
1963-64	5,07,699
1964-65	5,72,237

*SOURCE.—Lift Irrigation Department, Patna.

The fluctuations in revenue is due to the fact that in years of sufficient and well-timed rainfall people do not usually purchase water and accordingly the revenue decrease.

The statement below shows the rates of water purchased by cultivators during 1964-65*:—

Season.	Period.	ature of crops.	Number of waterings.	Rate (in Rs.)
Kharif ..	25th June to 25th October.	Paddy, *marua* and *kodo*	3 waterings ..	9.00
			Single watering ..	4.75
	26th October to 25th March.	Wheat, barley and gram	2 waterings ..	6.00
Rabi ..	Ditto ..	Chillies and tobacco ..	Single watering ..	7.00
	Ditto	Early potato ..	4 waterings ..	4.20
	Ditto ..	Double potato ..	9 waterings ..	34.00
	Ditto ..	Late potato ..	6 waterings ..	23.00
Hot weather	26th March to 24th June.	Crop other than Sugarcane.	2 waterings ..	7.00
	Ditto ..	Sugarcane ..	3 waterings ..	19.00

*SOURCE.—Lift Irrigation Division, Patna.

The following table shows the areas irrigated from tube-wells* :—

Area irrigated from Tube-wells.

Name of scheme.	Number of tube-wells working with location.	Area irrigated (in acres).									
		1955-56.	1956-57.	1957-58.	1958-59.	1959-60.	1960-61.	1961-62.	1962-63.	1963-64.	1964-65.
1. P. B. B. E. B. Scheme.	103 (Bihar, Bihta, Ekangarsarai and Barh.	34,201	30,415	37,109	35,313	35,796	34,861	34,957	40,862	39,759	40,154
2. T.C.A. Programme.	74 (Barh, Mokameh, Ekangarsarai, Bihar and Bihta).	10,211	11,142	16,833	13,248	11,298	11,505	12,951	15,615	14,904	15,906
3. T.C.M. Programme.	20 (Ekangarsarai) ..	3,205	3,617	4,509	3,567	2,406	2,462	3,091	2,669	3,357	2,588
4. 15 New Tube-wells Scheme.	15 (Bihar) ..	Nil	Nil	Nil	Nil	30	..	23	1,091	1,776	2,170
5. Construction of T. C.A. Schme.	74 (Patna) ..	312	561	323	3,211	3,256	4,618	7,812	8,412	7,415	8,912

*SOURCE.—Lift Irrigation Division, Patna.

Mokameh Tal Drainage Scheme.—A tract of land, about 410 square miles on the south of Eastern Railway extending from Patna to Lakhisarai in varying width of 4 to 11 miles and about 65 miles in length, remains submerged under water during monsoon. The low-lying area below 150 feet contour is known as *tal* and has different local names, of which Mokameh *tal* is an important one. It is joined at different places by numerous rivers, e.g., Sakari, Panchane and Mohane which generally flow from south to north. The total drainage area combined of all the rivers is about 5,150 square miles.

The entire *tal* area comprises of about 30 square miles of high land, 70 square miles of land which produces double crop and 310 square miles of *rabi* lands. It has been proposed to drain off this *tal* area during the Third and Fourth Five-Year Plan period and develop it for agriculture purpose. The plan for development envisages the construction of the following works :—

(*a*) For quick drainage of the *tal* area—

(*i*) Construction of drainage channels linking the *tal* pockets with the river Ganga ; (*ii*) remodelling the existing spill channels (locally known as *pyne*) which connect the *tal* pockets with the adjacent rivers ; and (*iii*) provision of new spill channels.

(*b*) For checking the entry of flood waters of the river Ganga into the *tal* pockets—

(*i*) Construction of an anti-flood sluice on each of the proposed drainage channels on Ganga side ; and (*ii*) construction of an anti-flood sluice at the river Harohar near Balgudraghat.

(*c*) For checking the entry of winter floods of Punpun and other rivers into the *tal* areas —

(*i*) Construction of an anti-flood sluice on both ends of the Dhawa link channel which connects Fatwa *tal* with Dhawa and Punpun river; and (*ii*) construction of regulator at the junction of each spill channel with the adjacent river.

(*d*) Construction of a new ring bund as well as strengthening the existing ones for protecting paddy in the double-cropped areas.

The main problem of utilising properly this *tal* area is to see that the flood water is regulated and properly utilised. Unrestricted water of

high floods damages the crops. It is also necessary to drain out water for particular emergencies. The existing spill channels do not connect the different pockets of the *tal* areas with adjacent rivers, such as Dhawa, Mohane, Harohar, etc., and play the dual role of draining the water of the pockets into the adjacent rivers as well as allowing the river water to enter the pockets. The spill channels, either due to silt or scour, are not good enough for proper drainage of the pockets. There is no regulatory arrangement at the junction of the spill channels with the rivers. *Rabi* crops are often damaged by winter flood.

The problem has been engaging the attention of the Irrigation Department and a comprehensive scheme has been prepared, dividing the *tal* areas into seven zones, viz., Fatwa, Bakhtiarpur, Barh, More, Mokameh, Barhaiya and Singhaul (the last two are in Monghyr district). The total estimated cost of the proposed scheme is Rs. 258 lakhs. It is expected that on completion of the scheme, an area of 2,44,000 acres will be benefited. The extra yield is expected to be 50,000 tons.

Soil.—Four classes of soils are found in this district : (1) *Kewal*, which contains about seventy per cent of clay ; (2) *doras*, which is half clay and half sand ; (3) *balsundri*, in which sand preponderates over clay ; and (4) *diara* land, which may be either *doras* or *balsundri* (usually the latter), but which is enriched every year by a deposit of silt. Besides these, there are some places where a white soil called *rehra*, is found. It is rendered more or less sterile by being impregnated with carbonate of soda (*reh*).

Kewal soil, which is a species of hard stiff clay, opening out when dry in gapping fissures, is cultivated with rice; but it is also suitable for *rabi* crops, as it retains moisture for a long period and *rabi* has to depend, to a great extent, on sub-soil moisture. One variety of *kewal* in the Barh subdivision, known as *tal* land, remains submerged during the rains to grow rice. The main produce is rich *rabi* crop.

Doras soil, when low-lying, produces rice and *rabi* crops ; while *bhadai* and *rabi* crops, such as maize and *arhar*, are raised on it, if it is in the uplands. The richest *doras* soil consists of what is known as the *bhith* or *dih* land, i.e., the belt near the village homestead, which is better manured and more carefully cultivated than land at a distance. Here well irrigation is largely practised and the most valuable crops, such as spices, potatoes and vegetables, are grown extensively.

Balsundri soil is a sandy loam, which grows *bhadai* and *rabi* crops, such as *marua* and barley ; and the same crops are raised on *diara* lands, but the favourite crop in the latter is the castor plant*.

Patna District Gazetteer (1924), p. 83.

Pricipal Crops—The crops of the district fall under three main harvests, the *aghani, bhadai* and *rabi*. The *aghani* is the winter crop which is harvested in the month of *Aghan* (November-December) and is composed mainly of winter paddy. The *bhadai* is the early or autumn crop reaped in the month of *Bhado* (August- September) consisting of the variety of 60 days paddy (*sathi*), sugarcane, *marua*, maize, millets and other less important grains. The *rabi* crop includes cold weather crop like wheat, barley, gram and pulses, etc.

If the crops are divided into the classes usually adopted in the statistical returns, we find that out of the total cropped area of 15,26,742 acres in 1963-64, rice accounts for 6,89,343 acres, cereals and pulses 5,26,054 acres while the oilseeds occupy 6,745 acres. The area under the other pulses was 6,46,062 acres, gram 1,63,398 acres, sugarcane 19,321 acres and condiments and spices 3,908 acres*. Rice is the staple food of the district. It is mostly grown in the Bihar subdivision which has low-lying land suitable for paddy. The canal belts in southern part of the Danapur subdivision also grow bumper paddy crops. The Barh subdivision is better adapted to the cultivation of *rabi* crop and grows little rice.

Rice.—It occupies an area of 6,50,080 acres and *aghani* or winter rice forms the greater part of the crop, being an area of 6,48,798 acres or 37.8 per cent of the total cropped area in 1963-64. The seeds are broadcast after the commencement of the rains in June or July on lands selected for seed nurseries which have previously been ploughed three or four times and the seedlings are transplanted. The *Hathia* rains are the most important for *aghani* rice and are required to mature the rice plant if sufficient irrigation water is not available. The *bhadai* rice, which covers 1,195 acres is also sown broadcast in June or July and not transplanted. There is another kind of rice, known as the *boro* or spring rice, which is sown in January and transplanted after a month and cut in April but it is insignificant. It is grown only on marsh lands and in the beds of shallow streams, and the area in 1963-64 was only 87 acres**. A noticeable feature of rice cultivation is the way in which it is conducted scrupulously according to *nakshatras*. The seed beds throughout the district are

*SOURCE.—District Agriculture Office, Patna.

**A summer variety of rice, known as Tai-chun has been introduced in this district and on account of its high yield progressive cultivators are growing it in low lands which contain some moisture and also enjoy some benefit of surface irrigation. It ripens in about 90 days and is harvested before the onset of the monsoon.

sown within a period of 15 days in the *Adra Nakshatra* which lasts for about 15 days from about 20th June to the 5th July (approximately). The water in the field is drained out in *Utra Nakshatra* (from about the 12th to 28th September), a period when there is a little rain. It is a general custom to keep the field watered and wet during the *Chitra Nakshatra* (from about the 8th to 20th October). At the commencement of *Swati Nakshatra* (from about the 21st October to 3rd November) they are against drained out and the plants are left to mature till the *Baisakhi Nakshatra* (from about the 26th April to 10th May). The yield is about 30 maunds per acre of early paddy and 25 maunds of late paddy. The straw is used as fodder and for thatching houses.

