

CHAPTER IV.

AGRICULTURE AND IRRIGATION.

LAND RECLAMATION AND UTILISATION.

"The total land area of the district is 28.2 lakh acres and the population is 26.9 lakhs. The total geographical area per head of the population thus works out to only 105 cents. The total cultivated area is said to be 17.3 lakh acres and *per capita* it comes to 65 cents only. Of the total geographical area of the district, 9.3 lakh acres are under hills, rivers, canals, homestead, village common roads, etc., and are thus not available for cultivation. Current fallows based on average figures for the quinquennium ending 1949-50 amount to 0.8 lakh acres, and the culturable wastes to 0.73 lakh acres. The cultivated lands together with current fallows and cultivable wastes work out to only 72 cents *per capita*. 41 per cent of the total gross cultivated area is under rice. Maize and other cereals and pulses account for 54 per cent and cash crops are grown on 5 per cent of the gross cultivated area. At the time of the last settlement (1907-16), 32 per cent of the gross cultivated area was under rice."* The population according to 1961 census is 32,18,017 which reduces the availability of land per head.

In order to reclaim the culturable waste land, the Bihar Waste Land Reclamation, Cultivation and Improvement Act was passed in 1946. The Waste Land Reclamation Section is under the Revenue Department. There is a Waste Land Reclamation Officer for the district with headquarters at Dehri. Manual reclamation of waste lands is encouraged by the distribution of land improvement loans. The following figures of reclamation of waste land were supplied by the Waste Land Reclamation Section of Patna:—

Total area of culturable waste land (in acres.)	Area of waste land reclamation by manual labour through assistance of L.I. Loan (in acres).	Amount spent as L.I. Loan (in rupees).	Area reclaimed by tractors (in acres).
1951-52	59,000	Not available	63,100
1952-53	59,000	601	72,325
1953-54	59,000	133	8,192
1954-55	59,000	400.48	1,364
1955-56	59,000	464.78	22,300
1956-57	59,000	727.46	2,000
1957-58	59,000	Nil	500
1958-59	59,000	196.53	3,000
1959-60	59,000	Nil	Nil
1960-61	59,000	Nil	Nil
1961-62	59,000	Nil	Nil

* District Census Handbook, Shahabad (1951), page vii.

The figure of the area of culturable waste land given by the Waste Land Reclamation Section differs from the statistics of 'Bihar in figures' which are as follows:—*

1947-48.	1948-49.	1949-50.	1950-51.
79,214	74,633	73,335	72,192

In the *District Census Book of Shahabad* based on 1951 census figures the area of cultivable waste land is shown as 73,149 acres.† In the *Bihar Statistical Handbook* from 1956 the area of the culturable waste land is shown as 59,000‡ but in the Handbook for 1957 it is shown as 36,000**. There is a bewildering variation of figures in different books. The Waste Land Reclamation Section has obviously adopted the figures of the Statistical Handbook for 1956. Whatever be the area the progress of waste land reclamation through manual labour has not been very encouraging. It is not known if the loans taken for land reclamation were actually used for that purpose.

From our personal knowledge of the district it is doubtful if the district has got as big an area of 59,000 acres as culturable waste land. The weakness of the statistical base will be corrected only when the Survey and Settlement Operations which are now on conclude.

* Bihar in figures (published by the Department of Public Relations, Bihar, Patna in 1956), page 25.

† District Census Handbook (1951), Shahabad, p. 108.

‡ Bihar Statistical Handbook, 1956, p. 84.

** Bihar Statistical Handbook, 1957, pages 86-87.

The statement below will show the classification of area in the district.

Serial no.	1951-52* (acres).	1956-57** (acres.)	1957-58*** (acres.)	1958-59†.	1960-61‡
1	2	3	4	5	6
1. Total area of the district	28,20,032	28,11,000	28,11,000	28,11,000	28,11,000
2. Forest land	Break up figures not given.	6,08,000	6,08,000	..	6,22,000
3. Barren land	Ditto	69,000	70,000	..	..
4. Other Garmazrua land	Ditto	2,59,000	2,54,000	..	..
5. Permanent pasture and other grazing land	Ditto	6,000	2,000	..	..
6. Culturable waste other than fallow land..	73,149	59,000	36,000	1,77,000 (including fallow lands).	54,000
7. Other fallow land****	..	35,000	24,000	..	1,25,000
8. Current fallows	81,137	1,44,000	2,29,000	..	..
9. Net area sown	17,34,752	16,07,000	15,59,000	16,53,000	16,80,000
10. Area sown more than once	9,40,469	8,85,000	8,12,000	12,32,000	11,77,000
11. Bhadaí crops	Figures not given	82,000	97,000	..	..
12. Aghani crops	..	10,76,000	11,60,000	..	..
13. Rabi crops excluding orchard	..	13,28,000	11,06,000	..	..
14. Garma crops	..	6,000	8,000	..	..
15. Orchard	39,879	23,000	29,000	28,84,000	28,57,000
16. Total cropped area	Not available	Not available	Not available		

SOURCE.—* *Shahabad District Census Handbook*, 1954 (p. 108).

** *Bihar Statistical Handbook*, 1956 (pp. 34-35).

*** *Bihar Statistical Handbook*, 1957 (pp. 36-37).

**** Figure for the area, N. A. for cultivation in 1951 *Census Handbook* is given as 891,115 acres.

† *Bihar Through Figures*, published by Director of Economics and Statistics, Bihar, 1953, page 25.

‡ *Ibid*, 1961 pages 34-35.

In this district both the irrigated and the non-irrigated areas excepting the hills and forests are well exploited for cultivation. In recent years some of the large *jhils* have been dewatered and cultivated. An example is the large *jhil* at Dumraon which was a favourite duck-shooting area in the winter, has now been put to crop and grows excellent *boro* crops which is transplanted and harvested from October to April. Intensive agriculture is also being attempted by what is popularly known as the Package Programme. The Block Development authorities are also trying to extend cultivation and improve the output. The remodelled Sone Canal system has the objective of bringing in more land under cultivation. Horticulture is spreading and orchards are springing up in all parts. Urbanisation and industrialisation have given an encouragement to the extension of green belts. The uplands of the towns now grow vegetables.

Urbanisation and industrialisation have recently spread at the cost of a percentage of the cultivable lands. This is, however, a very negligible percentage and cannot affect the agricultural economy of the district.

IRRIGATION.

Agriculture depends mainly on the availability of water at proper time and in proper quantity. Lack or excess of water affects the crop prospects. Agriculture largely depends on rainfall. Rainfall is not a dependable source of water and so irrigation facilities are essential. In some areas in the pre-zamindari abolition days the *zamindars* used to maintain *ahars* and *pynes* which served the purposes of both irrigation and drainage. Ordinary wells have always been a good source of irrigation. The details of rainfall have been given in the text on 'General'. The average rainfall for the year is 44.5".

A rational distribution of rainfall in different seasons is necessary for proper cultivation and good harvest. Rainfall in the last week of May or the first week of June is beneficial for *bhadai* crops. This helps sowing of the crops. Rainfall during the last week of July and first week of August is essential for transplantation of paddy. Rainfall in the month of October determines the yield of paddy and also helps in preparation of land for *rabi* crops and keeps the soil moist for growth of *rabi* though these crops require rain at intervals also for their proper growth and good yield. *Hathia* rains in October in moderation is very useful but an excess of *Hathia* rainfall may cause a great damage. The importance of timely rains has its echo in some well-known proverbs which have been mentioned in the *District Gazetteer of Bhagalpur*.*

* *Bhagalpur District Gazetteer* (1962), p. 164.

As mentioned elsewhere this district has some distinct natural divisions. The greater part of the southern portion is unfit for cultivation owing to its rocky nature and thick forests in the hills. There are no good provisions for irrigation. Only a few villages are found scattered over the tableland, and sparse cultivation is done in the green valleys adjoining the hills. The valleys have a rich soil, well watered by the springs and produce excellent rice. Wheat, barley and mustard seeds are raised on the fields surrounding their homesteads which are protected by hedges of dry thorns against the ravages of wild pigs and other animals. There is abundance of pasturage during the rainy season. The pasturage becomes dry and arid in the summer but later grows some pulses and other *rabi* crops.

As mentioned elsewhere, the northern portion consists partly of old alluvium in the central tract and partly of newly-formed alluvium in a narrow strip between the old Patna-Buxar road and the Ganga. The tract lying in the Ganga valley is regularly flooded by the Ganga and usually remains under water for nearly four months during the rainy season. The Ganga brings with it a very rich soil and fertilizers and spreads them on the banks resulting in good *aghani* crops. The area is thickly populated and is very rich in livestock. Food crops other than rice, such as, wheat, barley, pulse, maize and sugarcane are also grown in rotation.

From Hunter's *A Statistical Account of Bengal* it is gathered that in his time the district was generally irrigated through reservoirs (*ahars*), wells and *pynes* (water courses). He mentioned as follows:—

"The *ahars* are filled partly from the *pynes* and partly by the surface-drainage of the adjacent lands. They are the property of the landowners, who keep them in repair and reimburse themselves by the higher rent they are able to obtain for lands which are watered in this way. The rice crop requires abundance of water at regular intervals; and to make the crop remunerative, the irrigation should be caused by a natural flow of water. The cost of lifting a sufficient quantity of water for the purpose is so great as to neutralise the profits that would otherwise accrue; so that when the cultivators are forced by deficient rainfall to raise water to irrigate their rice crops, they only lift the very minimum sufficient to save it from total destruction, trusting that an early fall of rain may still come. The check caused by an insufficient supply of water at any period of its growth, however, materially affects the outturn of the crop. The *rabi* or spring crops are invariably irrigated, except on the low-lying *Khadir* lands along the bank of the Ganges. Wheat and barley generally receive three waterings; peas from two to three; and

gram only one. Poppy requires seven or eight waterings, and sugarcane from six to twelve. According to Captain Heywood, the quantity of water given at one time hardly ever exceeds 6,800 cubic feet per acre, which would cover the surface to a depth of $1\frac{3}{4}$ inches. He estimates the water required by an acre of wheat and barley at 20,400 cubic feet the quantity required by peas at from 13,600 to 20,400 cubic feet; that required by gram at 6,800 cubic feet; and that required by poppy at from 47,600 to 54,400 cubic feet. The amount of water available for irrigation varies with the rainfall, but is always limited. Consequently, the area cultivated with crops requiring irrigation is also limited."*

The last District Gazetteer (1924) mentioned that the agricultural prosperity of the district depended on artificial irrigation, without which many tracts would be uncultivated, and the land would be unable to grow sufficient food crops to sustain its population. The four great sources of irrigation were artificial reservoirs, wells and the Sone canals all of which helped to supplement the natural supply of water and to compensate for its inadequacy or untimely distribution.†

Ahars are artificial reservoirs suiting the lie of the country and are meant to collect the rain water. These long shallow tanks were protected by small embankments and served as an artificial catchment basin for receiving the water coming down from the adjacent lands. From the *ahars* water channels (*pynes*) are constructed or *pynes* are made to the nearest stream or water-course. The *pyne* system, as observed in the last District Gazetteer (1924) was not so complete and extensive as in Gaya district but served approximately 179,000 acres. The maintenance of the *pynes* was the responsibility of the landlords and the rights of the tenants to the use of water were duly recorded in the *fard-pashi*. According to the last District Gazetteer (1924) private canals were comparatively unimportant in Shahabad, except in the Bhabua subdivision where irrigated 18,000 acres and in the Sasaram thana between the Kaimur Hills and the Sone. The *pynes* in this district are not elaborate works as in Patna or Gaya, but short, serving one or two villages only.

The third source of irrigation, namely, wells irrigated about 81,600 acres as mentioned in the last District Gazetteer (1924). The methods of drawing and distributing the water are common to the whole of Bihar—the use of the *latha* or lever. The use of the two other contrivances or raising water, namely, the *dona* and the *sair*,

* W. W. Hunter's *A Statistical Account of Bengal*, Vol. XII, p. 249.

† *The District Gazetteer of Shahabad* (1924), pages 74–77.

is limited.* "The *don* is a boat-shaped wooden scoop, attached at one end to a lever which has its fulcrum a little to the side, the lever being weighed at the other extremity with mud. This machine is used for lifting water either from the reservoirs (*ahars*) which are so numerous in the district or from a lower to a higher channel, where water is plentiful and the elevation small. The *sair* is used when the quantity of water remaining is small; it is a triangular basket made of bamboo with the edges raised on two sides; cords are attached to each angle, 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 until the basket reaches the level of the higher water-channel by which the field is to be irrigated."

The other source of irrigation which was vital for the district when the last District Gazetteer was compiled, namely, Sone canal continues to be vital now as well and will be discussed later.

It is not possible to find out the comparative figures of the area irrigated by *ahars* and *pynes* now. But we have figures of the areas irrigated by wells and the other sources.

The following statement will show the area irrigated (in thousand acres) by different sources from 1957-58 to 1960-61.†

Year.	Government canal.	Private canal.	Tanks.	Tube-wells.	Other wells.	Other sources.	Total area irrigated.
1	2	3	4	5	6	7	8
1957-58	656	..	285	13	126	91	1,171
1958-59	695	..	361	..	117	89	1,262
1959-60			Not available				
1960-61	716	Nil	295	58	83	101	1,253

As the head works of the Sone‡ canal system are located in Shahabad district and this system has been the most important source of irrigation in the district from the year it was constructed and particularly because a reorientation of the system has been taken in hand, it is very necessary to give a quotation *in extenso* of the description from the *District Gazetteer of Shahabad* (1924). The old description is of particular interest because of the re-orientation scheme which will follow.

* *District Gazetteer of Shahabad*, 1924, p. 77.

† From '*Bihar through figures*' published from Directorate of Statistics, Bihar, from 1957 to 1961.

‡ The river Sone is also mentioned as Son.