Bhadai crops.—The *bhadai* crops require plenty of rain with interval of bright sunshine to bring them to maturity and constant weeding is necessary for a good harvest. The time of sowing depends on the advent of the monsoon. If there is early rainfall, they are sown in the beginning of June ; but they can be sown as late as the middle of July without the crop being lost. Harvesting usually extends from the 15th July to the 15th October.

Maize.—The principal *bhadai* crop is maize known locally as *makai* or *janera*, which was grown on 42,321 acres in 1963-64 in the district. It is sown in June and July and harvested in August and September. Maize is usually poor man's food, being consumed in the form of powder (*sattu*), while the cobs are also parched and form a favourite article of diet. The average yield per acre during 1963-64 was 11.62 maunds.

Marua.—The *bhadai* crop most extensively grown after maize is *marua*, which was grown on 10,390 acres in 1963-64. This is a valuable millet, which is grown at the commencement of the rainy season and cut at the end of it. It is partly sown broadcast and partly transplanted. This is largely consumed by the poorer classes in the form of *sattu*, or is converted into flour and made into a course bread ; when the rice crop fails, it supports them till the spring crops have been harvested.

Jowar.—It is another valuable millet which is grown in 1,314 acres. It is sometimes called *jinora* or *janhari*. The average yield per acre during 1963-64 was 7 maunds.

Kodo.—It is another millet sown on poor lands early in the rains and reaped after they are over. It is cheaper than rice and is popular among the poorer classes.

Rabi Crops.—Ploughing of the fields for the *rabi* crops commences early in the rains and is continued at intervals. In the case of clayey soils in unirrigated parts, more frequent ploughing is necessary for all *rabi* crops, because otherwise the soil would become so hard that, if there was no rain at the sowing time, the crop could not be sown. The time of sowing *rabi* is generally regulated by the amount of rain during the *Hathia Nakshatra* (roughly 26th September to 7th October). If sown too late, the plants will not become strong enough to resist the cold ; if sown too early, the heavy rain will probably drown the seed and sprouting crop and thus necessitate re-sowing. The general practice is that the proper time for sowing the *rabi* crops is the *Chitra Nakshatra* (roughly 8th to 20th October) and that it must not be delayed beyond the *Siwati Nakshatra* (roughly 21st October to 3rd November). A sufficient supply of water is essential at this time ; later on several waterings are required, and if there is no rain, the crops have to depend on well irrigation. They are finally harvested between the last week of February and the middle of April. The crop requires great care, and must be frequently irrigated.

Wheat.—It occupied 1,07,226 acres in 1963-64 in the district. Sowing begins in October, the seed being sown broadcast or by means of a seed drill, called *chura* attached to the plough; and the crop is harvested in March. The average yield per acre during 1963-64 was 9.28 maunds.

Barley.—It was grown on an area of 26,293 acres in 1963-64, mostly on the sandy loam called *balsundri*. Sowing takes place in November, after the soil has been prepared by ploughing and has been manured with ashes and cow-dung when they are available. The crop is usually not irrigated if there are timely showers, but in a dry season it may receive a few waterings from some adjacent well. It is, as a rule, ready for harvest in April. The average yield per acre during 1963-64 was 11.14 maunds.

Gram.—The other class of *rabi* crops consists of pulses, of which gram is by far the most extensively grown, its area being 1,23,702 acres in 1963-64. This pulse is eaten in all stages of its growth. The young leaf is eaten and the grain is split and converted into *dal* or pounded into the *sattu*. The average yield per acre during 1963-64 was 5.16 maunds.

Among other *rabi* crops may be mentioned peas, *kurthi* and various pulses and lentils such as *arhar* or *rahar* and *khesari*. The areas under these crops in 1963-64 were 6,77,321 acres.

Oil-seeds.—They occupy an important place among *rabi* crops, the chief one being linseed which was grown on an area of 6,234 acres in

1963-64. It is always sown either separately or with wheat and gram. The other principal oil-seeds are mustard and rape which were grown on 6,745 acres. The average yield of rape, mustard and linseed per acre during 1963-64 was 4.73 maunds and 3.70 maunds respectively.

Castor.—The castor plant is a special crop of *diara* lands. There are two varieties, one large and the other small. The former is sown mixed with *bhadai* crops, while the latter is a *rabi* crop sown in September and reaped in May. It is reported to yield 4 to 6 maunds per acre. It was grown in 1,931 acres in 1963-64. The average yield per acre during 1963-64 was 7.21 maunds.

Other Crops.—Tobacco was grown only on an area of 637 acres and is of little economic importance. Of the other food crops by far the most important are chillies, sugarcane and potatoes.

Sugarcane.—It was grown on an area of 16,380 acres in 1963-64. It is one of the most profitable crops grown in the district. It is a crop which not only exhausts the soil, but occupies the ground for a long period, extending over a year. It is planted during February or March. When the plant begins to sprout, it is well watered and the surrounding earth is loosened. Each plant grows into a cluster or canes, which are generally ready for cutting in January or February. The average yield per acre during 1963-64 was 16.98 tons.

Chillies.—Chillies are cultivated widely, but more in Barh subdivision*. The crop needs uplands and sandy loamy soil. In 1963-64 it was grown over an area of 8,561 acres with an yield of 4,257 tons.

The following table shows the area sown and outturn of different crops in tons from 1957-58 to 1963-64** :—

Years.	Area in acres.	Outturn in tons.
	Rice.	
1957-58	6,28,000	1,71,000
1958-59	6,12,000	2,26,000
1959-60	6,11,000	2,06,000
1960-61	6,50,000	2,98,000
1961-62	5,92,258	2,34,820
1962-63	6,59,342	2,91,000
1963-64	6,60,539	2,91,443
1964-65	6,47,028	2,97,997

*There are about ten *golas* for chillies in Barh and Mokameh towns.

**The figures of all crops from 1957-58 to 1960-61 have been taken from *Bihar Statistical Hand-books*, 1957 (pp. 43, 45), 1958 (pp. 35, 36), 1959 (pp. 41, 43), 1960 (pp. 35, 37) The figures for 1961-62 (p. 58), 1963-64 and 1964-65 have been noted from *Annual Season and Crop Report*, 1961-62 (p. 58), 1964-65 (pp. 60—71 and 92—95), respectively.

Years.	Area in acres.	Outturn in tons.
Wheat.		
1957-58	68,000	20,000
1958-59	92,000	37,000
1959-60	1,12,000	33,000
1960-61	1,07,000	34,000
1961-62	1,29,375	45,197
1962-63	1,18,219	62,481
1963-64	1,04,844	35,741
1964-65	97,771	32,109
Barley.		
1957-58	23,000	5,000
1958-59	25,000	11,000
1959-60	28,000	6,000
1960-61	26,000	6,000
1961-62	29,456	9,014
1962-63	30,109	10,424
1963-64	25,194	10,310
1964-65	25,827	8,444
Gram.		
1957-58	1,19,000	23,000
1958-59	1,28,000	31,000
1959-60	1,36,000	35,000
1960-61	1,94,000	37,000
1961-62	1,42,977	30,078
1962-63	1,51,321	39,428
1963-64	1,17,172	22,210
1964-65	1,08,722	37,023
Maize.		
1957-58	49,000	17,000
1958-59	63,000	21,000
1959-60	54,000	22,000
1960-61	60,000	29,000
1961-62	64,542	25,440
1962-63	49,327	32,412
1963-64	63,753	27,205
1964-65	53,655	22,508
Sugarcane.		
1957-58	11,000	1,88,000
1958-59	14,000	2,75,000
1959-60	15,000	2,64,000
1960-61	16,000	3,32,000
1961-62	18,135	3,51,094
1962-63	17,109	3,72,414
1963-64	11,663	1,94,539
1964-65	13,029	2,14,066

Years.	Area in acres.	Outturn in tons.
Marua (Ragi).		
1957-58	2,000	Not available.
1958-59	Not available	Ditto.
1959-60	Ditto	Ditto.
1960-61	Ditto	Ditto.
1961-62	Ditto	Ditto
1962-63	10,029	4,561
1963-64	6,560	2,169
1964-65	5,496	1,903
Chillies.		
1957-58	8,000	2,000
1958-59	9,000	3,000
1959-60	11,000	3,000
1960-61	9,000	3,000
1961-62	663	927
1962-63	7,142	3,541
1963-64	7,972	2,601
1964-65	8,196	3,592
Pulses including peas.		
1957-58	3,48,000	69,000
1958-59	4,71,000	1,10,000
1959-60	4,78,000	1,39,000
1960-61	5,30,000	1,35,000
1961-62	6,41,070	1,43,959
1962-63	6,27,214	1,57,457
1963-64	6,41,826	1,50,433
1964-65	6,40,637	1,41,254

Rotation of Crops.—The cultivators are traditionally conscious of the beneficial effects of rotation of crops to conserve the fertility of soil and to remove the insects and pests from it. Crop rotation also controls the incidence of crop diseases and growth of weeds. A great part of the land growing winter rice bears that crop year after year, but sometimes a second crop of *khesari* is raised, or if the land continues moist until the harvest time, it may be ploughed and sown with gram and peas or barley. The *bhadai* crops of early rice, maize and millets are also followed by a mixture of various pulses and oilseed with wheat and barley. The mixture of pulses and cereals serving the purposes of rotation enriches the soil with nitrogen. From time immemorial mixed cropping is in practice in the district. The most popular practice is to sow the mixed

crops broadcast and the seeds are sown in rows or on borders. The following are types of mixed cropping* :—

(*a*) Sown broadcast	..	(1) Wheat and/or gram and/or barley. (2) Barley and gram. (3) *Masoor* and peas.
(*b*) In rows	..	(1) *Masoor* and linseed. (2) Linseed, gram and wheat.
(*c*) In borders	..	(1) Linseed and gram plus wheat or gram and wheat.

Seed-rates (in seer) per acre for different crops in the district (1963-64).

Crops.	Maximum.	Minimum.	Mean.
Paddy	45	35	40
Khesari	30	25	27
Wheat	45	40	42
Gram	35	25	30
Barley	40	30	35
Linseed	5	4	5

Agricultural Implements.—The primitive and indigenous implements are still largely used. Attempts are being made to introduce better implements through the Agriculture Department.

The approximate cost of an indigenous plough with necessary accessories is Rs. 35 to Rs. 40. The other implements used are spade, sickle and *khurpi*. The Agriculture Department has introduced a set of new improved implements such as senior and junior Bihar plough, *Sukhda* plough, junior ridging plough, etc. But they are yet to become popular. Some of the other new implements in use are Japanese paddy weeder, cutter for fodder and maize-shaker.

Improved Implements.—The following statement shows the use of improved scientific implements used by cultivators in this district during 1967-68** :—

1. Improved Plough	222	numbers.
2. Cultivators (Weeders)	20	,,
3. Other (Japanese Weeders Hoe, etc.)	428	,,
4. Hand Sprayers	339	,,
5. Hand Dusters	104	,,

*District Agriculture Office, Patna.

**SOURCE.—Deputy Director of Agriculture, Patna.

The statement below gives comparative picture of the agricultural implements in the district* :—

Years.	Wooden ploughs.	Ploughs.	Tractors.	Oil engines.	Electric Pump.	Sugarcane crushers.	
						Power.	Bullocks.
1945 ..	1,00,796	321	9	20	6	142	4,372
1956 ..	1,35,667	1,068	25	664	63	235	4,707
1961 ..	1,56,383	2,118	79	802	550	184	3,669
1964 ..	1,63,142	2,639	101	915	637	302	5,401
1965 ..	1,65,214	2,789	148	1,012	742	418	6,107
(Upto August, 1965). ..	..	..	..	..	..	..	..

Seeds.—The cultivators generally reserve a certain portion of their own grains for use as seeds. The village merchants also sell seeds. The Agriculture Department also sells improved variety of seeds, including those grown by registered cultivators.

The Seed Multiplication Schemes have been taken up for better type of seeds. There are Seed Multiplication Farms at Patna, Danapur, Phulwari, Masaurhi, Punpun, Hilsa, Barh, Fatwa, Sarmera, Bihar, Asthawan, Giriak, Silao, Ekangarsarai and Islampur. The farms receive pedigree seeds from the Patna Agriculture Farm, multiply them and distribute them to big cultivators.

The farmers and the Block Development Officers have an agreement that the seeds will be exchanged with the general cultivators for multiplication purposes, the former getting Re. 1 as premium for each maund of seed exchanged with or sold to general cultivators.

New species plants.—During 1967-68, the following new species plants were introduced in agriculture, area** under each being shown opposite each :—

	Acres.
(*i*) Taichun (Summer paddy)	3,440
(*ii*) Taichun (Kharif paddy)	48,682
(*iii*) Paddy 1 R-8	887
(*iv*) Hybrid Maize (Summer)	4,278
(*v*) Kharif	37,373
(*vi*) Rabi	731
(*vii*) Larma Rozo Wheat	37,373

*The figures of 1945 and 1956 have been taken from the *Bihar Statistical Handbook*, 1957, pp. 53-54 and those for 1961 and 1964, have been collected from District Animal Husbandry Office, Patna.

**SOURCE.—Deputy Director of Agriculture, Patna Division, Patna.

The statement below shows the amount of improved seeds sold from 1960-61 to 1964-65 in the district* :—

Years.	Improved seeds sold (in maunds).	Number of purchasers.
1960-61	1,21,421	32,421
1961-62	1,43,529	41,405
1962-63	1,65,327	51,319
1963-64	1,81,329	54,216
1964-65	2.01,427	58,321

Manures.—Our investigation reveals that compost pits are kept only by few enlightened cultivators. In 1964† there were only 3,215 compost pits in the district. Farmyard manures are common. Green manures like *sanai* and *dhaincha* have not become very popular.

Chemical fertilisers are also used in a small measure. They are sold through the Credit Agricole Depots and their agents. The multi-purpose Co-operative Societies also sell them.

The following table shows the sale of chemical fertilizers**:—

Year.	Ammonium sulphate nitrate (in tons).	Single super-phosphate (in tons).	Uria (in tons).	Bone meal (in tons.).
1953-54	50	25	Nil	25
1954-55	75	52	Nil	31
1955-56	103	101	Nil	49
1956-57	189	137	25	67
1957-58	305	141	41	109
1958-59	419	207	57	174
1959-60	543	312	101	218
1960-61	705	419	187	312
1961-62	937	523	145	344
1962-63	1,101	615	194	387
1963-64	1,925	741	201	434
1964-65	2,319	921	289	489

The table above indicates that the sale of manures is progressively increasing, but the consumption is rather insignificant in proportion to the acreage under cultivation.

The cultivators are generally not ignorant of the beneficial effects of the use of ammonium sulphate and superphosphates. Thus the general poverty of peasantry may be the main cause of slow intake of chemical fertilisers.

Pests and diseases.—Some of the pests which affect crops are ants, caterpillars, grasshoppers, paddy hispa, potato sloth, etc. They are controlled by the use of various insecticides and other methods. The

*District Agriculture Office, Patna.
†*Ibid.*
**Ibid.*

common pests found in the district, extent of damages done by them and remedies against them are described below* :—

Crops.	Name of the pests.	Nature of damage.	Extent of damage. Per cent.	Control measures adopted.
Paddy ..	(1) Paddy Gell-fly ..	The maggot bores into the stem, attacks buds of shoots. The plant turns into long, hollow tube-like structure.	10—15	No effective remedy known. Spraying the plants with .04 per cent Endrin or Folidol has been found to minimise the attack to a great extent.
	(2) Paddy stem borer	The main shoot dries up without bearing any grain.	3—5	Three spraying at fortnightly intervals, beginning from early September, with .04 per cent Folidol E-605.
	(3) Rice hispa ..	It destroys the leaves by making innumerable holes and scratches and eating the chlorophyl matter.	1—3	Dusting with 5 per cent BHC at the rate of 20 lbs. per acre.
	(4) Paddy case worm	It is a common pest in low-lands where water remains stagnant for a long time. It cuts the leaves into to pieces and makes cases in which it lives and feeds.	2–5	(1) Spraying the plants with 2½ lbs. of 50 per cent DDT Wettable plus 4 ozs. of Pyrocolloid in 100 gallons of water. Or (2) Spraying with .02 per cent Endrin. (3) Drainage of water for a week where possible has been found very economical.

*Source—District Agriculture Office, Patna.

Crops.	Name of the pests.	Nature of damage.	Extent of damage Per cent.	Control measures adopted.
	(5) Rice Mealy bugs	They attack the plot in patches and retard plant growth.	1–2	Spraying the plants with .03 per cent Folidol or .02 per cent Endrin at the rate of 80—100 gallons per acre.
	(6) Paddy jassids ..	They suck the sap from leaves and turn them yellow.	2-3	Ditto.
Vegetables–				
Cabbage and cauliflower.	(1) Leaf-eaters ..	The pests destroy the leaves and thereby the plant growth is retarded.	5-8	(1) Dusting the plant with 5 per cent DDT at the rate of 15–20 lbs. per acre if the attack is mild. (2) Dusting the plants with 5 per cent BHC at the rate of 16–20 lbs. per acre, if the damage is severe. If the pest appears to persist, repeat it after a week.
	(2) Painted bug ..	It sucks the sap from the leaves (specially of cabbage) and the plants get yellow and ultimately dry up.	4–6	(1) Spraying with .04 per cent Folidol, if the product is not to be consumed before 21 days. (2) Spraying with Pyrocolloid (1 lb. in 60 gallons of water) if required to be consumed within 21 days.
Potatoes ..	(1) Greasy surface caterpillar.	It cuts the plant at surface level and drags the cut portion inside the soil.	8—10	(1) Heavy irrigation when attack is noticed. (2) If the above is not possible, resort to 5 per cent DDT dusting at the rate of 10–15 lbs. per acre.

Crops.	Name of the pests.	Nature of damage.	Extent of damage. Per cent.	Control measures adopted.
	(2) Potato-moth ..	In field it acts as a leaf miner, but under storage condition, it acts as a rubber bores.	30–40	Field condition— (1) Bread ridges should be encouraged. (2) Ridges should be earthened up after each irrigation. (3) Frequent irrigation is necessary to check this pest infestation in the field. Storage conditions— (1) The use of Giegy 33-A, 10 per cent DDT at 2 oz. per md. of potatoes has been found very effective against the pest attack. Or (2) The tubers should be kept under 2" course dry sand. Monthly change of the sand should be done.
Brinjal ..	(1) Epilachna beetles	The grubs skeletonise the leaves. Seedlings are completely damaged if attacked.	10–12	(1) Head picking is effective if done thoroughly. (2) Dusting the plants with 5 per cent BHC dusts at the rate of 15–20 lbs. per acre. But if the infestation is severe, dusting with a mixture of 5 per cent BHC and Pyrodust in the ratio of 2 : 2.
	(2) Shoot and fruit borer.	The shoots stoop down. The affected fruits show holes.	2-3	Destruction of affected shoots and fruits.
Bhindi ..	Shoot and fruit borer.	Ditto.	2-3	Ditto.