The last District Gazetteer mentions:—

"The sources of artificial irrigation just mentioned are, however, of minor importance as compared with the Son Canal system which has by far the greatest value as a factor making for the prevention of famine and the maintenance of continued prosperity among a people so dependent on agriculture and so vitally affected by the vicissitudes of the seasons.

"The idea of constructing works which would irrigate the districts bordering on the Son originated in 1853 with the late Colonel C. H. Dickens, who recommended to Government the construction of a series of reservoirs along the foot of the hills to catch the surface drainage and of canals to lead it over the plains country for use during the dry months. Subsequently, as the result of further investigation, he was convinced that the Son should be the source of supply and that the reservoir scheme was of secondary importance; and the subject was under discussion for several years, the preparation of detailed surveys and estimates being seriously interfered with by the Mutiny. Finally the Government of India decided that the execution of the project should be left to private enterprise, and it was offered to, and accepted by, the East India Irrigation and Canal Company which had already undertaken the Orissa and Midnapore canal works. In 1868, however, the interest of the Company was bought by Government for ten and a half lakhs of rupees; and the work of construction was commenced in the following year. Sufficient progress had been made in 1873 to allow of water being supplied, through cuts in the banks of the Arrah canal, to relieve the drought of that year; the canals were completed a few years later, and from the year 1876-77 water was supplied on payment of rates in a regular manner. They carry a maximum volume of 6,700 cubic feet per second, and about 75 per cent of the irrigation lies in Shahabad, 11 per cent in Gaya, and 14 per cent in the Patna district.

Canal system.

"The system derives its supply from an anicut across the Son at Dehri, and the general plan of the works comprises a Main Western canal, branching off from it on the left bank, and a Main Eastern canal branching off on the right. The anicut or weir, which is 12,469 feet long, consists of a mass of rubble stone laid to a

uniform slope and stiffened by walls of masonry founded on shallow wells. Twenty scouring sluices are provided at either flank; and these are fitted with gates which can be opened or closed at any state of the river other than high flood. By means of these gates the level of the water in the pool above the weir can be kept at the height required to feed the canals. The total cost of the anicut, which was begun in 1869 and finished in 1875, amounted to about fifteen lakhs of rupees.

"The total length of the main canals is 209 miles, of the branch canals 149 miles, and of the distributaries 1,235 miles; and in Shahabad there are 123 miles of navigable canals, 149 miles of canals used for irrigation and 897 miles of distributaries. The area provided with distributaries in this district is 1,105 square miles, the gross area commended (1,397 square miles) being contained in a triangle having Dehri for its apex, the East Indian Railway from Koelwar to Chausa for its base, and the river Son and Panjraon branch canal for its sides. The Main Western canal supplies the Arrah, the Buxar and Chausa canals, which all branch off within the first twelve miles, and is continued for a total distance of twenty-two miles, as far as the Grand Trunk Road, two miles beyond Sasaram. Its prolongation for a further distance of fifty miles to the frontier of the district, towards Mirzapur, was commenced as a relief work during the scarcity of 1874-75, but was never completed, as sufficient water was not available for the extension. The chief engineering work is the syphon-aqueduct of twenty-five arches, by which the Kao, a formidable hill torrent, is carried under the canal. The Arrah canal branches off from the Main Western canal at the fifth mile, and follows the course of the Son for thirty miles, when it strikes northwards, running on a natural ridge past the town of Arrah, and finally after a total course of sixty miles it falls into the Gangi Nadi, a local stream flowing into the Ganges. It is designed for navigation as well as irrigation, but owing to shoals at the point of junction with the main stream of the Ganges, navigation along the Gangi Nadi is only possible during the cold season. To overcome the total fall of 180 feet, thirteen locks were constructed, one of which has since been abandoned. Besides four principal distributaries, its main offshoots are the Bihia canal, thirty-one miles long, and the Dumraon canal, forty miles long. The Buxar canal,

which is also intended for navigation, leaves the Main Western canal at its twelfth mile and communicates with the Ganges at Buxar, after a course of forty-five miles; its main branch, known as the Chausa canal, has a length of forty miles. The total fall is 159 feet, which is overcome by twelve locks.

Canal revenue.

"When the construction of the canals was in progress, sanguine hopes of the revenue they would yield were entertained, but the event proved the fallacy of these early forecasts. In 1875 a yearly irrigated area of 10,43,680 acres was anticipated, and it was estimated that the net profits would amount to Rs. 26,40,530 and yield a return equal to 8.3 per cent on the capital outlay. It was expected that there would be a large return from navigation receipts; and a considerable sum (estimated at Rs. 66,85,606 or one-quarter of the whole capital outlay) was sacrificed in making the canals first class navigation lines. These hopes were falsified; the supply of water from the Son proved smaller than was anticipated, the maximum area ever irrigated being 6,19,033 acres (in 1920-21); in the five preceding years the average was 5,33,193 acres, and in 1911-12 the irrigated area was only 4,49,541 acres. The receipts from tolls have equally failed to realise the expectations originally entertained; and they have been still further reduced since 1900 in consequence of the construction of the East India Railway line in the south of the district. During the four years previous to the opening of that line, the navigation receipts averaged Rs. 87,600; but they fell to Rs. 36,500 in 1901, and the average annual receipts during the last five years were Rs. 23,900. The result has been that for many years the canals were unremunerative; and it is only during recent years that the return on the capital expenditure has exceeded 4 per cent. By the end of 1921-22 the total capital outlay amounted to Rs. 2,68,98,109, while the net revenue for the year was Rs. 15,37,513, yielding a return of 5½ per cent.

Effects of canal irrigation.

"Even though there was for many years a recurring loss on the canals, it has been compensated for by the great benefits which they have conferred on the tract which they serve. They have afforded it absolute protection against famine; they have increased the profits of cultivation; and they have enlarged the

material resources of the community. Even if only their value as protective works and the insurance they afford against famine are considered, their construction has been fully justified. The catchment areas of most *ahars* are small, seldom extending far beyond the village boundary, and, as they depend largely for their utility on the rainfall, the supply is uncertain and very often insufficient. The constant and ample supply of canal water available from the end of June to October presents, therefore, advantages which cannot well be overrated, especially as the private reservoirs are liable to fail just when they are most needed, in the beginning or end of the season. The result is that when rainfall is deficient or ill-distributed, the *rai-yats* are dependent on the water furnished by the canals, from which they can rely on obtaining enough to save their crops.

Protection from famine.

"Notwithstanding occasional years of scarcity and consequent distress, there is no record of any famine having ever occurred along the tract of country watered by the canals; and in spite of the fact that the area irrigable has been found to be much less than was originally contemplated, it is still sufficient in years of deficient rainfall to supplement, to a large extent, the failure of the crops in those portions of the district which the canals do not touch. Their great value in this respect has been strikingly demonstrated on several occasions. During the famine of 1873-74, even though the canals were not completed, the water which was supplied gratuitously from them saved a large portion of the crops. In 1877, a year of scanty rainfall, the prospects were so gloomy that, with a view simply to the production of more food, it was decided, at a certain sacrifice of revenue, to reduce the water-rate for the rice crop from Rs. 2-8 to Re. 1 an acre; and this measure led to a considerable demand for water, and the irrigated *kharif* rice proved a bumper crop. In 1888-89, distress and scarcity would have been the inevitable result of the total failure of the rains in September and October but for these irrigation works; all the *ahars*, except those with a large catchment area, dried up, the rice crop watered from them yielded an outturn of only a quarter of that given by the crops on canal irrigated lands; and the area irrigated from the canals was only circumscribed by the supply available. Again, in the famine of 1896-97, the portion of the district served

by the canals was entirely protected by the network of distributaries and village channels and remained immune from famine, when it attacked a large area which had not the benefit of this system of irrigation.

Canal Administration.

"The whole system is under the control of a Superintending Engineer, who is assisted by two Executive Engineers in the charge of Divisions. The latter are responsible for the maintenance of the canals, the conduct of irrigation operation and assessments, and a separate establishment is entertained for the collection of the revenue. For this purpose, there is a revenue division in charge of a special Deputy Collector, who sees to the collection of water-rates under the orders of the Superintending Engineer. The irrigated area under long leases 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. Applications for water are made by the cultivators on a prescribed form, the year being divided into three seasons, 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 of ten years, which provide for the supply of water during the *kharif* and *rabi* seasons only and are granted at a reduced rate. These long-term leases are only granted for compact blocks defined by well-marked boundaries of such a nature that the leased lands can be clearly distinguished from the adjoining unleased lands, and also so situated that unleased lands will not be ordinarily irrigated by water supplied for the land included in the block. These boundaries are mentioned in the application for the lease, on receipt of which a special report is submitted to the Subdivisional Canal Officer. If the lease is likely to be approved, he issues orders for the block to be measured, and a detailed *khasra*, or measurement of each cultivator's holding, is then made. The lease and the *khatiani* or demand statement are finally approved by the Divisional Canal Officer who issues the permit, but before this can be done, the majority of the cultivators who have fields within the block must sign their names against the areas which have been measured and which will be assessed in the block. Fields which

cannot be ordinarily irrigated, or for which canal water is not ordinarily required, can be excluded from the block, such fields being duly noted in the *khasra* or measurement paper. In these long-term leases water-rates are charged for the area measured and accepted by the majority of the cultivators, whether water is required or not; and the channel by which the area is irrigated must be registered as well as the name of its owner. In *rabi* and hot-weather leases water is supplied on application, and water-rates are levied on the actual areas irrigated, and not necessarily on those specified in the application. In order to assist the Canal Department in regulating and distributing water among the cultivators named in the leases, and in collecting water-rates, influential men of the village are appointed, in consultation with the cultivators concerned, to act as *lambardars* or headmen. Their duty is to assist in measurements, to give in the names of the cultivators of the different holdings, to see that water is properly distributed over the leased area, and to help generally in the collection of water-rates. For these duties they are paid a commission of Re. 1-9-0 (1.56) per cent on all assessments.

• *Water-rates.*

"There are five rates charged for the water supplied, viz., (1) *rabi* season leases from the 26th of October to the 25th of March at Rs. 3-8-0 an acre; (2) hot-weather leases from the 26th of March to the 24th of June at Rs. 7-8-0 an acre; (3) leases during the same period at Rs. 2-8-0 for each watering; (4) *kharif* season leases between the 25th of June and the 25th of October at Rs. 5 an acre; (5) ten years' leases for block areas for any kind of crop between the 25th of June and the 25th of March in the next year at Rs. 4-8-0 an acre. When the long lease system was inaugurated, it was calculated that water would be given for 50 per cent of the whole area of a village; and this portion was marked off into one or more well defined blocks, for the irrigation of which a charge was made at a reduced rate. The cultivator is supplied with water enough for his own block, but he may not use it beyond these limits; and it is, therefore, laid down that there must be a well defined village channel to conduct the water from the distributary, and that it is not to be allowed to escape to an *ahar*. At first, when the canals were opened, water was allowed to fill up the *ahars* and to be drawn thence on to the fields, but as soon as water-rates were claimed, the *rai-yats* maintained that they

had used only rain and not canal water; and as their allegation could not be disproved, it was found necessary to discontinue the practice of filling *ahars*. Of all these leases the most popular are the long leases, which are given only for the areas for which protection can be assured even in the driest years. The rates for this class of lease were originally fixed at a low figure owing to the backwardness of the cultivators in resorting to canal irrigation and to the fact that the use of canal water is not indispensable in years of ordinary rainfall; the holders of these leases have preferential claims to water during periods of high demand such as occur in dry seasons; and, as the cultivators have been quick to recognize the advantages of the system, the area under long leases has steadily expanded, until at the present day 61 per cent of the whole irrigated area receives water on long lease, and the demand for such leases cannot be fully met."*

The Sone canals consisted of $2\frac{1}{2}$ miles weir across the Sone at Dehri and two main channels, viz., Arrah and Buxar channels, with distributaries and sub-distributaries and parallel channels, besides private village channels, taking off from them. The total cost in the extension of the scheme was 2.78 crores. The Arrah and Buxar main canals have two divisions with headquarters at Arrah and Buxar respectively. The branch canals, namely, Behea and Dumraon canals, take off from the Arrah canal and is under the administrative control of the Subdivisional Officers, Sone Canal, Koath and Ramnagar, respectively. Two other branch canals, viz., Gara Chaubey and Chausa branch canals take off from the main canal and are under the jurisdiction of the Subdivisional Officers (Sone Canal) with their headquarters at Basawan and Manoharpur respectively. There are altogether 171 distributaries and sub-distributaries in the district and the total area irrigated by them is 6,90,972 acres.

The main western canal starting from Dehri was originally designed to carry a discharge of 4,342 cusecs up to five miles where the Arrah canal takes off and it was intended to irrigate 12,00,000 acres of *rabi* area. The total length of the main western canal is 22 miles. It was aligned in such a way as to escape heavy cutting 30 feet deep at Dehri. It curves round in a northerly direction from the head works and then bends to the west crossing Kao over a syphon at Meranpur and finally ends on the Grand Trunk Road, two miles west of Sasaram.

The Arrah canal which branches off at the 5th mile of the main western canal, curves back towards the river Sone, a course it follows up to the 30th mile. It strikes due north and runs on

* *District Gazetteer of Shahabad* (1924), pp. 77—89.

a natural ridge, passes Arrah and finally falls into the Ganga. The canal is 60 miles long from Dehri to the point where it enters the river but 10 miles more have to be traversed before the water reaches the Ganga. It is designed for irrigation and navigation as well. From Arrah canal two branch canals take off, the Behea and Dumraon branch canals.

Arrah Canal.

There are 29 distributaries and sub-distributaries under this canal system. The length of this canal is 130 miles and the total area proposed for irrigation is 87,572 acres.

The main distributaries under this canal system are Rajpur, Nasriganj, Kaithy, Sakla, Koilwar, Jaitpur, etc.

There are 23 distributaries and sub-distributaries in Dumraon branch canal and the length of these are 149 miles. The total area proposed for irrigation is 9,15,170 acres.