Crops.	Name of the pests	Nature of damage.	Extent of damage. Per cent.	Control measures adopted.
Cowpeas and beans.	(1) Aphids ..	They appear in large numbers on leaves and stems of the plant and suck the sap with the result that the plants turn yellow and ultimately dry up.	8–10	(1) Spraying with .02 per cent Endrin or Folidol if the produce is not expected to be consumed within 20 days. (2) If to be required for immediate use, spraying with tobacco decoction— Use 2 lbs. of tobacco in 20 lbs. of water, to be boiled for half an hour. Strain the solution and mix 2 lbs. of bar soap and churn well. Dilute it 10–15 times with water before spraying.
	(2) Bihar hairy caterpillar.	The larvae skeletonise the leaves.	5—8	(1) Dusting with 5 per cent BHC dust if the attack is mild. (2) Dusting with a mixture of BHC and Pyrodust (3 : 2) if the infestation is serious.
Onion ..	Thrips ..	They suck the sap from the leaves and stems and consequently the yield is very much affected.	7-8	.02 per cent Folidol spray at the rate of 100 gallons per acre.
Mango ..	(1) Mango hoppers	The pest appears in large number and sucks up sap from the flowers with the result that no fruit formation takes place.	15—20	(1) Two sprayings—one in November-December and the second by the end of January with .125 per cent DDT Wettable (Guesarol 550) give complete protection to the crop. (2) If one spraying is required, it should be started from early February and finished within a fortnight. (3) If the above operation cannot be complete within the specified time an addition of 2 ozs. Pyrocolloid per 40 gallons of solution is necessary.

Crops.	Name of pests.	Nature of damage.	Extent of damage. Per cent.	Control measures adopted.
	(2) Mango shoot galls	Appearance of cabbage like galls on the leaf buds.	60–70	No control measure has been found effective. Removal of galls in November-December, however, initiates a good crop of mango.

The other agencies which destroy crops are—

Locust.—It is of migratory nature in Bihar and destroys any vegetable if it settles down. The Plant Protection Organisation in Patna copes with the locust invasion.

Rat.—This is a common pest found everywhere both under field as well as godown condition. Fumigation of rat holes by cymag has been found effective and is commonly followed in Government farms and also in cultivators' holdings by the Plant Protection Organisation.

Stray cattle.—No estimate available of the loss of crop caused by stray cattle. But it may be negligible.

Fruits and vegetables.—The vegetables grown are the egg-plant or *baigun* (*solanum melongena*) and groundnut (*arachis hypogoea*), while pumpkins (*lagenaria vulgaria*) and gourds (*benincasa carifera*) may be seen climbing over the roofs of the houses in nearly every village. Onions, yams, turnips, cabbages, beans and cucumbers are also common, and in the winter radishes, carrots and melons are cultivated. Melons are grown in considerable quantities in the fields near the bank of the Ganga. They are of two kinds—the musk melon or *kharbuza* and the water-melon or *tarbuz*. Both are sown in sandy soil, generally in October, and come to maturity in March or April. There are also two kinds of cucumber—one a large variety called *kakri* and the other a small species called *khira*. Pumpkins and gourds are put to a variety of uses. They are eaten plain and also in curries, and the rind is used by fishermen to float their

nets, while the hollow gourd is used by musicians as a sounding board for their guitars and by religious mendicants to serve as a water-bottle. Among condiments the favourite is chilli, which is grown in large quantities. Turmeric, coriander and ginger are also cultivated extensively.

The most popular fruit is the mango, which forms a valuable addition to the food of the people during the hot weather*. Of the other cultivated fruits, the commonest are the plantain, lemon, *lichi* (*nephelium lichi*), jack fruit (*artocarpus integrifolia*), custard apple (*anona squamosa*) and *bel* fruit (*agle marmelos*). The *khajur* tree (*phoaenix sylvestric*) is cultivated abundantly for the sake of its juice, which is made into liquor and the *mahua* flower is used for the manufacture of country spirit and is also eaten by the poorer classes**.

Due to rise in the standard of living, change in food habits and urbanisation, there has been a growing demand for the supply of vegetables and fruits. The industries of Barauni complex have stimulated cultivation of vegetables even on uplands. Apart from *Koiris*, traditional growers of vegetables, there are now other persons also who have taken to growing vegetables. Onion, various kinds of potatoes, spinachs, tomatoes, cabbage, beans, cauliflowers, tinda and various other greens are now cultivated. The consumption of onion and tomato has become universal.

The areas around Patna City, Barh, Bakhtiarpur and Bihar produce the bulk of vegetables both for internal consumption and export. The export of potato is a notable feature of the economy of this district. A number of cold storages have been constructed in the last two decades to store potato mainly.

The following table shows area in acres for some vegetables grown in Patna district during 1960-61 and 1963-64† :—

Area in acres (State figures given within bracket).

Year.	Potato.	Onion.	Cauliflower.	Tomato.	Cabbage.	Carrot.
1960-61 ..	15,700	4,044	1,608	142	77	206
	(83,550)	(23,489)	(6,749)	(5,119)	(584)	(1,004)
1963-64 ..	34,668	7,015	2,715	457	215	314
	(95,690)	(34,587)	(7,049)	(6,305)	(794)	(1,890)

*Among the standard varieties of mangoes *Digha Maldah* is noted for its flavour.
**Patna District Gazetteer (1924), p. 90.
†Horticulture Office, Patna.

As regards fruit cultivation Patna mangoes, particularly the variety known as *Langra* or *Maldah* is one of the best in India. Among other fruits guava, banana, jack-fruit and papaya may be mentioned.

The total area under fruits and vegetables in 1965 was 18,485 and 56,186 acres respectively. Urbanisation, however, is taking a toll of the acreage all over the district, particularly around Patna, though high prices of vegetables have also provided incentive to cultivators to bring new lands under these crops as would be evident from the above table. The Horticulture Department supplies seeds and plants.

The following table gives the incidence of seeds (vegetables) and plants sold to people in Patna from 1961-62 to 1964-65* :—

Year.	Seed sold (in mds.).		Plants sold (in number).
	Mds.	seers.	
1961-62	2	17	5,435
1962-63	3	5	6,712
1963-64	3	22	7,410
1964-65	4	5	7,845

The following table gives the area in acres under certain fruits for the year 1960-61 and 1963-64** :—

Area in acres (Stage figures within bracket).

Year.	Mango.	*Lichi*.	Lemon.	Guava.
1960-61 ..	44,732 (2,17,517)	1,000 (23,616)	1,424 (5,756)	2,000 (19,992)
1963-64 ..	54,469 (2,99,450)	1,045 (28,000)	1,512 (6,732)	3,049 (37,000)

Year.	Banana.	Ber.	Orange.	Jack-fruit.	Papaya.
1960-61 ..	600 (20,800)	1,000 (6,000)	17 (1,048)	312 (9,960)	514 (9,700)
1963-64 ..	1,342 (28,000)	2,015 (7,040)	22 (2,095)	515 (8,300)	612 (9,700)

*Source—Horticulture Office, Patna.
**Ibid.

The average yield per acre of some of the vegetables and fruits is as follows* :—

Potato	..	50 to 80	maunds	per acre.
Onion	..	60 to 100	,,	,, ,,
Tomato	..	1,000	,,	,, ,,
Mango	..	120 to 130	,,	,, ,,
Guava	..	80 to 100	,,	,, ,,
Banana	..	250 to 280	,,	,, ,,
Jack-fruit	..	200 to 250	,,	,, ,,
Papaya	..	200	,,	,, ,,

In 1964 a shadow package programme (intensive cultivation) had been introduced in the district for growing vegetables. It has yet to show result. There is also a scheme of distributing six fruit trees to villagers but this has had little success so far. Grafts making in the nursery farms of Community Development Blocks also has not made much headway.

Plant protection.—A Plant Protection Organisation works in the district since 1952. Its main function consists in eradication of pests and diseases, both in fields and godowns and educating the farmers about them. There are eleven Plant Protection Centres in the district spread over all the subdivisions.

The State Government give 50 per cent subsidy to the cultivators to purchase the plant protection equipment which are, however, too costly for common villagers. The table below shows the working of the Plant Protection Scheme in the district from 1957-58 to 1965-66 (till June 1965)** :—

Year.	No. of persons trained in the district.	Area of field crop treated under plant protection (in acres).	No. of fruit trees sprayed.	Quantity of seeds treated (in maunds).	No. of sprayers sold.	No. of duster sold.	Quantity of chemicals sold (in maunds).
1957-58 ..	6,487	4,932	1,634	20,412	10	9	40,561
1958-59 ..	7,095	5,487	1,937	23,211	15	18	43,291
1959-60 ..	8,793	6,345	2,814	26,392	12	13	45,347
1960-61 ..	9,345	7,098	3,709	30,451	8	24	50,421
1961-62 ..	10,817	8,828	4,702	32,060	9	43	60,281
1962-63 ..	14,207	9,511	8,943	10,725	10	265	68,216
1963-64 ..	26,645	7,148	6,956	14,739	13	28	1,13,937
1964-65 ..	38,930	8,417	5,031	35,839	29	24	2,21,317
From April 1965 to June 1965.	9,349	4,194	1,500	7,645	Nil	5	2,550

*SOURCE—District Agriculture Office, Patna.
**Plant Protection Office, Patna.

It would appear that the number of sprayers and dusters sold in the district is rather negligible. Apart from the high prices of these implements, the conservatism of cultivators is also responsible for this low off take. Generally big cultivators purchase spraying machines and give them on hire to other villagers. The average price of an equipment for spraying varies from Rs. 250 to Rs. 300 per machine and that of a duster from Rs. 20 to Rs. 100 per machine.

Animal Husbandry.—The table below shows the livestock population in the district from 1920 to 1961* :—

Year.	Total cattle.	Total buffaloes.	Sheep.	Goats.	Pigs.	Total.
1920 ..	4,20,688	1,80,945	35,831	82,387	Not available	7,19,851
1925 ..	4,82,098	2,07,236	37,221	2,09,901	Ditto	9,36,456
1930 ..	4,63,056	2,11,257	33,546	1,48,812	Ditto	8,56,671
1940 ..	4,09,542	2,01,233	30,112	1,52,915	15,166	8,08,968
1945 ..	3,26,278	1,98,551	16,422	1,04,141	13,598	7,28,990
1951 ..	5,14,550	2,33,514	23,215	1,84,600	15,162	9,71,041
1956 ..	5,18,852	2,34,116	29,186	2,19,804	21,704	10,23,662
1961 ..	5,57,708	2,36,313	29,114	2,70,941	24,938	11,25,689** (including 5,013 horses and 1,530 donkeys).

The depletion in figures of 1945 is explained by export of livestock for slaughter during the period of the Second World War. But an increase is noticed in the cattle population of the district when the figures of 1951, 1956 and 1961 are compared with that of 1945. Apart from rise in the cattle population there has also been improvement in their breed.

*Figures up to 1951 have been taken from *District Census Handbook* (1954), *Patna*, pp. 114-115 and those of 1956 from the *Statistical Handbook of* 1957, p. 57.

**District Animal Husbandry Office, Patna.

Cattle.—In addition to the ordinary country breeds there are two local varieties of cattle, one a cross between the Hansi and the country breeds, and the other three-quarters or half English breed known as the "Bankipur breed". The former class are large massive animals; the bullocks do well for carts and for ploughing, but the cows are not very good milkers. The Bankipur breed is the residue of an English stock imported about the middle of the 19th century by William Taylor, then Commissioner of Patna, who started a cattle farm at Lohanipur and also inaugurated an agricultural exhibition. The animals are not usually very large, but the cows are excellent milkers, giving from eight to sixteen seers daily. Owing to their smaller size they cost much less to keep than the other breed. The breed has deteriorated greatly through in-breeding and want of new blood. To improve the strain the Patna District Board imported two bulls from Australia and also purchased Montgomary bulls for the improvement of the indigenous breed.*

Cattle of the local breed, though hardy and suited to the climate, are generally of a very mediocre stamp; little or no care is taken in selecting bulls breeding immature or poor specimens being used; and the Brahmani or dedicated bulls are usually no better than their follows, though the freedom with which they are allowed to graze keeps them in better condition. The stock has thus little chance of improvement, and besides the want of careful and systematic breeding, there is difficulty in obtaining pasturage. Grazing grounds are few, and fodder is scarce, for during the hot weather the ground retains little moisture and the grass is parched up by the burning sun. Nearly all the land available for pasturage, moreover, has been given up to cultivation; and the cattle have to be content with the scanty herbage found in the arid fields or are stall-fed on chopped straw or maize stalks. Buffaloes are employed for the plough, especially when deep mud is being prepared for the transplantation of paddy, and are also used for slow draught work. But the chief value of cattle is for the milk which they yield in large quantities. Sheep are reared in fairly large number in the west of the district, for the local markets at Danapur and Patna, and also for the Calcutta market. Goats are bred in almost every village, and pigs of the usual omnivorous kind are kept by the low castes. The only horses are the usual indigenous ponies; they are generally undersized and incapable of heavy work; but those used for *ekkas* often show remarkable endurance and fair speed. Though very hardy, they are generally broken in too early, and are sometimes starved or worked to death before they are seven or eight years old.*

**Patna District Gazetteer* (1924), pp. 91-92.

In the last two decades the quality of the livestock has improved considerably because of the efforts of Government and the response of farmers. The Bankipur breed of cattle more commonly known as 'Taylor breed' is still found in the district. The Brahmani bulls have been replaced by the Tharparkar bulls and the Brahmani bulls numbering about 1,000 have been sent to *Gosadan* in Patna. For the improvement of the breed Key Village Schemes and Artificial Insemination Centres have been started in the district.

Besides the local breed of cattle, Taylor breed or Bankipur breed, Shahabad breed, Tharparkar breed and Hariana breed of cattle are found. Cattle of the local breed, though hardy and suited to the climate are generally of mediocre type. The cows and bullocks of Shahabad breed are very suitable. These cows are good milkers and the bullocks are used both as cart bullock and plough bullock. This breed is usually found in villages on the bank of the river Ganga. The Tharparkar breed was introduced in this district through Government Cattle Dairy Farm at Phulwarisharif in 1926. The cows of this breed are also good milkers and the bullocks serve both as cart bullocks and plough bullocks.

Buffaloes are employed for plough but their main value is for milk which they yield in large quantity.

Animal diseases and veterinary dispensaries.—The Veterinary Hospital at Bankipur, established in 1897, was the only institution of its kind in the district in the early part of the present century. By 1907 there was also a dispensary in charge of a touring Veterinary Assistant Surgeon in the entire district. As the advantages of controlling epidemics by scientific methods were brought to the notice of the local authorities, they realised that something more should be done to help the agricultural classes in combating the diseases which play such havoc with their livestock. By 1924 there was touring Veterinary Assistant Surgeon in each subdivision; and hospitals were either actually in course of construction or were sanctioned for Danapur, Barh and Bihar*.

The popularity of the hospital at Bankipur can be judged from the fact that whereas in the year 1908-09 only 870 patients were treated, the number in 1921-22 was 1,669. A similar development was also noticeable in the work of the touring Veterinary Assistant Surgeons, who treated 2,281 animals during 1923-24 against 105 in the year 1908-09. Several outbreaks of rinderpest and haem orrhagic septicaemia occurred in 1922 with the result that 1,924 cattle succumbed to attacks. The Veterinary Assistant Surgeons protected 3,581 animals by preventive inoculation*.

* *Patna District Gazetteer*, 1924, pp. 92-93.

In the intervening period there has been a considerable expansion of the organisation in the district. The number of veterinary hospitals and dispensaries has gone up considerably. The important ones have also been provincialised. A number of common cattle diseases like rinderpest, haemorrhagic, black quarter, foot and mouth, anthrax, etc., have been controlled to a large extent. The table below shows the incidence of outbreak and deaths from diseases from 1959-60 to 1964-65*:—

Year.	Rinderpest.		Haemorrhagic.		Black quarter.		Foot and mouth.		Anthrax.		Ranikhet.	
	Seizure.	Death.	Seizure.	Death.	Seizure.	Death.	Seizure.	Death.	Seizure.	Death.	Seizure.	Death.
1959-60	285	210	372	210	25	14	3,018	Nil	112	97	315	210
1960-61	410	374	314	292	31	19	2,845	Nil	93	81	232	197
1961-62	312	218	289	272	21	15	2,545	Nil	74	57	182	114
1962-63	217	292	310	262	12	8	2,012	Nil	53	32	114	82
1963-64	155	104	245	154	5	3	5,067	Nil	20	13	88	61
1964-65	104	78	345	65	5	3	2,104	Nil	7	7	343	277

*SOURCE.—District Animal Husbandry Office, Patna.

The incidence of cattle mortality appears to have declined. Sera and vaccines have been useful in combating the diseases. The Rinderpest Eradication Scheme sponsored by the Central Government has controlled to some extent the spread of this disease.

The table below shows the sera and vaccine received and used in the district from 1963-64 to 1964-65* :—

No. of vaccines.	Received in doses.		Used in doses.	
	1963-64.	1964-65.	1963-64.	1964-65.
Haemorrahagic vaccine	42,175	45,550	42,175	45,550
Haemorrahagic sera	2,125	2,480	2,125	2,480
Black quarter vaccine	6,785	8,850	6,785	8,850
Black sera	65	80	65	80
Anthrax vaccine	3,540	3,600	3,540	3,600
Anthrax sera	2,555	2,700	2,555	2,700
Number of fowls vaccinated ..	9,845	11,400	9,845	11,400

At present (1965) class I veterinary dispensaries are running at Ekangarsarai, Bihta, Rajgir, Naubatpur, Noorsarai, Bikram, Mokameh, Bakhtiarpur, Barh, Asthawan, Masaurhi, Danapur, Hilsa, Fatwa, Sarmera, Sampatichak, Patna City, Paliganj, Giriak, Islampur, Punpun, Pundarak, Dhanarua, Rahui, Chandi, Maner and Harnout.

Cattle breeding—The local breeds are poor in quality. Efforts have been made by the Animal Husbandry Department to improve the quality of local breed by cross breeding with improved variety of bull of Hariana breed. Hariana cows are better milk producer and the bull calves are more virile and useful for the plough. Artificial Insemination Centres have been opened at Biharsharif, Paliganj, Sarmera and Masaurhi with 15 sub-centres for improving local breed. Bulls, Jamnapari bucks and she-buffaloe calves of better variety are distributed for upgrading the local

*Source—District Animal Husbandry Office, Patna.

types. The district has been divided into two zones and different improved species are being used in each to study the results. The area consisting of Sarmera, Mokameh and Barh police-stations gets Hariana bulls. The other parts of the district get Tharparkar bulls. The cows in Patna town get the services of Taylor bulls.

The following table shows the number of artificial insemination work done in the district *:—

Year.	Cows.	Buffaloes.	Goat.
1960-61	9,545	652	201
1961-62	10,341	742	292
1962-63	12,218	845	347
1963-64	14,364	931	482
1964-65	18,242	1,045	647

Fodder crops—The indigenous fodders are stalks of maize, paddy, *marua, bajra* and leaves of *rahar* plants. Husk of wheat, barley, gram and *masoor* are also used as fodder. Green fodder is essential, but is in short supply. The cultivation of green fodder like *napier, para, jowar*, etc., and legume like *barseem* have been encouraged. It appears that the farmers are more inclined to grow edible crops than fodder. The Animal Husbandry Department has launched the fodder development programme of schemes popularising fodder production, conserving fodder for lean months and feeding of cattle on standard rations in the district. Demonstrations are held in selected plots. For fodder development 25 nurseries have been started in the district : Sadar subdivision—8; Bihar subdivision—7; Barh subdivision—4 and Danapur subdivision—7. Till 1964-65, 850 maunds of *para*, 760 maunds of *napier*, 580 maunds of *barseem* had been distributed in the district.

All-India Key Village Scheme—This scheme was sponsored in 1958 by the Government of India and is in operation in this district since then. It aims at improving the general efficiency of the cattle by adopting scientific method of breeding, feeding, disease control and

*Source—District Animal Husbandry Office, Patna.

marketing. Selected bull calves are reared in the key villages for distribution after maturity for the purpose of upgrading. About 1,000 bull calves are reared in all the key village centres and sub-centres. In the district there are key village centres at Mokameh, Barh, Bakhtiarpur, Fatwa, Maner, Bihta, Pali, Bikram, Patna and Ekangarsarai and five sub-centres at Ekangarsarai. Semen of Tharparkar bulls and Murra buffaloes is supplied to the centres and sub-centres. Each centre and sub-centre has been provided with ten bulls and two goats for natural breeding. For intensive cattle breeding a crash programme has been started in Danapur subdivision since 1964. For every 1,000 cattle one centre has been opened, there being 29 such centres in the subdivision.