The Behea branch canal takes off from the Arrah canal, has 13 distributaries with 10 sub-distributaries and the total length is 113 miles. The area proposed for irrigation is 84,570 acres.

Similarly, the Buxar canal leaves the main western canal at the 12th mile and the maximum discharge is 1,950 cusecs. It is designed both for irrigation and navigation. The direction is generally north up to 29th mile and thereafter north-west up to the Ganga at Buxar. It commands the area between the rivers Kao and Dhanauti. The total length is 45 miles. It has 35 distributaries. From the Buxar canal, the Chausa Branch Canal takes off from 1½ miles to Kheri, Unwas Atrauna, Hathia and Rampur distributaries.

A statement given below will show the original discharge and the present discharge:—

Canals.	Original discharge in cusecs.	Present discharge in cusecs.	Expected discharge after remodelling of existing distri- butaries system in cusecs.
1. Main Western Canal	4,320	4,600	6,700
2. Arrah Canal ..	2,000	2,650	3,496
3. Dumraon Branch Canal	351	700	1,055
4. Behea Branch Canal	428	650	968
5. Buxar Canal ..	1,226	1,950	2,402
6. Chausa Branch Canal	623	628	1,020

The statement below supplied by the Superintending Engineer, Sone Circle, Arrah, will show the irrigated areas in the district from 1959-60 to 1962-63:—

	1959-60.	1960-61.	1961-62.	1962-63.
	Acres.	Acres.	Acres.	Acres.
Arrah Canal System	2,37,363	2,40,120	2,51,120	Not available.
Main Western Canal System ..	43,960	55,320	60,120	63,790
Buxar Canal System	1,64,316	1,70,120	1,70,720	1,72,900

After the remodelling of the Sone canal it is expected that the following additional areas will be brought under irrigation:—

	Acres.
Arrah Canal System	60,145
Buxar Canal System	44,115
Main Western Canal System ..	10,400

There are three different seasons for supply of canal water for different seasonal crops, viz., *kharif* season from the 25th June to 25th October, *rabi* season from the 26th October to 25th March and the hot weather season from the 26th March to 24th June. The number of watering is also different during the different seasons on which the calculation of water charge is based. The number of watering will naturally vary from season to season. In the *kharif* season there will have to be irrigation from 6 to 8 times; in the *rabi* season there will be watering for four times; the hot weather will require three waterings. The rates also differ. The rate per acre in the *kharif* season is Rs. 10, Rs. 6 per acre for the *rabi* season and Rs. 19 per acre for the hot season.

It has to be mentioned here that at present the Superintending Engineer, Sone Circle with his headquarters at Arrah, has three Executive Engineers instead of two as mentioned in the last District Gazetteer (1924). The headquarters of the Executive Engineers are at Arrah, Buxar and Dehri.

The revenue reported by the Superintending Engineer, Sone Circle, from 1952-53 to 1962-63 is as follows*:

Year.	Demand.	Collection.	Balance.
	Rs.	Rs.	Rs.
1952-53	1,33,922.82	3,089.78	1,30,903.04
1953-54	2,42,853.69	18,120.53	2,24,733.16
1954-55	2,53,075.10	39,292.82	2,13,782.28
1955-56	5,15,203.56	1,10,533.91	4,04,669.65
1956-57	5,34,474.93	1,18,764.01	4,15,710.92
1957-58	7,02,618.64	1,75,942.23	5,26,676.41
1958-59	11,57,787.53	3,96,434.94	7,61,357.59
1959-60	15,90,059.65	7,87,765.03	8,02,294.62
1960-61	25,32,299.37	13,17,827.05	12,14,472.32
1961-62	58,00,657.23	31,21,576.76	26,79,080.47
1962-63	79,07,205.94	3,10,388.70	48,03,325.24

* The figures also include the revenue of Gaya and Patna Divisions of Sone Canal because the separate figures for Shahabad district are not available as reported by the office of the Superintending Engineer, Sone Circle, Arrah.

The canals have been of immense boon to the district. They have improved the soil and have allowed inlet to certain accumulated drainage. The portion between Piro and Behea known as the jungle *mahal* is now a fertile rice bowl. Because of the canals many fallow tracts have come under cultivation and the cost of land has risen to Rs. 4,000 to Rs. 8,000 per bigha in place of Rs. 200 to Rs. 400 per bigha.

The canal system has provided cheap traffic for some merchandise. Previously, there used to be a paddle steamer service from Dehri to Arrah. In the agricultural economy of the district the canals play a great role. At the moment (1964) there is an Intensive Agricultural Programme (discussed elsewhere) in the canal irrigated area.

The Sone irrigation system built in 1868-74 has, however, been almost outmodel. The remodelling of the Sone canal system known as the Sone Barrage Project is described below.

Sone Barrage Project.

The present anicut is $2\frac{1}{2}$ miles wide. The excessive width caused heavy siltation on the upstream side and, year after year heavy recurring expenditure has had to be incurred in maintaining the anicut. The question of remodelling the anicut was examined several times during the last 40 years. It is no longer considered to be economical or technically dependable. It was felt that a remodelled barrage could be more useful. A similar anicut across the Krishna river in the Andhra Pradesh suddenly gave way in September, 1952. The matter was investigated and it was decided that the existing anicut should be replaced by a barrage about five miles upstream to Dehri.

The Sone Barrage Project consists of the three units, namely, the barrage on the river Sone, remodelling of the canal system and a high level canal system.

The barrage will be located at about five miles above the existing anicut and nearly six miles from Dehri-on-Sone Railway Station. To improve the flow conditions of the river at the barrage site, the width of the barrage has been kept at only 4,633 feet as against the river width of 12,500 feet. The barrage will have 50 spill-way bays and eight under-sluice bays on the left and four under-sluice bays on the right. A road bridge, 22 feet wide, will also be provided over the barrage. The barrage site will be connected with the Grand Trunk Road through the canal services roads on both the banks. This will provide suitable by-pass to the National Highway near Dehri town.

Link canals, about 6 miles long on either bank, will be constructed to feed the existing main western and eastern canals. The inland transport system on the Sone canals will be maintained through the link canals by providing navigation locks on either side.

The cost of the barrage and the link canals is estimated at Rs. 11,82,66,000 only.

The estimated cost of the Sone-remodelling work is Rs. 2.6 crore. With a more efficient regulation of the water supplies by the construction of the barrage and the utilisation of the additional discharge released by the Rihand Project in Mirzapur district (Uttar Pradesh), the remodelled Sone Canal System will irrigate an additional area of about 1.7 lakh acres of *kharif*, 40 thousand acres of *rabi* and 1 lakh acres of hot-weather crops within the Sone command.

Proposal for the construction of two high-level canals to irrigate additional areas in the upper reaches above the present Sone command is also under consideration. With these canals about 1.9 lakh acres of paddy, 48 thousand acres of *rabi* and 40 thousand acres of hot-weather crops will be brought under irrigation. Link canals will be constructed to carry the extra discharge required for this area.

Some of the salient features of the scheme are given in the table below:—

River-flow.

- (i) Catchment area—26,608 square miles.
- (ii) Average annual rainfall in the catchment—55 inches.
- (iii) Maximum observed flood—12,00,000 cusecs.
- (iv) Design discharge—14,50,000 cusecs.

The Barrage.

- (i) Length of Barrage—4,633 feet.
- (ii) Crest level of weir—River level 341.00 feet.
- (iii) Crest level of under-sluice—River level 339.00 feet.
- (iv) Average bed level—River level 340.00 feet.
- (v) Pond level—River level 355.00 feet.
- (vi) High flood level (observed)—River level 359.00 feet.
- (vii) Design High flood level—River level 360.40 feet.
- (viii) Maximum water level—River Level 364.94 feet.

Canal System.

- (i) Western Link Canals—
 - (a) Length—6.5 miles.
 - (b) Gross command—12.76 lakh acres.
 - (c) Full Supply discharge—7,883 cusecs.
- (ii) Eastern link canals—
 - (a) Length—6.75 miles.
 - (b) Gross command—4.24 lakh acres.
 - (c) Full supply discharge—4,250 cusecs.

- (iii) Additional yield of crops annually—
 - (a) Foodgrains—10.44 lakh maunds.
 - (b) Non-foodgrains—97.50 lakh maunds.
 - (c) Monetary value foodgrains—Rs. 138.64 lakh.
- (iv) Non-foodgrains—Rs. 140.40 lakh.

Progress of the implementation of the project.

The remodelling works are now nearing completion. A new head regulator has been constructed at Dehri to push in about 1,900 cusecs of water. The existing eastern head regulator was increased to push in an additional quantity of 400 cusecs. The main eastern and western canals including the structures have also been widened, wherever necessary. Some of the distributaries were out of use for a long time due to shortage of water at the tail ends. These distributaries are now expected to get water. New distributaries and minor ones have also been constructed in Shahabad district by which new areas for irrigation will be brought under the present command. About 60,000 to 1,00,000 acres of additional area has already been brought under irrigation within the present Sone command by the remodelling works.

Barrage and link canals.

Construction of the barrage, five miles upstream of the present anicut was started in November, 1962. The work is being done under contract system and there are several contractors. Heavy earth moving machinery worth about Rs. 20 lakhs was arranged by the Project Administration in advance and handed over to the contractors on hire purchase. Import licence for functioning additional machinery including the well point system, worth about Rs. 55 lakhs, was also arranged for direct purchase by the firm. All these machines have now arrived at the site of work and installed. Out of 132 lakh cubic feet of concrete, 23 lakh cubic feet in the western head regulator and under-sluice was done during 1962. It is proposed to do 77 lakh cubic feet of concrete required for completing the entire spill-way section of 60 bays during the current working season.

With a view to achieve economy, arrangement for getting cement in bulk has been made in the Rohtas Cement Factory after erecting a new silo and making arrangement for direct pumping to trucks. Another economy is being achieved by mixing 10 per cent fly ash to replace cement in the concrete without reducing the strength. Arrangement for getting the fly ash from Bokaro Thermal Power Station has been made. Investigations are afoot to get fly ash at a cheaper rate from Durgapur Thermal Power Station.

Link Canals.—Excavation on both sides is under progress. There is some difficulty in getting suitable contractors and this has affected the progress considerably.

The following statement will show the expenditure on the Barrage:—

Year.	Rs. (in lakhs).
1960-61	43.83
1961-62	1,02.01
1962-63	1,90.98
1963-64 (up to December, 1963) ..	1,27.21

Other Irrigation Schemes.

The Master Plan of Irrigation in Bihar published in 1959 has mentioned the following irrigation schemes of this district* :—

Sl. no.	Name of Scheme.	Estimated cost (Rs. lakhs.)	Total irrigable area ('000 acres).	Potential utilised up to 1958-59 ('000 acres).
1	Sone Canal (part) ..	2,14.64	6,14.00	6,14.00
2	Dehri-Sasaram Irrigation Scheme ..	58.00	34.00	34.00
3	P.B.B.E.B. Scheme (Part)** ..	16.00	6.80	6.80
4	Kao Irrigation Scheme ..	2.86	4.50	4.50
5	Durgawati Irrigation Scheme ..	32.16	26.00	20.00
6	126 Tube-wells, part of 350 tube-wells under 1952 T.C.A. Programme in Arrah-Buxar area.†	62.49	31.50	29.38
7	Suara Irrigation Scheme ..	15.50	9.00	6.60
8	Bharari Dam ..	3.00	2.10	1.50
9	15 Tube-wells, part of 35 tube-wells under 1953 T.C.A. Programme.	7.40	4.00	4.00

SCHEMES UNDER EXECUTION.

10	Kohira Reservoir Scheme‡ ..	60.34	25.50	..
11	Sone (Remodelling) Barrage Project (Part) 1.	3,12.00	3,25.00	..
12	New tube-wells ..	2.00	0.40	..

KARAMNASA SCHEME.

As regards Karamnasa Scheme the last District Gazetteer mentions as follows:—

“This sketch of the irrigation system in Shahabad would be incomplete without a reference to the proposal to extent irrigation works to the Bhabhua subdivision. This subdivision, like a part of Sasaram, is beyond the reach of the Sone waters; though 88,500 acres are irrigated from private works, it is still much exposed to drought; and the barrenness of the fields is all the more striking from its contrast to the fertile plains in the neighbourhood. The idea of utilizing the waters of the Karamnasa to irrigate this area is no recent one,

* *Master Plan of Irrigation in Bihar (1959)*, p. 7.

** This scheme was completed in 1961.

† Patna-Bihar-Bakhtiarpur-Ekangarsarai-Bihta Technical Colombo Aid.

‡ This scheme was completed in 1961.

and more than a century ago the Collector of the district suggested the construction of sluices with canals leading into the interior. In 1870 the Chief Engineer of Bengal left it on record that there was a magnificent site for a large reservoir; and subsequently the Indian Irrigation Commission of 1901-03 urged the importance of conducting a survey of the upper portion of its course where it passes through the hills, though they could not admit that the liability of the subdivision to famine was so great as to justify a large unremunerative outlay. It was ultimately proposed that the weir should be constructed in that part of the Karamnasa which lies within the United Provinces*, and that five hundred cusecs of water should be made available for irrigating the tract of country in the Bhabhua subdivision, but the idea of constructing the weir has been given up by the Government of the United Provinces, and therefore, the project has been abandoned. Investigations and surveys are now in progress with a view to the construction of reservoirs at suitable sites for conserving the water in the Shaura and Kora Valleys"†.

This scheme has not been taken up as yet. Investigation has been taken up. Other schemes for Bhabua have, however, been completed.

UNIFIED MINOR IRRIGATION DIVISION.

Minor Irrigation Schemes include *bundhs*, tanks, wells, *pynes*, small protective embankments, etc., as well as repairs of old minor irrigation works that had been carried out by the *zamindars* in the *zamindari* days. These minor irrigation schemes were carried out by three agencies, one under the Revenue Department since 1948, second by the Agriculture Department since 1946 and the third by the Community Development Department since 1954-55. Since 1960 these works are carried out by Unified Minor Irrigation Section under Agriculture Department.

The Unified Minor Irrigation Division since 1960 has taken up 47 schemes out of which about 24 schemes have been completed up to November, 1963. By the completed schemes about 14,317 acres of land are being irrigated and after completion of 23 schemes about 70,932 acres of land will be irrigated.

LIFT IRRIGATION DIVISION.

It was under the control of Sone Canal till 1958. In 1959 this Division was made separate and three divisions were created namely, Arrah, Buxar and Dehri. Besides, two mechanical subdivisions were also opened, namely, Tube-wells Mechanical Subdivision,

* Now Uttar Pradesh.

† *District Gazetteer of Shahabad*, 1924, pp. 83-84.

Arrah and Dehri. The main function of the Lift Irrigation is to irrigate fields by tube-wells on a prescribed charge.

There is an Executive Engineer, Lift Irrigation Division, to look after the working of the five subdivisions. He is under the direct control of the Chief Engineer, Irrigation Department, Patna. There are five Assistant Engineers and eight Sectional Officers, Mechanical, etc., under him.

These are the important schemes under this division:—

- (1) *Patna-Bihar-Barh-Ekangarsarai-Bihta-Scheme.*—This scheme was taken up in 1950-51. It has been executed by two divisions, viz., Lift Irrigation Division, Patna and Arrah. There are 25 tube-wells in this scheme in which 22 are under Arrah Division and rest under Patna Division. The tube-wells have been sunk in Sadar subdivision area. An area of 3,823 acres was irrigated during 1962-63 as against 3,730 acres in 1961-62.
- (2) *Hundred Tube-wells Technical Colombo Aid Scheme, Arrah-Buxar Area.*—This scheme was executed in 1953 by the help of Colombo Aid. Out of the 100 tube-wells under this scheme 55 tube-wells are under Lift Irrigation Subdivision, Buxar, and 45 tube-wells under Lift Irrigation Subdivision, Arrah. An area of 22,649 acres were irrigated in 1962-63 as against 21,271 acres in 1961-62.
- (3) *Hundred Tube-wells Technical Colombo Aid Scheme, Bihta and Bihar.*—It was also executed in 1953. Out of 100 tube-wells under this scheme 74 are under Lift Irrigation Division, Patna and 26 tube-wells under Arrah Division. Out of which 18 tube-wells are under Lift Irrigation Subdivision, Arrah, 7 tube-wells are under Dehri Subdivision and 4 tube-wells are under Buxar Subdivision. In 1962-63, 5,576 acres were irrigated as against 5,295 acres in 1961-62.
- (4) *Thirty-five Tube-wells Technical Colombo Aid Programme.*—Out of 35 tube-wells, only 15 tube-wells are under this division which are under the direct control of Lift Irrigation Subdivision, Buxar and have been sunk which irrigated 3,527 acres in 1962-63 as against 2,955 acres in 1961-62.
- (5) *Dehri-Sasaram Lift Irrigation Scheme.*—There are 95 tube-wells under this scheme under the control of Lift Irrigation Subdivision, Dehri and the area irrigated during the year 1962-63 was 32,656 acres as against 30,846 acres in 1961-62.

The statement below will show the area in (acres) irrigated from tube-wells from 1941-42 to 1960-61*:-

Sl. no.	Name of Scheme.	No. of tube-wells.	1941-42.	1942-43.	1943-44.	1944-45.	1945-46.	1946-47.	1947-48.	1948-49	1949-50.
1	2	3	4	5	6	7	8	9	10	11	12
1	Construction of Dehri-Sasaram Scheme before 1st Five-Year Plan.	95 Dehri-Sasaram Area.	2,807	3,502	5,280	5,980	6,717	9,016	15,715	13,647	17,057
2	Construction of** T. C. A. Scheme during 1st Five-Year Plan.	100 Arrah-Buxar side.				Not taken up till 1953-54.					
3	Construction of T.C.A. Scheme during 1st Five-Year Plan.	26 in Shahabad and 74 in Patna district.				Not taken up till 1954-55.					
4	Patna-Bihar-Barh-Ekangarsarai Scheme.	22 in Shahabad, 3 in Patna-Arrah-Koilwar.				Not taken up till 1953-54.					
5	T.C.A. Scheme during 1st Five-Year Plan.	15 in Shahabad and 20 in Patna.				Not taken up till 1954-55.					
6	Construction of Tube-wells in 2nd Five-Year Plan.	1 in Buxar and 4 in Arrah.				Not taken up till 1956-57.					
7	New Tube-wells under 2nd Five-Year Plan.	5 in Shahabad and 10 in Patna.				Not taken up till 1959-60.					
8	Shallow Tube-wells under 2nd Five-Year Plan.	3 in Shahabad				Not taken up.					

*Supplied from the Lift Irrigation Section of Arrah.

**T.C.A.—Technical Colombo Aid.

NOTE.—The figures mentioned above shows that there is increasing tendency to utilise water from tube-wells. It may be possible that the demand of water from tube-wells must have increased and that is why the figures seem to fluctuate.

Sl. no.	Name of Scheme.	1950-51.	1951-52.	1952-53.	1953-54.	1954-55.	1955-56.	1956-57.	1957-58.	1958-59.	1959-60.	1960-61.
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1	2	13	14	15	16	17	18	19	20	21	22	23
1	Construction of Dehri-Sasaram Scheme before 1st Five-Year Plan.	17,634	20,714	22,305	20,100	14,331	18,720	16,632	26,562	28,356	32,670	34,858
2	Construction of T. C. A. Scheme during 1st Five-Year Plan.					1,958	8,005	7,539	8,359	17,437	23,169	32,216
3	Construction of T.C.A. Scheme during 1st Five-Year Plan.						57	900	3,323	3,211	3,258	5,950
4	Patna-Bihar-Barh-Ekangarsarai Scheme.					2,931	322	581	323	3,211	3,256	4,618
5	T.C.A. Scheme during 1st Five-Year Plan.						57	170	234	3,067	3,918	3,713
6	Construction of Tube-wells in 2nd Five-Year Plan.								214	379	654	589
7	New Tube-wells under 2nd Five-Year Plan.											223
8	Shallow Tube-wells under 2nd Five-Year Plan.											

The statement below supplied by Lift Irrigation Division, Arrah, will show the revenue realised by the Lift Irrigation Division from 1957-58 to 1962-63:—

Year.	Revenue.
	Rs.
1957-58	7,89,885.97
1958-59	6,12,441.57
1959-60	6,05,711.24
1960-61	6,98,957.81
1961-62	5,87,558.24
1962-63	6,48,699.18

From the above table it appears that the revenue figures show fluctuating tendency. The fluctuation is due to the fact that during the year when the percentage of rainfall is high and well-timed, people do not usually purchase water with the result that the revenue figures will decrease.

The statement below supplied by the Lift Irrigation Division, Arrah, will show the rates of water purchased by the cultivators during 1963-64:—

Class of seasons.	Period.	Nature of crops.	No of waterings.	Rate.
				Rs.
Kharif	.. 25th June to 25th October.	Paddy, Marua, Kodo.	3 waterings Single watering.	9.00 4.75
		Wheat, Barley, Gram.	2 waterings	6.00
	26th October to 25th March.			
Rabi	.. "	Chillies and tobacco.	Single watering	7.00
	"	Early potato	4 waterings	4.20
	"	Double potato	9 waterings	34.00
	"	Late potato	6 waterings	23.00
Hot weather	26th March to 24th June.	Crop other than sugarcane.	2 waterings	7.00
	"	Sugarcane ..	3 waterings	19.00

SOIL.

Clay is the characteristic soil in the district and is the basis of all other formations. The greater portion of the southern tract is of rocky nature. Clay is found usually to the west of the Arrah-Sasaram Road and along the Ganga and to the north of the Grand Trunk Road. The varieties of soil are clay, loam, sand and rock.

The clayey soils are known as *kewal*, *matiar*, *karael* and *gurmat*. Loamy soil is generally known as *doras* and predominates to the south

of the Grand Trunk Road and also in the canal-irrigated areas. Sandy-loam is known as *balumati* or *baluar* and is generally found along the Sone and the Karmanasa rivers. Alluvium is a clayey soil and known as *kadai* and found generally on the bank of the Ganga.

About 50 per cent of the area is covered with clay and clay-loam. Sandy-loam and alluvium claim from 20 to 25 per cent of the area.

Admixture of sand alters the texture and the quality of clay and the soil is described clayey or sandy as is the position of clay or sand in the soil loams comes between the two extremes. *Doras* is a rich loam and grow good crops of rice, wheat, barley, sugarcane, mustard and linseed. The other varieties of sandy-loam is suitable for the cultivation of *rahar*, groundnut, sweet potato and water-melon.

Soil erosion is caused every year by the winds and the floods and the fast flowing current of the hill streams. In Bhabua subdivision where there is a large number of hill streams, erosion is caused to a less extent because the soil is loamy and hard. Silting generally takes place from the floods of the Ganga and the other tributaries of the Ganga. New beds are also raised by the Ganga and the Sone during the floods, known as the *diara*, which grow a variety of cucurbita and *rabi*. The clay is fairly retentive of moisture and is well suited for *rabi* and *bhadai* crops. Loam mixed with sand is called *balmat* or *balsunder*. Where the sand predominates it is called *sigta*. If such soil is of loose texture, it is called *dhus*, and when it is on a high level and hard enough to allow the water to flow readily of it is called *tanr*.

Soil consisting chiefly of fine sand (*bal* or *benga*) is common along a strip three miles broad on the west bank of the Sone. This soil requires continuous irrigation for producing good crops. Sandy soils which contain a large proportion of clay are good for the cultivation of rice, if they are benefited by canal irrigation. In the hills, the soil in the saucer-shaped valleys found between the undulating ridges consist of a rich vegetable mould swept down from above; and the low-lying strip about the Ganga consist of recent alluvium, known locally as *kadai*, which is periodically fertilised, by fresh deposits of silt.

PRINCIPAL CROPS.

The crops of the district fall under three main harvests, the *aghani*, *bhadai* and *rabi*. The *aghani* is the winter crop which is cut in the month of *Aghan* and is composed mainly of winter rice. The *bhadai* is the early or autumn crop, reaped in the month of *Bhado* (August-September) consisting of 60 days' rice (*Sathi*), *marua*, maize, millets and less important grains; while the *rabi* crop includes such cold weather crops as wheat, barley, oats, grams, pulses, etc.

The statement below will show the acreage of the principal crops from 1949-50 to 1960-61:—*

Years.	Rice (Winter).	Rice (Autumn).	Maize	Wheat	Barley	Gram	Marua	Jowar	Sugarcane.	Tabacco	
1	2	3	4	5	6	7	8	9	10	11	
1949-50	..	1,118,291	20,771	28,621	264,108	55,771	342,676	16,191	N.A.	33,866	133
1950-51	..	1,106,371	27,504	17,940	281,491	59,624	318,640	1,548	276	26,416	105
1951-52	..	1,032,321	34,975	30,274	255,652	48,295	302,055	3,241	3,446	38,174	87
1952-53	..	1,045,389	26,779	20,741	316,572	52,098	339,036	4,162	4,084	30,308	78
1953-54	..	1,044,563	19,934	20,605	272,179	49,486	329,518	3,407	3,291	20,652	44
1954-55	..	970,055	21,790	22,915	228,612	40,407	288,656	2,434	2,401	18,338	47
1955-56	..	1,034,229	15,791	26,396	274,007	50,606	301,083	2,403	2,700	21,090	59
1956-57	..	1,056,812	16,283	21,491	352,588	71,659	317,610	1,257	2,157	2,278	21
1957-58	..	1,115,778	18,485	29,513	250,307	44,889	296,677	1,980	1,127	25,082	23
1958-59	..	1,166,662	25,690	37,424	311,022	58,753	334,653	3,461	1,982	34,814	55
1959-60	..	1,148,914	27,622	37,095	331,275	59,518	328,895	2,780	1,690	35,205	54
1960-61	..	1,165,064	26,320	36,123	N.A.	N.A.	N.A.	2,731	1,461	N.A.	N.A.

*Agricultural Intelligence in Bihar (1961 No. 1)

*Agricultural Intelligence in Bihar (1961 No. 1).

Published from Directorate of Agriculture, Bihar, Patna, pages 3 to 13.

NOTE.—Some of these figures differ from the figures of acreage under different crops given in the District Census Handbook of Shahabad of 1951. The figures from the Shahabad District Census Handbook are as follows:—

Rice.	Wheat.	Maize.	Gram.	Arhar.
Acres.	Acres.	Acres.	Acres.	Acres.
1,110,000	317,342	23,722	366,000	40,135

(The figures are based on the average for five years ending with crop year, 1949-50).

Shahabad District Census Handbook, 1951 (Page 109).

The Bihar through Figures published by Directorate of Economics and Statistics (Bihar), 1961, pages 36 to 38 gives the figures as follows:—

Year.	Rice (Autumn and winter).	Wheat	Barley.	Maize.	Marua.	Gram.	Masoor.	Arhar.	Khesari.	Peas.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1960-61	.. 1,191,000	326,000	54,000	36,000	3,000	295,000	45,000	36,000	614,000	24,000

Some of the figures, however, differ.

Rice.

The variety known as *bhadai* rice is sown broadcast in the month of June and harvested in September, taking nearly 60 days in all. *Sathi* is a principal variety.