Poultry farming—It is a cottage industry, largely confined to rural areas. The economically backward Muslims and low caste Hindus generally keep poultry to supplement their income. There is a great demand for good birds and eggs throughout the district and thus there is plenty of scope for the development of poultry farming. In 1965, there were 475 registered private poultry breeders in the district, 372 being in Patna and Danapur towns. But it was difficult for them to get the chicken feed at reasonable rates.

The table below shows the figures of poultry in the district for 1945, 1951, 1956 and 1961 *:—

Year.	Fowls.	Ducks.	Total.
1945	1,10,696	7,213	1,17,909
1951	1,05,226	5,453	1,10,679
1956	1,48,043	18,114	1,66,157
1961	2,07,952	6,039	2,07,991

The State Government are keen to improve the quality of poultry and to make better birds available. The Central Poultry Farm was established in Patna in 1950. It is managed by a Farm Manager and is supervised by the Poultry Development Officer, Bihar. It aims at producing stock for distribution to *bona fide* breeders and other subsidiary

*See *District Census Handbook, Patna* (1954), p. 115 for figures of 1945 and 1951 and *Bihar Statistical Handbook*, 1957, p. 57 for figures of 1956. The figures for 1961 were supplied by the District Animal Husbandry Office, Patna.

farms. It demonstrates to the interested persons as to how a poultry farm can be profitably run. It has at present (1965) 2,332 birds, out of which 201 are cocks, 379 hens, 632 cockerels, 497 pullets and 623 chicks. A total of 2,66,321 eggs were produced at the farm till July, 1965 out of which 27,457 eggs were sold to the registered breeders for hatching. There are one Poultry Extension Centre at Biharsharif, one Industrial Poultry Farm Centre at Mokameh and five hatching centres—one each at Ekangarsarai, Noorsarai, Barh, Phulwarisharif and Naubatpur. 48,981 eggs were produced in 1964-65 at the different poultry centres, out of which 20,815 eggs were utilised for hatching and 28,066 were sold. 42,540 old chicks were supplied to the breeders in 1965. The breeders are given one month's training free of cost by the Poultry Inspector at Patna.

Some of the facilities provided to the poultry breeders are: (*a*) supply of one day old chick with a foster-mother loaned for two months ; (*b*) subsidy for setting up improved poultry house ; (*c*) exchange of cockerels with ordinary species ; (*d*) inspection of poultry farms by the Poultry Inspector*; (*e*) free supply of poultry under Welfare Scheme to members of the Scheduled Castes and Scheduled Tribes ; (*f*) subsidy of Rs. 50 to the poultry breeders for purchasing wire netting for the poultry house and (*g*) individual loans of Rs. 500 to be realised in easy instalments.

Dairy farming—*Goalas* keep herds of cows and buffaloes and trade in their milk. A number of *Goshalas* in the district keep cows and buffaloes. Under the *Goshalas* Development Scheme, the following *Goshalas* have been supplied with pedigree bulls with the object of improving the breed of cattle and increasing milk production:—

Name of *Goshala*.	No. of bulls supplied.
Model *Goshala*	6
Patna City *Goshala*	13
Rajgir *Goshala*	3
Khusrupur *Goshala*	5
Mokameh *Goshala*	7
Barh *Goshala*	4
Bihta *Goshala*	5

In order to organise the sale of pure milk and improve its quality, the State Government have encouraged the existing *Goshalas* to adopt modern methods. They have contributed Rs. 5,000 for each *Goshala* for

*He also treats the affected poultry. In rural areas this is done by the Animal Husbandry Supervisor.

construction of building and also added five Hariana cows for each *Goshala*. About 2,434 improved progeny were obtained till September, 1965. On average only about two maunds of milk from each *Goshala* are consumed locally.

Government Cattle Farm—This was established in 1926 on about 649 acres of land. Its main objects are to develop indigenous stock by selective breeding and also to function as a dairy farm. It has to work in conjunction with the key village scheme for further development of cattle in the district. It also imparts education dairying to students of the Bihar Veterinary College. It started with 158 cows, seven Tharparkar bulls and 158 young stock bulls. The strength in 1965 (August) was 212 cows, 19 breeding bulls, 80 young male stock and 232 female young stock. Pedigree bulls produced at the farm are distributed to the breeders and farmers of the districts of Shahabad, Patna, Gaya and Saran. The farm on an average produced 277 bulls from 1961-62 to 1964-65. Yorkshire breed of pigs are also sold to pig breeders for piggery development.*

The maximum lactation range has gone up to 14,280 kilograms a month. After meeting the demand of calves the milk produced is supplied to the Patna Milk Supply Scheme, Patna at the rate of 63 paise per litre.

The table below shows the total production of milk during 1959-60 to 1964-65* :—

Year.	No. of cows.	Quantity. (in kilograms).
1959-60	192	1,56,675
1960-61	220	1,65,494
1961-62	214	1,71,705
1962-63	238	1,76,579
1963-64	212	1,71,336
1964-65	212	1,74,214

In order to supply sufficient milk to the people in Patna town, a milk supply scheme was sponsored in 1964 in Patna. Prior to that milk

*Manager, Government Cattle Farm, Patna.

was supplied through Patna Co-operative Milk Union started in 1953. The scheme supplies milk to the following:—

General public (card-holders only) ; Patna General Hospital ; Institution like Ayurvedic College, St. Xavier School, St. Joseph Convent and Patna Secretariat Canteen.

Milk is collected at the following centres and after processing at Patna it is supplied to the consumers*:—

Collecting centres.	Average collection in litres.
Maner	14,000
Bikram	1,500
Fatwa	1,500
Bakhtiarpur	1,000 to 3,000
Naubatpur	1,500 to 5,000
Government Cattle Farm, Phulwarisharif.	12,000 to 20,000

The capacity of the dairy per day is 10,000 litres but the average handling is about 3,000 litres only per day. During summer due to short supply of milk from different centres, the Government purchases milk from Gaya Dairy.

At present (1965) there are 41 booths and the card-holders purchase milk from their respective booths depositing one month's price in advance. The demand for milk has greatly increased and therefore the card-holders cannot get more than 2 litres of milk each.

The dairy also prepares *ghee* and butter, but the demand for butter is low because it is supplied from Barauni also. The demand for *ghee* increased, its average consumption being about 500 kilogram per month. *Ghee* is sold at the rate of Rs. 8.55 and butter at the rate of Rs. 7.48 per kilogram respectively.

Fisheries—An extensive bed of river Ganga in Patna and other places in the district offers one of the best fishing grounds. The spawn of *rahu, katla* and *hilsa* is also collected from the river Ganga. It is in great demand in other parts of Bihar and West Bengal. It is stocked in specially prepared nursery tanks. It develops to fry and fingerling stage within a fortnight and then it is ready for stocking in tanks.

*The Government purchases both cows and buffaloes milk at the rate of 66 paise and sells 80 paise per litre.

Fishing practically begins in October and the peak season is December, January and February, when a variety of fish could be seen in the fish market.

There are a large number of rivers, streams, ponds and low-lying fields in the district where water accumulates in the rainy season and they hold much potentiality for development of fishery.

The Fisheries Development Schemes of the district are managed by the District Fisheries Officer posted at Patna under the administrative control of the Director of Fisheries. The fisheries schemes in the subdivisions (Patna, Danapur, Barh and Bihar) are looked after by the Fisheries Inspector posted at respective subdivisional headquarters. Besides, there are five Fisheries Supervisors posted at the subdivisional headquarters.

The following are some of the schemes for the development of the fisheries in the district:—

Seed Collection and distribution.—Four species of quick growing major carps, *i.e.*, *rohu*, *katla*, *naini* and *kalbose* have been selected for culture in tanks and ponds. These fishes breed only in rivers. The spawn are collected every year during the rains from rivers Ganga and Punpun and sent to the nursery tanks at subdivisional headquarters and reared. When they attain a size of ½" they are sold to the tank owners at the rate of Rs. 7 before August and Rs. 9 later per thousand fish fry for culture in their tanks.

Fisheries Storage and Marketing.—Facilities are given for the preservation of fish and their transport to deficit areas. One Fisheries Marketing Supervisor has been posted in Patna for this purpose.

Demonstration and Propaganda.—Each block has been provided with a set of fisheries charts, models, etc., to educate the public regarding the technique of pisciculture and supplied with cast net and drag net to supply the villagers on hire for exploitation of fisheries. Demonstrations of fish culture in paddy fields are also held, so that paddy fields could also be utilised for rearing fish. But tangible results are yet to be seen. Manuring in fish ponds gives better result. With a view to educate the tank owners for proper manuring in tanks one demonstration is conducted by the Fishery Department and manures are supplied free of cost. The fishermen are supplied yarns and twines for making nets. Boats and

other accessories for helping fish exploitation are also supplied through Fishermen's Co-operative Societies. At present (1965) there are 10 such societies in the district with 435 members and about 207 members have been supplied yarns for making nets. Till 1965, 85 boats were sold to fishermen in the district.

The table below shows the development of fisheries in the district from 1956-57 to 1964-65*:—

Year.	Spawn collected (in batties).	Fry distribution (in lakhs).	Management and exploitation of Government tanks (in acres).	Paddy-*cum*-Fish culture (in acres).	Manurial demonstration in tanks (No.).
1956-57	195	6,78,192	78	3	14
1957-58	248	7,43,691	91	4	21
1958-59	394	8,76,642	103.50	2	18
1959-60	496	9,45,789	193.50	5	21
1960-61	584	1,03,214	279.75	2	34
1961-62	672	14,04,000	372.50	4	14
1962-63	364	14,68,556	489	1	58
1963-64	400	13,95,888	467	1	39
1964-65	514	14,36,795	519	5	57

There are certain castes like *Mallah*, *Bind* and *Kewat* who traditionally follow the occupation of fish-catching. Owing to lack of capital and organisation, they hand over bulk of the catch to the middlemen, usually Muslims and Kurmis, who make much profit. There are about 50 substantial fish merchants in the district.