The *aghani* or winter rice forms the greater part of this crop. It is sown broadcast in low level areas where the water is deep and transplanting is not possible. It is also transplanted on such lands where water can be stored but can be drained out. Seedlings are raised at the beginning of the monsoon in particularly selected plots well inundated. From these nurseries the seedlings are taken out and are planted in rows of two to three inches apart in watered fields, which have been ploughed and reploughed three to four times till the whole field is reduced to soft mud. The traditional method of rice-cultivation is very cumbersome and do not yield much produce, as sufficient land is used for bunding. The rice plant is then left to mature for nearly 15 days. After about 15 days, water is drained out and the field is left to dry for another 15 days, and then the first weeding is done. The field is again flooded, a practice known as *nigar*. The *Hathia* rains are the most important for *aghani* rice and are required to mature the rice plant if sufficient irrigation is not provided. If there will be no rainfall at this period the rice crop is usually liable to fail. In that case the plants will be used only as fodder and no grain will be available.

A noticeable feature of rice cultivation is the way in which it is conducted scrupulously according to astral movements (*Nakshatras*). The seed-beds throughout the district are sown within a period of 15 days in the *Adra Nakshatra* which lasts for about 15 days from about the 20th June to the 5th of July (approximately). Transplantation from the seed-beds goes on during the *Punarbash*, *Pus* and *Asres Nakshatras* (from about the 18th July to 15th August). The water in the field is drained out in *Utra Nakshatra* (from about the 12th to 28th September), a period, when as a rule, there is a little rain, and after the exposure of the soil to the air and the sun during the heavy rain of the *Hathia Nakshatra* (from about the 26th September to 7th October). 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 again drained off and the plants are left to mature till the *Bisakha Nakshatra* (from about the 26th April to 10th May).

The rate of produce (output) is about 34 maunds per acre of early paddy and 30 maunds of late paddy. The straw (*pual*) is used as fodder and for roofing the house.

Wheat and Barley.

Wheat is another important crop of the district and occupies 3,26,000 acres as mentioned in the statement for 1960-61. It is generally sown broadcast in October to November on sandy-clayey

and sandy-loamy soils and requires four waterings and harvested in the month of February-March. Its cultivation is done mostly in the canal irrigated areas. It is also sown on lands, where an early crop of rice is harvested. It is accompanied with gram, linseed or mustard seed. The straw (*bhusa*) is used as fodder. The stubble is grazed. Barley is generally sown broadcast and requires four waterings. The cultivation of barley occupies 59,518 acres as mentioned earlier. The yield of wheat per acre is 12 maunds and of barley is 10 maunds.

Gram.

Gram is by far the most important among the pulses, grown in the district and is grown on 2,95,000 acres as mentioned in the figures of 1960-61. Gram is used as pulse. Pounded and processed gram known as *sattu* is a popular and cheap food.

Other pulses.

Among other pulses are rahar grown on 36,000 acres in 1960-61, khesari grown on 6,14,000 acres and masuri on 6,000 acres in 1960-61.

Oilseeds.

The chief among the oilseeds is linseed and is grown on 36,809 acres according to the figures of 1959-60. It is either grown as a single crop or accompanies *masuri* or wheat. Mustard is another important oilseed and is sown broadcast during September-October and harvested a fortnight before the wheat harvest.

Sugarcane.

The important among the crops of the district other than rice and wheat is sugarcane. It was grown on 37,000 acres as mentioned in 1960-61. Sugarcane is a new crop in the district. Very little of it was grown four or five decades back. At that time the cultivation of opium was intensively done. But since the cultivation of opium has disappeared its place has been taken by sugarcane. Sugarcane goes to the sugar mills and a quantity is used for making *gur*. Gur-making is a cottage industry and is done in many villages. The yield of sugarcane per acre is about 230 maunds on the average. The sugar factory is at Dalmianagar.

Area and yield during normal years.

In the earlier statement we have discussed the area under the principal crops from 1949-50 to 1960-61. The corresponding figures of the yield as given in *Agriculture Intelligence in Bihar* (1961 No. 1) are as follows:—

The statement will show the outturn (in tons) of the principal crops from 1949-50 to 1960-61*:-

Year.	Rice (Winter).	Rice (Autumn).	Maize.	Wheat.	Barley.	Gram.	Sugarcane.	Tobacco.
1	2	3	4	5	6	7	8	9
1949-50	2,84,275	3,813	3,249	42,786	12,306	51,989	32,619	27
1950-51	2,00,054	2,766	5,641	51,288	9,528	41,670	26,747	12
1951-52	2,49,136	2,207	8,931	41,995	7,211	45,205	18,659	23
1952-53	2,93,252	3,544	7,848	96,871	13,741	97,894	33,908	39
1953-54	3,91,332	2,298	9,152	60,590	11,616	68,029	12,898	14
1954-55	2,27,903	2,168	7,189	66,344	15,363	63,198	15,739	29
1955-56	3,62,381	2,483	7,515	48,315	8,496	37,710	1,71,805	4
1956-57	3,29,876	2,263	7,593	46,239	10,424	33,135	51,903	4
1957-58	3,10,908	4,752	10,050	53,239	9,210	66,480	1,97,175	2
1958-59	5,26,569	4,538	9,870	89,117	12,496	69,089	5,73,038	9
1959-60	4,09,934	4,164	7,114	72,772	8,855	66,450	5,28,075	18
1960-61	4,40,882	N.A.	18,803	N.A.	N.A.	N.A.	N.A.	N.A.

* *Agricultural Intelligence in Bihar* (1961 No. 1) Published from Directorate of Agriculture, Bihar, pages 14 to 22.

The book *Bihar Through Figures* (published from Directorate of Statistics, 1961—pages 42 to 44 mentions as follows regarding the produce in tons during 1960-61. The figures differ from the above figures :—

Year	Rice (Autumn and winter).	Wheat.	Barley.	Maize.	Gram.	Masoor.	Arhar.	Khesari.	Peas.
1960-61 ..	4,52,000	90,000	13,000	19,000	69,000	8,000	10,000	1,33,000	5,000

FRUITS AND VEGETABLES.

The principal fruits of this district are mango, *lichi*, *bel*, guava, limes, lemon, jackfruit and custard apple. In some private gardens peaches, grapes, etc., have also been grown.

Mango, the principal commercial fruit of this district occupies the larger acreage and the variety of *Malda* of this district has a good market. Other popular varieties of mango are *Mithua*, *Bombai*, *Krishnabhog*, *Kalkatia Malda*, *Sipia*, *Sukul* and *Bathua*. Among these, *Mithua* and *Bombai* are the early ones, *Krishnabhog*, *Kalkatia Malda* mid-season, *Sipia*, *Sukul*, *Fazli* and *Bathua* are the late season varieties. *Bathua* a typical late season cheap variety of this district which starts appearing in the market from the end of July to August and continues till the middle of October. Growing plenty of *Bijoo* or inferior varieties of small fruits is another remarkable feature of this district.

Next to mango is the acreage under jackfruit. Besides *Aola* is grown in plenty in the Kaimur hills. Guava, a popular fruit of this district, also occupies a fair acreage. Transport facilities in recent years have widened its market.

All the common vegetables like spinach, cucurbita, cauliflower, cabbage, carrot, beet, etc., are grown. A good quantity of potatoes, brinjals, onions, *parwals*, etc., are grown. A description of the vegetable market will be found in the text on '*Banking, Trade and Commerce*'. *Mahua* flower is used for making an intoxicant beverage. It is also dried and eaten by the poorer section.

AGRICULTURAL IMPLEMENTS.

Various kinds of indigenous agricultural implements are widely used. The wooden-plough with iron shear, harrow, hook, ladder, sickle, etc., are some of the common implements. Modern implements have also been introduced but the response from the cultivators to use them is not very encouraging. Mould Board Ploughs known as *Kulti* are quite popular in the district. Some improved agricultural implements like the Bihar plough (senior and junior), Bihar cultivation, Bihar ridger (senior and junior), Japanese rotary hoe, Japanese paddy weeder and tractors are getting popular.

The indigenous *rahat* pumps and *lathas* are widely used for irrigational purposes along with the modern pumping sets.

The statement below will give a comparative picture of the agricultural implements in the district*:-

Year.	Wooden ploughs.	Iron ploughs.	Tractors.	Oil engines.	Electric pumps.	Sugarcane crushers.	
						Power.	Bullocks
1	2	3	4	5	6	7	8
1945	..	1,41,021	569	16	93	15	169
1956	..	1,97,218	3,377	61	508	86	858
1960	..	2,70,767	8,330	100	818	120	1,020

SEEDS.

The chief agencies of seed supply are the large cultivators, village merchants and the State Government. The bulk of the seed is supplied through the village merchants and agencies of the State Government. Seed multiplication schemes have been undertaken by the State Government, for which 33 seed multiplication farms have been established in this district.

There are four subdivisional farms in the district. The Arrah Farm was established in 1957, Buxar Farm in 1958, Sasaram Farm in 1958 and Bhabua Farm in 1957. All the farms have 25 acres of land. These farms along with the 33 multiplication seed farms have been able to improve the seeds. The seeds produced in the seed multiplication farms are given to the registered growers who multiply them and return a portion to the Government agency. The Block Development authorities have to see that good seeds are made available.

Subdivisional Agriculture Farm, Mahdah.

This farm was visited with a view to see its working and its impact on the villagers in the neighbourhood. The farm was started in 1958 at village Mahdah, 6 miles south of the Buxar town on the Buxar-Itarhi road. The road is in a very bad condition.

The staff consists of one Agriculture Inspector, one Farm *Sardar*, one *Chaukidar* and five Ploughmen and one Cattle Attendant. The Agriculture Inspector is in overall charge of the farm and is under the Subdivisional Agricultural Officer whose headquarters is at Buxar.

The farm is in 50 acres. Paddy and wheat are grown besides, *jawar* for fodder purposes and *Dhaincha* for green manuring and some gram and barley are also grown. The farm does not cultivate vegetables excepting a very small quantity of brinjals and onions. A portion of the farm, about five acres require reclamation, and is lying fallow. It has been ascertained that this could only be reclaimed by a tractor and there is no tractor available. There is a tube-well. The total capacity is 15,000 gallons per hour. The tube-well is

* The figures of 1945 and 1956 have been taken from the *Bihar Statistical Handbook*, 1957, pages 53-54 and the figures of 1960 have been collected from Agriculture Office.

exclusively meant for this farm. Ordinary earth-cut channels carry the water to the different portions of the farm.

It has been ascertained that the average yield per acre for different crops is as follows:—

- (1) Paddy—25 mds.
- (2) Wheat—10 mds.
- (3) Gram—10 mds.
- (4) Barley—10 mds.

This yield could be compared to the average yield in other parts of the village where the cultivators do not manure so lavishly but have got facilities of irrigation. Such cultivators get about 15 to 20 maunds of paddy and about 8 maunds of wheat per acre. Some of the villagers that were met with mentioned that they cannot use more fertilisers for want of money. They know that if more fertilisers are used and better irrigation is made, their land could yield more.

This farm multiplies improved seeds received from Ranchi, Bhagalpur and Patna. After multiplication, the seeds are supplied to the villagers at the rate of Rs. 14 per maund. The real benefit that this farm confers to the villagers around is the availability of improved seeds and technical skill if they require. The villagers can purchase the seeds direct from the farm.

For storage purposes there is a small room which is apparently quite inadequate to store the grains. There are 10 *Hariana* bullocks for ploughing purposes. The bullocks are well maintained.

The Agriculture Inspector gave the following figures of the quantity of seeds distributed in maunds:—

- 1960-61—734.
- 1961-62—842.
- 1962-63—910.
- 1963-64—943.

MANURES.

Cowdung, the cheapest and the best manure is still burnt as fuel in many households. Farm-yard manure is not much in use. No particular care is taken to produce a balanced farm-yard manure with good chemical properties. Common ash is often used.

Besides farm-yard manure, composts and fertilizers are also in use. Experiments on manures are being conducted to suit the different crops and soils by the Agriculture Department. Fertilizers are sold through the Credit Agricole Depots and their agents. There are 20 Credit Agricole Depots in the district for the sale of chemical fertilizers to the public. The demand for the fertilizers is on the increase. There are many villagers who still think that ammonium sulphate, ammonium nitrate, ammonium phosphate, superphosphate are no better than cowdung and oil-cakes.

The Agriculture Department has been endeavouring to teach the average cultivator as how to make a proper farm-yard manure or compost or what are the greens that could be used as manure.

In the rural areas the cultivators prepare their own compost. Cowdung, farm refuse, etc., are collected in a pit and are allowed to decompose to farm compost. The pits are opened after one year and the farm-yard manure thus prepared is taken to the field.

There is still a vast scope for the propagation of the use of leaf manure and legumes. There is also the need for more spread of knowledge of correct use of the fertilizers. The intensive Agriculture Programme commonly known as the Package Programme has been doing a lot of work in some of the canal-irrigated area for such spread of ideas.

ROTATION OF CROPS.

The knowledge of the need for rotation of crops has been there since time immemorial. The common cultivator knows that a plot of land requires rest and rejuvenation and that the same crop being grown year after year will exhaust the land quickly in case the crop requires more sustenance. The ordinary cultivator even before the fertilisers came in, knew that the soil has to be enriched by cowdung, common ash, leaf-mould and the droppings of the cattle or human excreta. W. W. Hunter had mentioned that sugarcane was never grown twice in succession on the same land. Many of the *rabi* crops, specially those which, like, *rahar*, occupied the soil for several months were usually alternated. On the other hand, the great spring crops, such as, wheat, barley, were generally grown on the same land year after year. Paddy also was invariably grown on the same land*.

Rotation of crops is observed particularly in the case of more exhausting crops, such as sugarcane. Crop rotation conserves the soil and improves the fertility and increases the quality and quantity of the crop. It also controls the incidence of crop-diseases and weeds. The following rotation of crops is usually followed:—

Kharif.

- (1) Early paddy.
- (2) Green manure.
- (3) Maize.
- (4) Maize and *Arhar*.
- (5) Maize.
- (6) Paddy.
- (7) Paddy.
- (8) Maize and green manure.
- (9) Maize.

Rabi.

- Wheat or barley.
Wheat.
Barley or wheat.
Arhar.
Potato.
Gram or *Khesari*.
Gram or wheat.
Gram.
Sugarcane.