The fish trade of Patna, Fatwa and Mokameh has a great turnover, and export large quantity of fish annually to Calcutta. Its transport and marketing are in the hands of private sector. The Eastern Railway

*SOURCE.—District Fisheries Office, Patna.

has provided two bogies known as "Fish Compartment" in Upper India Express (14 Down) from Patna to Howrah for carrying fish and spawn. About 30 to 40 *batties* of fish and spawn are sent daily to Howrah from Patna. The price of fish in the local markets of Patna, Mokameh and Fatwa varies from Rs. 3 to Rs. 5 per kilogram.

The total cultivable Government water area excluding river for fish culture in Patna district comes to about 22,172 acres. The average total production of fish in 1964-65 is reported to be 9,578 maunds from these water reservoirs*.

NATURAL CALAMITIES.

Famines—Of the notable famines which visited Eastern India in course of the last two centuries, one the district suffered from severely was that of 1770.

The failure of autumn rains of 1783 again caused temporary scarcity in Patna. The British Administration, after taking some measures for relief of the local shortage of grains, constructed the granary, "Golghar", at Bankipur for the perpetual prevention of famine. It was intended that grains should be poured in at the top of this granary and taken out through small doors at the bottom; but owing to the mistake of the builders, the doors were made to open inwards. It had never been filled in anticipation of scarcity†.

The next famine occurred in 1866. The East Indian Railway‡ had been extended in 1862 through the district and this improved the internal communication. Consequently though high prices prevailed, the distress was neither general nor severe. It began to be felt to a certain extent among the poorer classes by October, 1865 and it was most intense in the south near the Gaya district and a portion of the Bihar subdivision owing to the partial failure of paddy crop which was almost the sole cultivation in that part of the district. In June, 1866, schemes such as repair of roads and excavation of tanks were taken up in the most intensely affected areas, but less than 1,000 persons attended to the work. Gratuitous relief was also given at seven centres to indigent

*Source.—Fishery Inspector, Patna.

†In 1954, the State Government made over the Golghar to the Central Government for storage of foodgrains as buffer-stock to meet the eventualities of food shortage and since then grains are being stored in it. However, it is understood, a proposal has been mooted to preserve this building as historical monument.

‡Now Eastern Railway.

persons and from the end of June, till the end of November, 1866, their number was only 2,147. The number of deaths reported by police as having occurred from starvation or from diseases induced by want of proper food was 907.* The high prices prevailing during this famine were due not so much to the failure of the local produce as to the previous excessive export and the demand from the surrounding districts. Owing to the general high level of prices in Bengal, the import of rice was below the average of previous years, but large imports of other kinds of grains commenced from June and continued till the autumn harvest caused a fall in prices.

In 1874 the district suffered from acute scarcity. The flood in July, 1873 had seriously affected the prospects of the standing crops. In the Sadar subdivision, the country lying to the south and south-west of Bankipur was almost entirely submerged though in September, 1873, paucity of rain was keenly felt. The Barh subdivision, chiefly a *rabi* and *bhadai* country, suffered most by the floods; but the Bihar subdivision was not affected. However, due to very poor rainfall throughout the district, there was very scanty harvest of rice crop. Further, though the lower classes were hard-pressed due to rise in prices of foodgrains, there was nothing like a famine. Grain was poured in by private traders in very large quantity and relief works were opened in every part of the district. There was no demand for gratuitous relief.

The famine of 1897 was not so severe in this district as elsewhere in the division. It was caused due to deficiency of rainfall and also its uneven distribution throughout the agricultural season during the previous year. All available water from the Son canal was utilised ; the only fears were entertained for the Islampur thana, but this soon passed away and the only cause of inconvenience to the people was high range of prices which from October, 1866 pressed hard on the large urban population and on those who lived on small fixed income. Practically no relief had to be offered except to starving wanderers and mendicants.

Patna escaped almost unscathed from the great famines of the 19th century. Only south-east corner of Bihar thana and south of Islampur thana were vulnerable to temporary scarcity. The reasons could be attributed to silting up of certain channels which had previously provided a means of irrigation in the locality.

The present conditions in Patna district are very different from those in the last century. Even if the local rainfall is scanty, the cultivators could obtain a store of water for their crops* from the rivers flowing

Patna District Gazetteer (1924), p. 104.

from the south and from the canal system in the west. Large areas of the district are served by rail, river, canal and *pucca* road. Trucks and lorries penetrate deep in the countryside. Carts and pack-bullocks reach the remotest interior.

Famine of 1966-67— In 1967, the district was afflicted by famine* and except for the canal-irrigated areas under Bihar, Bikram and Naubatpur Anchals, the rest of the district was in its grip though Bakhtiarpur and Barh Anchals in Barh subdivision and Maner, Paliganj and Danapur Anchals in Danapur subdivision were declared as a scarcity† area. Out of 2,335 villages in the district, 1,658 were affected by famine and 335 were under scarcity. The corresponding area of affliction being 1,478 and 355.9 sq. miles respectively. A total number of 1,818,476 persons has been affected by famine while scarcity affected 483,918 persons.

The reason of this famine was failure of monsoon in the previous year. The total annual rainfall being only about 20" as against the normal of 45" and thus both *aghani* and *rabi* crops failed. In order to give relief to people, Government started Hard Manual and Light Manual Schemes to provide employment to landless labourers. The following table shows the extent of this relief:—

Name of subdivision.	Hard Manual Schemes taken up.
Barh	940
Biharsharif	1,629
Danapur	513
Patna Sadar	522
Patna City	53
Total	3,657

Seven spinning centres under the Bihar Khadi and Village Industries Scheme were taken up in the Bihar subdivision, each with 500 *Charkhas* to provide employment to middle classes. Gratuitous relief was given to 51,595 persons. In order to enable cultivators to grow crops, 10,950 *kutcha* wells were dug all over the district. Tube-wells were also sunk. 876 diesel pumping sets were distributed to the cultivators on 50 per cent

*682/C, dated 20th April, 1967, from Chief Secretary to Government, to all Commissioners.

†837/C, dated 25th May, 1967, from Relief Commissioner, to all Divisional Commissioners.

subsidy and 50 per cent loan bonds. 43 pumping sets were installed in the rivers, Ganga, Punpun and Mahane for irrigation. The Public Health Engineering Department provided 1,600 tube-wells to meet water-supply. The following amount has been spent out of public exchequer on relief:—

Year	Hard Manual Labour Schemes.	Light Manual Labour Schemes.
	Rs.	Rs.
1966-67	39,65,718	25,459
1967-68	54,99,984	31,000
On Gratuitous Relief—		
1966-67	1,59,086	..
1967-68	9,85,851	..

A sum of Rs. 8,43,900 was advanced as agriculturist loan and another sum of Rs. 1,34,80,768 as consumption loan which covered even the landless persons. Besides loans were given to cultivators in the shape of seeds and fertilizers. A sum of Rs. 1,85,41,132 was advanced as production loan and another sum of Rs. 29,712 as a short-term fertiliser loan. A sum of Rs. 6,83,085 was advanced for purchasing diesel pumping sets and another sum of Rs. 1,08,300 for tube-wells.

The failure of crops also led to scarcity of fodder and Government imported fodder from the Punjab and other places to feed the cattle population of the district.

Due to intensification of agricultural programme in the wake of this drought, it is expected that in future the rigour of drought would be moderated so that the agriculturists who form the majority of population might raise crops in spite of paucity of rains and thus escape the rigour of famine, if any.

Floods—In the north of the district floods are generally caused by the rivers Ganga and Son overflooding their banks. But such inundations rarely do any serious damage; rather they fertilise the soil by rich deposits of silt. In the south also, local floods, particularly of the river Punpun, are sometimes caused by the river's breach from banks owing to abnormal heavy rains in the hills and occasionally also by rivers leaving old course and appropriating the channel of *pynes*. These floods, however, are of very short duration and cause practically little distress. During the present century the most serious inundations have been those of 1901, 1913, 1923, 1936 and 1967.

The flood of September, 1901 was the result of a simultaneous rise in the rivers Son and Ganga, when the Son being unable to discharge its water into the Ganga, forced its way over its eastern bank and poured over the low-lying land towards Maner. But the Ganga inundated the country along its banks throughout the length of the district while at Digha, it rushed down the Patna-Gaya Canal and breached its western bank two miles from its mouth. 257 villages were flooded but the damage caused was comparatively slight except on the *diara* lands where over thousand houses were destroyed and the *bhadai* crops entirely ruined ; but here also the loss was counterbalanced by the silt left by the receding waters which was of great value for the *rabi* crop. The flood subsided between 24 hours.

The flood of 1913 was caused by a heavy and continous rain between the 7th and 11th of August in Patna which was already saturated. During this very period Hazaribagh and Gaya districts also had 22" rainfall and all this water sought an exit to the river Ganga through Patna district. The result was heavy flooding of the Sadar, Barh and Bihar subdivisions. The consequences were most serious in Barh subdivision where 40 human beings and 547 cattle were drowned, 23,360 houses were completely destroyed and Bihar subdivision escaped with lesser damage.*

In August, 1923, a sudden rise of the Son which occurred when the Ganga was already in flood, submerged large part of Danapur subdivision and all the *diara* lands and seriously threatened a part of the New Capital area in Patna. On the 19th of August, the level of the Son at Dehri was 343.90 feet, *i.e.*, 1½ feet higher than the highest level hither to recorded. The level of the Ganga was already 1½ feet higher than it had ever been known before ; and the result was that the bank of the Patna-Gaya Canal was breached and the western and northern portions of Danapur subdivision were flooded. There was a heavy lost of standing *bhadai* crops and a large number of houses were damaged or destroyed. Prompt relief measures, however, kept the loss in human life and cattle at the minimum. The embankments along the Bankipur-Digha Road also overtopped and breached in many places, with the result that villages between the river and the New Capital area were inundated ; but the floods subsided before the capital could be damaged.†

In August, 1936, the town areas of Patna and the low-lying tracts south of it were heavily inundated, though the situation was short-lived. Heavy rain and the simultaneous high flood level of the river Ganga were responsible for this.