* W. W. Hunter's *A Statistical Account of Bengal*, Vol. XII (1877), p. 250.

Cultivators generally sow mixed crops as the seeds of the cultivators are diversified and most of them hold small holdings. The crops usually grown together are (i) maize, *arhar* and turmeric; (ii) maize, *urid* and *moong*; (iii) wheat and gram; (iv) barley, gram and (v) wheat and mustard.

The cultivators do not always allow margin of rest to the land. This is not correct. A small gap between the *rabi* and *kharif* crops should be given.

DISEASES AND PESTS.

The diseases and pests in this district are common to the other districts as well. The common pests of paddy are the rice *Gundi Bug* and rice case-worm. The first generally attacks the early paddy at the flowering time and sucks the juice at the fruiting stage. The latter is common to both the *Bhadai* and *Aghani* paddy and damages the growing plant at all the stages of its growth. Both of them are very harmful.

Borers are also commonly found doing damage to the maize and sugarcane crops. They bore holes into the stems of the plants and cause considerable stunting of growth and driage. Spraying with insecticides such as strong crude emulsion oil at the early stages of attacks is useful.

Crickets and hoppers are common in *rabi*. They damage the crops by cutting the plants at their base and eating away their leaves. Clean cultivation and irrigation are good preventives. Irrigating the fields with crude emulsion oil or flooding them with water mixed with kerosene oil is extremely beneficial.

Mango-hoppers are serious pest in the mango orchards of the district. The juice of the young shoot and flower buds or the entire inflorescence is sucked up. A characteristic fungus grows and the whole crop is lost. Spraying with resin soap, kerosene or crude oil emulsion and weak mixture of sulphate and lime help in combating these hoppers.

The traditional method to prevent pests and diseases is the simple use of liquid cowdung and ash.

PACKAGE PROGRAMME IN THE DISTRICT.

Out of 41 Community Development Blocks, only 20 blocks have been selected since 1960-61 for the implementation of the Intensive Agricultural District Programme.

The statement below will show the acreage in 1959-60 under the principal crops in each intensive agricultural district programme blocks:—*

Block.	Paddy.	Sugarcane.	Barley.	Gram.	Barley and Gram.	Wheat.	Wheat and Gram.	Wheat and Barley.	Potato.
1	2	3	4	5	6	7	8	9	10
1. Udwantnagar ..	26,435	39	131	1,071	2,456	1,091	9,225	83	361
2. Dinara ..	63,262	436	486	2,675	1,233	10,269	11,551	35	122
3. Mohania ..	33,861	802	158	7,488	1,597	5,259	15,057	30	131
4. Dehri ..	21,444	3,998	1,039	526	913	3,816	4,077	1,222	1,270
5. Buxar ..	19,310	205	354	3,288	4,926	2,770	9,404	325	342
6. Dumraon ..	34,330	3,222	596	2,206	2,529	3,340	9,588	472	504
7. Nasriganj ..	30,030	573	460	613	814	5,066	7,073	392	362
8. Raipur ..	64,494	406	610	2,011	4,510	10,323	9,035	148	242
9. Sahar ..	38,228	634	493	1,411	1,874	1,783	7,524	9	32
10. Tarari ..	36,171	699	197	1,556	1,538	2,968	6,292	42	464
11. Kargahar ..	64,272	517	395	7,013	599	14,025	18,963	3	59
12. Itarhi ..	37,027	352	459	1,382	2,394	4,358	7,243	623	172
13. Bikramganj ..	40,385	694	461	568	551	6,308	4,633	106	315
14. Nokha ..	41,607	435	238	1,469	523	7,886	3,889	67	107
15. Charpokhari ..	27,756	404	201	544	643	1,876	5,990	24	135
16. Nawanagar ..	33,627	1,893	384	3,544	2,580	1,676	8,830	148	216
17. Piro ..	43,045	887	524	769	1,033	6,112	9,015	418	360
18. Jagdishpur ..	49,871	2,006	837	1,474	2,481	6,689	8,010	178	776
19. Karkat ..	37,824	1,131	410	883	682	3,973	9,019	108	561
20. Dwath ..	31,832	583	465	343	544	5,383	2,961	299	439
TOTAL ..	7,74,811	19,966	8,898	41,142	34,371	1,04,966	1,67,374	4,732	7,320

*Supplied from the Package Office, Arrah.

As a result of the concentrated and co-ordinated efforts under the Intensive Agricultural District Programme, it is estimated that there will be an increase in agricultural production by about 2,78,270 tons at the end of the 5th year, i.e., 1964-65, over the base production of about 4,70,183 tons during base year 1959-60. This means an increase of about 59 per cent over the base production. This is, of course, the aim only.

Procedure of Work.

So far as the procedure of work is concerned an attempt is made to educate the village institutions, namely, the Gram Panchayat, Co-operative Societies and the farmers in the process of improved agricultural practices and the benefits accruing from the same. A schedule of technical recommendations for the area of each block under the programme is prepared and given wide circulation and publicity through mass meetings, group discussions and the individual contacts with farmers. Technical recommendations are prescribed for the area of each block. The recommendation regarding the quantities and varieties of fertilizers to be used are based on the experiences of crop response on the basis of the experiments conducted by the Field Experiment Service.

On the basis of the Package of Practices a Farm Production Plan is prepared for each family which agrees to adopt the recommended practices. The contents of the Farm Production Plans are as follows:—

- (a) The existing agricultural situation of the farmer, his resources, methods of cultivation and level of production.
- (b) The recommendations made for achieving the optimum production in individual farmer's condition.
- (c) The financial implications, in terms of extra expenditure, involved in the implementation of the plan.

All the credit required by the farmers for implementation of Farm Production Plans is obtained by them from the Co-operative Societies concerned, which in turn, borrow from the Central Co-operative Banks and the State Co-operative Banks respectively. Any farmer, who wants to participate in the programme and have a Farm Production Plan prepared, which he cannot finance out of his own resources has to be a member of the Co-operative Society of the area and has also to contribute the required share capital to enable him to borrow the amount required for the implementation of his Farm Production Plan.

Ordinarily, a member can borrow from a Co-operative Society, only up to Rs. 200 on personal security and for amounts above this, it is necessary to mortgage land. In view of the specific recommendations for the loan on the basis of the Farm Production Plan, the

issue of the major portion of the loan in kind and the intensive supervision of the proper utilisation of the loans and supplies under the Intensive Agricultural District Programme, this rule has been relaxed and any farmer participating in the Intensive Agricultural District Programme can borrow up to Rs. 750 each for the *kharif* and *rabi* seasons, subject to the credit requirements indicated in his Farm Production Plan.

Some of the broad achievements of the programme are briefly mentioned below.

The coverage under the programme has been increasing as the following figures supplied by the Package office would indicate:—

	Rabi. 1960-61.	Kharif. 1961.	Rabi. 1961-62.	Kharif. 1962.	Rabi. 1962-63.	Kharif. 1963-64.
1	2	3	4	5	6	7
No. of blocks covered ..	6	12	20	20	20	20
No. of villages covered ..	174	540	1,276	2,235	2,103	2,687
No. of farmers covered ..	2,032	8,954	11,667	35,702	23,755	44,485
Area in acres covered ..	2,627	20,593	19,724	1,23,548.23	60,085	2,35,262

The following comparative figures of the last four years would indicate that there has been a considerable increase in the consumption of chemical fertilisers in this district since the introduction of the Intensive Agricultural District Programme:—

	1959-60. (in tons).	1960-61. (in tons).	1961-62. (in tons).	1962-63. (in tons).	1963-64. (in tons).
1	2	3	4	5	6
1. Nitrogenous	6,283	8,160	10,686	14,355	10,880.89
2. Phosphatic	478	917	3,255	4,542	6,009.64
3. Potassic	Nil	9	418	533	683.41
4. Mixture	Nil	337	1,070	3,024	1,682.42

Besides, the depots of the Bihar State Co-operative Marketing Union, a large number of co-operative societies have been appointed sales agents of the Marketing Union for sale of chemical fertilizers, which have been made available within the easy reach of the farmers.

There has been an increase in the distribution, exchange and saturation of improved seeds in the Intensive Agricultural District Programme. Some varieties of improved seeds of paddy (early Aman Variety, BR-34) and wheat (NP-798 and NP-799) are fairly popular, extensively used and preferred over other varieties. The total quantity of improved seeds distributed and exchanged during the different seasons in the Intensive Agricultural District Programme is as follows:—

Year.		Rabi. (In maunds.)	Kharif. (In maunds.)
1960		1,800	..
1961		12,662	4,799
1962		22,769	17,469
1963		33,402	54,358

The use of insecticides has also increased in the Intensive Agricultural District Programme area. Sale centres for insecticides have been opened in each Intensive Agricultural District Programme Block. About 90 thousand pounds of pesticides were used in the district during 1959-60 and over 2 lakh pounds during 1963-64.

A step has been taken towards the introduction of improved agricultural implements. About 5 thousand Mould Board ploughs, 744 paddy weeders and 184 other implements have been sold to the farmers in the package area so far (1963-64).

IMPACT OF PACKAGE PROGRAMME ON THE AGRICULTURISTS OF BUXAR BLOCK, DISTRICT SHAHABAD.

The package programme, i.e., Intensive Agricultural District Programme was started in the district as well as in the Buxar Block in 1960 for making an intensive improvement in agriculture of the agriculturists living in the area.

An investigation was made by the Research Assistants of Gazetteer Revision Branch in February-March, 1964 in Buxar Block. Three villages, viz., Kamarpur, Sonbarsa and Pandeypur were studied.

The details regarding the villages visited and persons examined are given below:—

- (1) *Village Kamarpur.*—The village is at a distance of about five miles towards west of Buxar town. It has an area of 627 acres with 75 occupied houses according to the figures supplied by the Buxar Block Office. The total population is 1,134, i.e., 591 males and 543 females. The Bhumihars and the Koiris form the majority in the village. In the course of the investigation, twelve

persons were examined. The details of the respondents are given below.

The study of the impact on some of the farmers in the village participating in the programme was analysed. The names of the farmers of the said village are as follows:—

Sl. no.	Name of the Cultivator.	Caste.	Total land.	Kharif land.	Rabi land	Land under Package Programme.			
						1960.	1961.	1962.	1963.
1	2	3	4	5	6	7	8	9	10
			Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1	Sri Ram Nagina Rai	Bhumihar	12	8	4	1	1	1	2
2	Sri Ram Dutta Singh	Ko ri	16	12	4	2	3	4	4
3	Sri Sidh Nath Rai	Bhumihar	32	25	7	3	3	4	6
4	Sri Kesho Giri	Goasain	6	4	2	Nil	Nil	1	2
5	Sri Nandji Singh	Koiri	6	3	3	Nil	Nil	Nil	2
6	Sri Kapildeo Singh	Koiri	25	17	7	Nil	1	3	5
7	Sri Sudama Rai	Bhumihar	32	25	7	6	8	12	16
8	Sri Jitan Rai	Bhumihar	10	7	3	Nil	Nil	1	2
9	Sri Sukhen Singh	Koiri	10	6	4	Nil	1	1	2
10	Sri Ram Yash Singh	Koiri	10	7	3	Nil	Nil	1	3
11	Sri Radha Singh	Koiri	10	7	3	Nil	Nil	2	3
12	Sri Satyadeo Rai	Bhumihar	10	8	2	Nil	Nil	1	2

(2) *Village Sonbarsa.*—The village is at a distance of about twelve miles towards south-west of Buxar town. It has an area of 306.40 acres with 70 households according to the figures supplied by the Block Office. The total population is 1,132, i.e., 618 males and 514 females. Brahmins form the bulk of the villagers. Details regarding the persons examined are given below:—

Sl. no.	Name of the cultivator.	Caste.	Total land.	Kharif land.	Rabi land.	Land under Package Programme.		
						1961.	1962.	1963.
1	2	3	4	5	6	7	8	9
			Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1	Sri Hargovind Rai	Bhumihar	25	3	22	1	4	12
2	Sri Ram Kewal Mishra	Brahmin	12	2	10	1	8	9
3	Sri Bachajee Mishra	Brahmin	10	1	9	Nil	1	5
4	Sri Ram Lakhan Ahir	Gwala	3	Nil	3	1	2	2
5	Sri Harihar Mishra	Brahmin	24	3	21	1	6	10
6	Sri Bajrangi Mishra	Brahmin	10	2	8	1	5	7
7	Sri Dhan Mishra	Brahmin	20	3	17	Nil	7	15
8	Sri Udaya Mishra	Brahmin	20	2	18	Nil	Nil	3
9	Sri Sarbeshwar Mishra	Brahmin	10	2	8	1	2	7
10	Sri Ram Tyagi Mishra	Brahmin	10	1	9	1	2	3
11	Sri Sheo Prasad Lall	Kayastha	3	1	2	1	1	2
12	Sri Nokhlall Mishra	Brahmin	24	3	21	1	4	8
13	Sri Raghubar Mishra	Brahmin	16	2	14	1	2	7
14	Sri Chogan Pandey	Brahmin	7	Nil	7	1	1	3
15	Sri Bashitha Mishra	Brahmin	10	2	8	1	2	4

(3) *Village Pandeypur*.—The village is at a distance of 8 miles towards south-east of Buxar town. It has an area of 74.60 acres with 50 households. The total population is 442, i.e., 225 males and 217 females according to the figures supplied by the Buxar Block Office. Brahmins form the bulk of the population in the village. Details regarding the persons examined are as follows:—

Sl. no.	Name of the Cultivator.	Caste.	Total land.	Kharif land.	Rabi land.	Land under Package Programme.		
						1961.	1962.	1963.
1	2	3	4	5	6	7	8	9
			Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1	Sri Kailash Pati Pandey	Brahmin	8	2	6	1½	2	6½
2	Sri Ambika Pandey	Brahmin	9	3	•6	1½	2	2
3	Sri Tarkeshwar Pandey	Brahmin	3	½	2½	½	½	1
4	Sri Dhanraj Pandey	Brahmin	8	½	6½	Nil	Nil	2
5	Sri Sheonarain Pandey	Brahmin	4	Nil	4	1	1	1
6	Sri Hanuman Pandey	Brahmin	4	½	3½	1	1	1½
7	Sri Bishwanath Pandey	Brahmin	4	½	3½	1	1	4
8	Sri Brahmddeo Pandey	Brahmin	3	½	2½	1	1	1
9	Sri Harihar Pandey	Brahmin	8	1½	6½	1	1	2
10	Sri Bindeshwari Pandey	Brahmin	4	½	3½	Nil	Nil	6
11	Sri Dharan Shankar Pandey	Brahmin	5	½	4½	1	1	5
12	Sri Kamaladhari Pandey	Brahmin	7	2	5	1	1	2
13	Sri Pashupati Pandey	Brahmin	3	Nil	3	Nil	Nil	1
14	Sri Jitan Pandey	Brahmin	3	Nil	3	Nil	1	2

From the tables indicated above, it appears that the incidence of participation in the package programme is increasing gradually. Prior to the inception of the programme, the villagers had to depend on natural rainfall, there being no irrigational facilities but this programme encouraged and helped the villagers in sinking irrigational tube-wells in the villages visited.

On an enquiry from Sudama Rai of village Kamarpur, Harihar Misra of village Sonbarsa and Kailashpati Pandey of village Pandeypur it was ascertained that the villages were at first apathetic and even suspicious of the package programme authorities. This was

due to the fact, as they alleged that they did not get proper help from the Block Development authorities since its inception in 1957. But later they were convinced of the constructive work under the package programme. The recommendations of the package programme contain on items like variety of seeds to be used, quantity of seed to be used, the methods of seed treatment, the methods for raising seed beds, transplantation, the quantity of various types of chemical fertilisers to be used, the methods and use of green manuring, use of insecticides for prevention of plant diseases, use of improved implements, etc. The periods on which crop should be irrigated have also been broadly indicated. Such methods were unknown to the villagers. The lands of the villages visited are sandy loam. Prior to the introduction of the package programme the villages usually practised indigenous method of cultivation. The main crops grown in the area were *bajra*, paddy and *jowar*, etc. On an enquiry from Sidh Nath Rai of village Kamarpur, Chegom Pandey of village Sonbarsa and Hanuman Misra of Pandeypur village it was ascertained that the lands of the said villages were mostly unirrigated. The Buxar Development Block could not be of much help to them. The Block constructed one irrigational well in each village as a result of which most of the cultivable lands remained unirrigated. The introduction of the package programme helped them and with the help of the package authorities seven tube-wells (electric) in village Kamarpur, six in village Sonbarsa and three in Pandeypur have been sunk by the villagers. They now produce wheat, gram, potato and the yield is much more. Some of the villagers mention that the produce is three to four times more now.

(a) *The villages in I.A.D.P.**

It has been discussed elsewhere that the villages selected for package programme were started working from 2nd October, 1960. The following data were supplied by the Package Office, Buxar:—

Item.		Village Kamarpur.	Village Pandeypur.	Village Sonbarsa.
1. Total geographical area (acres)	..	627	74.60	306.40
2. Net cultivated area (acres)	..	580	67.73	242.15
3. Area under—Paddy (acres)	..	175	Nil	Nil
4. Area under—Wheat (acres)	..	115	18	51
5. Area under—Potato (acres)	..	15	15	18
6. Total irrigated area (acres)	..	180	25	150
7. Total agricultural families (Number)	..	60	17	28

* I. A. D. P.—Intensive Agricultural District Programme.

(b) Participation in the package programme.

Rabi (Village Kamarpur). 1960-61. 1961-62. 1962-63. 1963-64.				
1. No. of families for which the plan prepared.	14	33	43	58
2. No. of families actually participated	14	33	43	58
3. Area for which the plan prepared (acres)	16	65	70	137
4. Area actually covered (acres)	..	16	65	137
Kharif. 1961-62. 1962-63. 1963-64.				
1. No. of families for which the plan prepared ..	..	32	40	64
2. No. of families actually participated ..	..	32	40	64
3. Area for which the plan prepared (acres)	..	43	60	75
4. Area actually covered (acres)	..	..	43	75
Village (Pandeypur) Rabi. 1961-62. 1962-63. 1963-64.				
1. No. of families for which the plan prepared ..	..	10	3	2
2. No. of families actually participated ..	..	10	3	2
3. Area for which the plan prepared (acres)	..	11.75	2.50	4
4. Area actually covered (acres)	..	..	11.75	2.50
1. No. of families for which the plan prepared ..	..	Nil	4	6
2. No. of families actually participated ..	..	Nil	4	6
3. Area for which the plan prepared (acres)	..	Nil	12	15
4. Area actually covered (acres)	..	..	Nil	12
1. No. of families for which the plan prepared ..	..	23	20	24
2. No. of families actually participated ..	..	23	20	24
3. Area for which the plan prepared (acres)	..	24	26	91.50
4. Area actually covered (acres)	..	..	24	91.50
Village Sonbarsa—(Rabi). 1961-62. 1962-63. 1963-64.				

Kharif.		1961-62. 1962-63. 1963-64.		
1. No. of families for which the plan prepared	..	21	22	24
2. No. of families actually participated	..	21	22	24
3. Area for which the plan prepared (acres)	..	36.50	53.50	81.50
4. Area actually covered (acres)	..	36.50	53.50	81.50

The output of the harvests has been found encouraged both in the farmers' plots and the demonstration plots covered under the programme of the villages visited. A few practical demonstrations are laid out on farmers' plots in different villages. The cultivation on the demonstration plot is done by the farmer himself under the guidance and supervision and with the help of the Village Level Worker and other technical staff of the Block. Apart from the cost of seeds and fertilisers which are supplied from Government funds, all the cultivation expenses such as ploughing, sowing, transplantation, irrigation and all other cultural operations are met by the farmers. The entire produce of the demonstration plot of course belongs to the farmers.

The results of the harvests have been obtained as the basis of random crop cutting survey conducted by the Package authorities in the villages in Buxar Block:—

Year.		Average yield rate in maunds per acre for participating cultivators.		Average yield rate in maunds per acre for non-participating cultivators.	
No. of observations.		Average yield rate.		Average yield rate.	
		Maunds.		Maunds.	
1961-62	29	36	29	22	
1962-63	23	26	23	16	
The percentage increase in the yield in 1961-62 and 1962-63 records 49 and 43 respectively.					
		Wheat.			
1961-62	9	18	9	8	
1962-63	28	17	28	8	

The percentage increase in the yield in 1961-62 and 1962-63 records 112 and 33 respectively.

A sample study for 12 cultivators in Kamarpur, 15 cultivators in Sonbarsa and 14 cultivators in Pandeypur was made for an approximate estimate of the net return due to Intensive Agricultural Programme. The total area under Intensive Agricultural Programme in the villages visited was 175 acres for paddy, 184 acres for wheat and 48 acres for potato.

The average yield per acre in participated area was 25 maunds per acre for paddy, 18 to 20 maunds per acre for wheat and 200 to 250 maunds per acre for potato. From the study it was ascertained that the average yield per acre in those areas before the introduction of the Package Programme was 15 maunds per acre for paddy, 6 to 8 maunds per acre for wheat and 60 to 80 maunds per acre for potato. Thus the additional yield per acre in the participated areas in the villages visited was recorded as 10 maunds per acre for paddy, 8 to 10 maunds per acre for wheat and 120 to 150 maunds per acre for potato. This is due to the intensive method of cultivation implemented in the villages.

Though based on limited samples, the following estimates give an idea of the trend in agricultural productions and additional income to the farmers.

The table below will show the demonstration of crops made in the plots and yield result during 1960-61 to 1963-64 in the villages visited:—

Year.	Name of the crop.	No. of cultivators on whose field demonstration laid out.	Total no. of demonstrations laid out.	Total area covered by demonstration in acre.	Average yield in maunds per acre.	Average cost in rupees.
1	2	3	4	5	6	7
<i>Village Kamarpur.</i>						
1960-61	Wheat	3	3	1½	17	85.00
	Potato	1	1	1	180	35.00
1961-62	Wheat	3	3	1	18	105.00
	Paddy	4	4	1½	23	125.00
	Potato	3	3	1½	190	120.00
1962-63	Paddy	6	6	2½	25	180.00
	Potato	5	5	2	200	145.00
1963-64	Potato	5	5	2½	215	160.00
	Paddy	4	4	1½	24	135.00

Year.	Name of the crop.	No. of cultivators on whose field demonstration laid out.	Total no. of demonstrations laid out.	Total area covered by demonstration in acre.	Average yield in maunds per acre.	Average cost in demonstration in rupees.
1	2	3	4	5	6	7
<i>Village Sonbarsa.</i>						
1961-62	Wheat	1	1	$\frac{1}{2}$	15	30
	Potato	1	1	$\frac{1}{2}$	220	20
1962-63	Wheat	2	2	1	16	60
	Potato	2	2	1	218	40
1963-64	Wheat	2	2	1	14	65
	Potato	2	2	1	225	45
<i>Village Pandeypur.</i>						
1961-62	Wheat	1	1	$\frac{1}{2}$	17	30
	Potato	1	1	$\frac{1}{2}$	240	20
1962-63	Wheat	1	1	$\frac{1}{2}$	18	35
	Potato	1	1	$\frac{1}{2}$	235	25
1963-64	Wheat	2	2	1	16	60
	Potato	2	2	1	225	45

INCREASED USE OF CHEMICAL FERTILISERS.

With the introduction of the package programme there is ready availability for getting chemical fertilisers as the Co-operative Societies in the villages themselves now sell them. The villagers do not have to go to Buxar to get such fertilisers as was the case before. As a result the cultivators have now become fertiliser minded and the sale of chemical manures has tremendously gone up.

The table below supplied by the Buxar Block Office will indicate the increase in the use of chemical fertilisers in the villages visited from 1961-62 to 1963-64.

	1961-62.	1962-63.	1963-64.
1. Nitrogenous fertilisers ..	2 tons	3 tons	5 $\frac{1}{2}$ tons
2. Phosphatic fertilisers ..	1 ton	2 tons	3 tons
3. Potashic fertilisers ..	57 mds.	79 mds.	81 mds.

Village Sonbarsa.

	1961-62.	1962-63.	1963-64.
1. Nitrogenous fertilisers ..	2 tons	3½ tons	4 tons.
2. Phosphatic fertilisers ..	48 mds.	57 mds.	59 mds.
3. Potashic fertilisers ..	39 mds.	49 mds.	57 mds.

Village Pandeypur.

	1961-62.	1962-63.	1963-64.
1. Nitrogenous fertilisers ..	1 ton	1½ ton	2 tons.
2. Phosphatic fertilisers ..	21 mds.	37 mds.	41 mds.
3. Potashic fertilisers ..	27 mds.	31 mds.	37 mds.

The Co-operative Societies at villages Kamarpur, Sonbarsa and Pandeypur have been appointed sole agents of the Bihar State Co-operative Marketing Union for the sale of chemical fertilisers in the villages visited and the adjoining areas. Besides, the villagers have been given medium and short-term loans through co-operative societies. In medium-term loan the loanees have to pay the loans taken by co-operative society within five years and in short-term loan the loanees have to pay the loans within a year. There has been an increase in the number of co-operative societies in the rural areas.

The table below supplied by the Block Office, Buxar, will indicate the loans given in the villages visited under medium and short-term loans by co-operative societies from 1961-62 to 1963-64:—

Village Kamarpur.

	1961-62.	1962-63.	1963-64.
	Rs.	Rs.	Rs.
1. Medium term loan payable within five years.	3,200	Nil	Nil
2. Short term loan payable within one year.	2,200	Nil	1,500

Village Sonbarsa.

	1962-63.	1963-64.
	Rs.	Rs.
1. Medium term loan payable within five years.	9,574	Nil
2. Short term loan payable within one year.	2,081	Nil

Village Pandeypur.

	1962-63.	1963-64.
	Rs.	Rs.
1. Medium term loan payable within five years.	1,108	Nil
2. Short term loan payable within one year.	1,100	Nil

From the above figures it appears that during 1963-64 no medium term loan was given to the villagers. On enquiry from the Package authorities and also from Kailash Nath Pandey of village Pandeypur and Barmeshwar Mishra of Sonbarsa village, it was ascertained that due to non-realisation of the loans from the members, the co-operative department has stopped to grant further loans unless the loaned amount is realised. For instance, it was reported by the *Mukhiya* of Sonbarsa village that a sum of Rs. 9,574 was given to the members of the Sonbarsa Co-operative Society out of which only Rs. 2,790 has been realised up to 1963 (December). Since then they are not getting any loan from the said society. Except for a very small portion of the medium term loans for purchase of bullocks and for making cash expenditure in connection with farm operations, practically the entire short term loan meant for items like chemical fertilisers, seeds, insecticides and small implements are given to farmers in kind. •

Ordinarily a member could borrow only up to Rs. 200 on personal surety and for this it is essential to mortgage his land. In view of specific purposewise recommendations for the loan on the basis of farm production plan, the issue of the major portion of the loan in kind, and the supervision of the proper utilization of the loans and supplies under the Intensive Agricultural District Programme, the rule can be relaxed and the farmer participating in the programme can borrow up to Rs. 750 subject to the credit requirements indicated by him to the authorities.

DISTRIBUTION OF IMPROVED SEEDS.

The following quantities of improved seeds were distributed and exchanged in the villages visited in the different crop seasons:—

Village Kamarpur.

		1961-62.	1962-63.	1963-64.
			(up to Dec. '63).	
		Mds.	Mds.	Mds.
1. <i>Rabi</i>				
1. Wheat	..	Nil	10	4
2. Potato	..	40	50	27
2. <i>Kharif</i>				
1. Early paddy	..	43	10	12
2. Late paddy	..	16	Nil	Nil

Village Sonbarsa.