**Patna District Gazetteer* (1924), p. 77.

†Later on protective bundhs were made along the Danapur-Patna Road to prevent flood waters entering the Capital area in flood future exigency.

In the first week of August, 1948, a flood occurred which was of minor duration than in the past. It repeated in the first week of September of the same year. There was heavy rainfall in the last week of August and the river Ganga began to rise from the 1st September. Extensive areas in Barh, Patna City and Danapur subdivisions were inundated and this necessitated the evacuation of a large number of human beings and cattle from the low-lying areas.

In 1960-61, the district suffered from floods which affected the *diara* areas of Danapur, Sadar and Barh subdivisions, submerging 42 square miles of land and affecting over 62,000 people. Crops standing on 26,620 acres of land were damaged, resulting in loss to the extent of Rs.13,77,300.

In the year 1961-62, floods re-visited the district and affected 1,171 villages and damaged *bhadai* and other crops on about 4,78,712 acres of land and also took a toll of human lives and cattle.

In September-October, 1967, Patna town, particularly the locality of Rajendra Nagar and Kankarbagh came under a heavy grip of floods. These two colonies remained under water for about two weeks and the inhabitants, by and large, had to be evacuated to places of safety. The Kadamkuan areas were also affected. There was no loss of human life, but many cattle were washed away and damage to properties, both public and private, was heavy. This flood was a result of simultaneous combination of the following: (*a*) Flood level of the river Ganga was steady ; (*b*) Excessive rain in the hills of Hazaribagh and Gaya caused overflow of the river Punpun which could not discharge its water into the swollen Ganga and found outlet through uncovered gaps in the protective embankments on its left side ; (*c*) Due to rise of the Son, there was some outflow from the Patna-Gaya Canal towards the east ; and (*d*) Throughout the previous night Patna* had incessant rain which submerged the low-lying areas. The stagnation of water in Rajendra Nagar and Kankarbagh colonies was due to the fact that the natural outlets instead of draining out water were themselves choked up. It might amuse the posterity to know that the Rajendra Nagar roads were under water, 3 to 7 feet in depth, and boats plied over them for over 10 days.

Other natural calamities—The earthquake of the 15th January, 1934 (*supra*) also affected some parts of Patna district. During 1956-57 a hail-storm damaged the *rabi* crops. Again in 1962, there was another severe hail-storm which affected a number of villages in Danapur subdivision.

In early December, 1961, the district faced a very serious cold wave for about a fortnight.

*There was torrential rain from 18th September to 20th September, 1967.

Drought—Since time immemorial, success of crops in the district, as elsewhere in the State, has been a gamble of the monsoon. If it is timely and distribution of rainfall even, the crops have good prospects. Particularly the failure of *hathia* rain is the major cause of failure of *aghani* crops. *Rabi* crops also become scanty because of lack of moisture in the soil.

Drainage—The northern part of Patna district, the area in between the right bank of the river Ganga, east of the Son and north of the Punpun is like a saucer. The average level of this area is generally lower than the highest flood marks on these rivers. Therefore, the question of drainage and flood in this area has been a perpetual problem and if there is simultaneous rise in the level of these rivers, there would be no drainage for this area and its flooding would be a natural corollary. Historical evidence and analysis of sands show that the river Son has oscillated west-ward to its present site from near the Hardinge Park, Patna in the last few centuries and in this process has left deep depressions in its old course which are also liable to floods. The general slope of Patna town, south of the river Ganga, is towards south and it becomes almost dead across the railway line in Kankarbagh colony, which fringes on the northern bank of the river Punpun. In the event of saturation of Mokameh tal, there would be no outlet for the water of the saucer area. If excessive rain coincides with the general rise of the Ganga, Punpun and Son, this area will be extremely vulnerable to floods. This has been a problem for Patna since time immemorial and a permanent solution for this has still to be found.

APPENDIX I*.

Medium Irrigation Schemes in Patna district.

Name of Scheme.	Nature of Scheme.	Cost in rupees.	Area expected to be benefited in acres.
1. Sahebnagar Medium Irrigation Scheme, P. S. Punpun.	Construction of sluice gate and repair of bundh.	31,872	1,000
2. Adla Korawa i Scheme, P.S. Naubatpur.	Construction of weir.	69,200	2,500
3. Karanpur Scheme, P. S. Paliganj	Ditto ..	11,708	706
4. Bhagwanpur Scheme, P. S. Giriak	Ditto ..	27,000	800
5. Muraora Irrigation Scheme, P. S. Bihar.	Ditto ..	25,000	800
6. Nagri Ahar Irrigation Scheme, P. S. Rajgir.	Ditto ..	30,055	1,000
7. Jaitiya Scheme, P. S. Islampur ..	Ditto ..	85,958	3,000
8. Mahmoda Scheme, P. S. Islampur	Ditto ..	25,097	1,000
9. Mai Scheme, P. S. Ekangarsarai..	Ditto ..	1,17,382	4,000
10. Akauna Scheme, P. S. Punpun	Repair of *Ahars* fixing of pipe and construction of sluice gate.	55,104	2,000
11. Sukhastia Scheme, P. S. Masaurhi	Repair of *Ahars* and construction of weir.	32,569	1,000
12. Kistipur Scheme, P. S. Masaurhi	Construction of sluice gate and repair of bundh.	59,339	1,050
13. Mohanpur Scheme, P. S. Punpun	Ditto ..	31,029	1,000
14. Tetari Scheme, P. S. Masaurhi ..	Construction of weir, fixing of pipes and others.	43,358	900
15. Phulwari Scheme, P. S. Phulwari.	Desilting of tank ..	20,000	2,000
16. Goai Scheme, P. S. Danapur ..	Construction of weir	55,700	2,000

*SOURCE –Executive Engineer, Unified Minor Irrigation Department, Patna.

APPENDIX I—*contd.*

Name of Scheme.	Nature of Scheme.	Cost in rupees.	Area expected to be benefited in acres.
17. Koilawan Scheme, P. S. Danapur	Construction of weir and marginal embankment.	87,667	4,000
18. Naruddinpur M. D. Scheme ..	Construction of weir and marginal embankment.	85,048	2,500
19. Muzaffarpur M. I. Scheme, P. S. Biharsharif.	Construction of weir and repair of bundh.	90,079	4,100
20. Ajnaura M. I. Scheme ..	Ditto ..	36,741	1,647
21. Att M. I. Scheme, P. S. Silao ..	Ditto ..	1,94,990	800
22. Uthertho M. I. Scheme, P. S. Asthawan.	Ditto ..	1,70,590	2,000
23. Bara M. I. Scheme, P. S. Silao	Construction of weir, culverts and repair of bundh.	97,650	4,000
24. Paparnausa M. I. Scheme, P. S. Bihar.	Desilting of *pyne* and repair of bundh.	58,750	2,900
25. Daraura M. I. Scheme, P. S. Bihar.	Repair of *ahars* and bundh.	38,761	1,167
26. Maira M. I. Scheme, P. S. Giriak.	Construction of weir and repair of bundh.	94,506	5,000
27. Andi M. I. Scheme, P. S. Asthawan.	Repair of embankment.	69,555	1,345
28. Chackobigha M. I. Scheme, P. S. Asthawan.	Ditto ..	11,593	795
29. Barhog M. I. Scheme, P. S. Asthawan.	Ditto ..	44,365	876
30. Jaor M. I. Scheme, P. S. Silao	Repair of *ahars* and desilting of *pyne* and sluice culvert.	49,773	1,453
31. Pachetau M. I. Scheme, P. S. Asthawan.	Repair of bundh and sluice gate.	46,885	643
32. Hunainpur M. I. Scheme, P. S. Biharsharif.	Ditto ..	87,212	2,500
33. Punha M. I. Scheme P. S. Biharsharif.	Repair of *ahar* and sluice gate.	60,353	2,000

APPENDIX I— *contd.*

Name of Scheme.	Nature of Scheme.	Cost in rupees.	Area expected to be benefitted in acres.
34. Ora M. I. Scheme, P. S. Biharsharif.	*Pucca* weir and repair of *ahars* and *pynes*.	32,620	1,000
35. Sonsa M. I. Scheme, P. S. Biharsharif.	Ditto ..	17,541	280
36. Basak Sundi M. I. Scheme, P. S. Biharsharif.	*Pucca* weir and sluice gate.	36,901	700
37. Jaswant Bigha M. I. Scheme, P. S. Chandi.	Ditto	99,985	3,400
38. Kachhiwan M. I. Scheme, P. S. Chandi.	Ditto ..	70,881	4,200
39. Pukhanpur M. I. Scheme, P. S. Hilsa.	Ditto ..	79,900	2,500
40. Kewali M. I. Scheme, P. S. Islampur.	Sluice, culvert and pynes.	14,671	700
41. Kewali M. I. Scheme, P. S. Chandi	Construction of weir and repair of bundh.	49,988	560
42. Baijal Ahar M. I. Scheme, P. S. Hilsa.	Ditto	41,044	1,162
43. Asta M. I. Scheme, P. S. Chandi	Ditto ..	99,999	1,100
44. Gorainpur M. I. Scheme, P. S. Chandi.	Ditto ..	34,049	169
45. Bardiha M. I. Scheme, P. S. Chandi	Ditto ..	17,707	584
46. Bhatehar M. I. Scheme, P. S. Chandi.	Ditto	49,540	592
47. Chandeanpura M. I. Scheme, P. S. Islampur.	Ditto ..	22,560	294