		1961-62.	1962-63.	1963-64.
			(up to Dec. '63).	
		Mds.	Mds.	Mds.
1. <i>Rabi</i>				
1. Wheat	..	Nil	Nil	14
2. Potato	..	Nil	Nil	22
2. <i>Kharif</i>				
1. Early paddy	..	Nil	Nil	14
2. Late Paddy	..	Nil	Nil	10

Village Pandeypur.

		1961-62.	1962-63.	1963-64.
			(up to Dec. '63).	
		Mds.	Mds.	Mds.
1. <i>Rabi</i>				
1. Wheat	..	Nil	Nil	17
2. Potato	..	Nil	Nil	32
2. <i>Kharif</i>				
1. Early paddy	..	Nil	Nil	11
2. Late paddy	..	Nil	Nil	7

The incidence of utilising improved seeds appears to have increased. The villagers interviewed appear to realise that a preliminary training for utilising such seeds is necessary. As a matter of fact the package programme authorities try to train the cultivators first and then supply them with improved seeds.

Use of Insecticides.

The Plant Protection Office at Buxar sells different types of insecticides to the Co-operative Societies based at the villages. The cultivators can purchase the insecticides very easily.

The villagers are also taught the use of proper insecticides and they are now getting insecticide minded.

The following statement will show the quantity of insecticide sold:—

Village Kamarpur.

Years.				Quantity of insecticides.
				lbs.
1961-62	..	..	..	700
1962-63	..	..	..	800
1963-64	..	..	..	750
(up to December 1963).				

Village Sonbarsa.

Years.				Quantity of insecticides. lbs.
1961-62	..	..	..	1,100
1962-63	..	..	..	1,500
1963-64	..	..	..	1,300
(up to December 1963).				

Village Pandeypur.

Years.				Quantity of insecticides. lbs.
1961-62	..	..	..	440
1962-63	..	..	..	500
1963-64	...	..	..	440
(up to December 1963).				

IMPROVED IMPLEMENTS.

In spite of the proper efforts, there has not been much of replacing the indigenous agricultural implements. This is mostly due to the economic incidence of the cultivators. However, on enquiry it was ascertained that *Sabash* ploughs are being introduced. There are 27 of them at Kamarpur, 29 at Sonbarsa and 7 at Pandeypur.

Irrigation.—Since 1961 six tube-wells have been sunk at Sonbarsa village and three at Pandeypur village. The villagers have contributed 50 per cent of the expenditure. There is one State tube-well at Kamarpur village. The tube-wells owned by private persons are exploited by other villagers.

Conclusion.—The impact was studied in only three villages out of 113 populated villages of the Buxar Community Development Block. The number of villages surveyed may not be adequate but, nevertheless it gives some data as to the impact. From the discussion with the package officers and the villagers it may be said that the survey throws out a pattern which is common to the other areas under package programme as well. Apart from the statistics collected there was a certain amount of personal contact with the participants and the non-participants. It was gathered that the villagers fully appreciate the impact of the use of more irrigation, seeds, manures, etc. In spite of this information and credit being easily available, there has not been such wide response as could be expected. This is due to the fact that the villagers had not got a financial security that they could invest more on their lands.

They do realise that the extra cost involved in the use of better seeds, chemical manures, etc., will give them a higher yield. Yet there is a certain amount of apathy to put more and more lands under the package programme.

It is also felt that the package programme has yet to be pushed in. This is probably due to the personal equation of the villagers who still think that it is more the duty of the Government to advance loans, hold demonstrations, etc. It is likely that a part of the credit taken has been abused and that is why the loan is not being returned.

The cultivators who have participated in the Package Programme are gainers. For instance, a cultivator spends Rs. 120 per acre in irrigation, seeds, fertilizers and manual labour, etc., in wheat crop. The average yield per acre is 20 maunds. If he sells the wheat at the rate of Rs. 20 per maund, the total price will be Rs. 400.00 hence he earns Rs. 280.00 from wheat crop per acre. Secondly he has to incur Rs. 500.00 or Rs. 600.00 per acre in potato. The average yield per acre ranges between 200 to 250 maunds and the cultivator sells at the rate of Rs. 8.00 per maund. The price will be Rs. 1,600.00 per acre on the average. In this way he earns Rs. 1,000.00 per acre from potato. In paddy crop the cultivator spends Rs. 200.00 per acre. The yield from the crop is 25 maunds per acre on the average and the total price from the crop including rice bran is Rs. 600.00 per acre. Hence he earns Rs. 400.00 per acre from the yield.

It may be noted that the average yield from paddy, wheat and potato in non-participated land ranges between 12 to 15 maunds per acre, 8 to 10 per acre and 60 to 80 per acre respectively. The total expenditure in paddy, wheat and potato is Rs. 50, Rs. 75 and Rs. 200 per acre respectively in the lands which are not under Package Programme.

It may be mentioned that the State Government have sponsored the Rural Industries Project extending over an area of 284 square miles in the Buxar subdivision. The Project is primarily based in the area under the Package Programme. The surplus agricultural economy of the area may provide the base for the development of an Agro-Industrial economy. Some such rural industries are food processing, hand-pounding of rice, oil-crushing, sheet metal works, handloom weaving, tailoring and carpentry, etc. In the three villages studied, however, there were no rural industries.

PIRO BLOCK.

An appraisal was sought to be made of the Intensive Agricultural Programme (commonly known as the Package Programme) in Piro Block. The following statements were supplied by the Project

Executive Officers indicating the working and the progress of the programme:—

STATEMENT I.

1. Name of the block—Piro Intensive Agricultural District Programme.
2. Date of starting the Package Programme—August, 1961.
3. Total number of families—16,638.
4. Population of the block—1,03,236.
5. Total number of agriculturist families—13,310.
6. Number of villages in the block—112.
7. Coverage of villages under Co-operative fold—112.

Progress of Co-operative Movement.

	30-6-1961.	1961-62.	1962-63.	1963-64.	31-8-1964.
	Rs.	Rs.	Rs.	Rs.	Rs.
1. No. of Co-operative Societies	51	94	102	104	104
2. Membership enrolled ..	1,248	2,423	2,875	3,492	3,535
3. Share capital raised ..	30,577	52,470	70,283	84,404	85,770
4. Financing	1,41,703	2,24,550	2,66,431	2,82,799	1,05,515
5. Demand	Not available.	1,24,600	1,99,400	2,06,829	..
6. Collection	Nil	1,13,000	2,03,000	1,97,000	Nil
7. Percentage	Nil	92	103	96	Nil
8. Number of agriculturist families covered.	1,188	2,278	2,638	3,070	3,113
9. Number of sale centres for fertiliser.	4	4	43	48	48

STATEMENT II.

Year.	Number of village covered.	Number of people participation executed.	Area covered in acres.	Consumption of fertiliser.				Improved seed sold or exchanged.	Improved implements sold.				Insecticides used.
				Ammonium Sulphate in tons.	Single Super phosphate in tons.	Potash in tons.	Total fertilisers in tons.		Ploughs	Hand-hoe and rakes.	Japanese weed era.	Rehats	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1961-62 (<i>Rabi</i>)	34	633	927	59.3	36.0	9.0	104.31	136.00	7(61-62)	..	..	20	81 kgs. in 1961-62.
1962-63 (<i>Rabi</i>)	94	1,315	2,282	100.4	107.2	13.7	221.3	260.00	30(62-63)	..	..	91	..
1963-64 (<i>Rabi</i>)	99	1,595	3,205	142.47	81.82	17.09	241.30	588.20	211(63-64)	36	..	56	86 kgs. in both <i>rabi</i> and <i>kharif</i> , 1962-63.
1962-63 (<i>kharif</i>)	81	1,439	4,050	234.9	129.6	34.4	398.0	330.00	..	..	..	..	..
1963-64 (<i>kharif</i>)	98	2,207	8,379	377.0	109.79	25.0	511.00	1,999.00	..	..	..	..	97 kgs. in both <i>rabi</i> and <i>kharif</i> in 1963-64.
1964-65 (<i>kharif</i>) up to August, 1964.	101	2,319	12,419	339.00	73.00	11.4	423.40	3,958.00	96(64-65)	35	26	13	521 kgs. and 180 cc in <i>kharif</i> 1964-65.

The figures appear to be impressive but certain further information called for could not be supplied and for want of all that it is difficult to come to precise conclusions. The Project Officer could not supply much information as to the improvement of marketing condition or development of communications leading to the improvement of the marketing conditions. It was given out that although seven *halka* godowns had been made for the storing of the agricultural produce of the cultivators to avoid selling in the buyers' market, they were actually being used for other purposes. Fertilizers and insecticides are being stored by the Project Organisation and not even one of the *halka* godowns was being used for the purpose for which it was made. On an enquiry it was found that not much work was being done by the *Vypar Mandals*. On the other hand the cultivators have to sell a good quantity of their produce till March in order to meet the loans, rent, etc. They could not possibly hold back the produce or the bulk of it through the lean period and take advantage of selling later in the sellers' market.

Another feature was that the participants would not put their *batai* lands under the scheme lest the *bataidars* acquire any statutory rights. The tenurial lacunae stood on the way of a large area from getting under the scheme.

The Project office has not tried to make any follow on study in any village and to strike out a balance sheet as to the actual cost of each of the participants under the scheme as compared with the cost before he opted to work under the scheme, the quantity of the surplus produce and how he utilises the surplus produce and what money value he had received. Without any such follow on study it will be only a generality that the produce has gone up by 10 maunds for *rabi* and 14 maunds for *kharif*. Without any particular improvement in the marketing condition and help to the cultivator to keep back the surplus produce for selling in the seller's market it appears that the middlemen are the real beneficiaries. This personal opinion was also confirmed by personal enquiries from the cultivators, officials and non-officials. In certain villages of other blocks under the scheme the area has been found to be shrinking or variable from year to year. The reasons have to be properly found out and squarely met. The figures of the total number of agriculturist families and the number of the participants usually show a big gap. The figures also do not show the total area with the block that could have been brought under the scheme and the area that has actually been brought under the scheme. It is difficult to say from the study that the package programme has caught the imagination of the people and has become a source of self-generating dynamism. At least a marginal if not a comfortable economic cushion in the participant is required to take full advantage of the Intensive Agricultural Programme under which easy loans are given and

fertilizers are sold. It is a mistake to think that a man of sub-marginal economic incidence could be pulled out immediately under the scheme. There are also some complaints regarding the timely availability of water. This complaint being vague was not gone into and particularly because this is a canal irrigated area.

The figures of the quantity of the fertilizers sold and the loans advanced, and the increasing acreage of *rabi* and *kharif* crops under the Intensive Agricultural Programme are, somewhat, impressive. An investigation into the incidence of indebtedness of the participants before and after they started participating in the Package Programme would be a good indication of any concrete results. But it has to be remembered that Piro Block has been somewhat economically advanced, from before and has had large villages, a few *hats* and Piro as a place of considerable trade importance. The existence of a water patch just by the side of the Project office with the thick growth of water hyacinth is a depressing sight, particularly because water hyacinth offers a good compost. Apparently no imagination has been shown by teaching the people the importance of the eradication of water hyacinth and using it as compost.

ANIMAL HUSBANDRY.

The possession of livestock generally adds to the social status of the farmer. In the last District Gazetteer (1924), particular mention was made of the mediocre stamp of the cattle. It was particularly observed that little care was taken in selecting bulls for breeding. The quality of the livestock has had some improvement since because of serious efforts of the Government and the response of the farmers.

The district has quite a large population of prosperous agriculturists mostly due to the facilities of canal irrigation. The farmers in the canal irrigated area have a considerable cattle wealth. Any one observant in his journey from Arrah to Sasaram must have been struck with the number and quality of the cattle by the roadside. The Kaimur hills offer excellent pasturage for a part of the year. Hundreds of cattle are taken in different herds to Adhaura side for pasturage. Cattle from other districts are also taken to the Kaimur hills for pasture. They remain there for several months.

The table below will indicate the livestock population in the district from 1920 to 1956*:-

Year.	Total cattle.	Total Buffaloes	Sheep.	Goats.	Pigs.
1	2	3	4	5	6
1920 ..	8,12,684	2,50,698	1,07,879	45,699	..
1925 ..	8,21,602	2,78,345	1,29,711	1,45,876	..

* Figures up to 1951 have been taken from *District Census Handbook* (1951), *Shahabad*, pages 112-113 and figures of 1956 from the *Statistical Handbook of* 1957, p. 56.

Year.	Total cattle.	Total Buffaloes.	Sheep.	Goats.	Pigs.
1	2	3	4	5	6
1930 ..	8,46,870	2,96,386	1,19,329	83,799	..
1940 ..	7,72,643	2,63,592	1,38,886	1,08,869	38,820
1945 ..	6,66,450	2,33,420	64,058	58,867	29,614
1951 ..	8,60,108	3,05,681	76,813	1,46,300	16,710
1956 ..	9,19,688	3,22,947	1,18,321	1,76,671	20,133

The figures of 1945, showing a decrease under each of the heads, are easily explained by the heavy drain of livestock due to the exigencies of the Second World War. But an increase is noticed in the animal wealth of the district when the figures of 1951 and 1956 are compared with that of 1945. This shows that there is a tendency towards increase in the cattle wealth of the district.

Poultry.

Poultry is indigenous to certain sections* of Muslims and Hindus. In the Muslim villages and where certain low caste Hindus predominate, birds are reared to add to the income of the family. But usually the birds are small and very little care taken to rear them. They are let loose to peck food for themselves and occasionally some paddy or husk is given. With the increase in the price of birds and eggs and a good market readily available, the margin of profit is quite good. But there is not much attempt to keep birds of better breed.

The State Government are keen to improve the quality of the poultry and to make more birds available. There are now one Poultry Development Centre at Dehri and five hatching centres at Dumraon, Behia, Sasaram, Chenari and Bhabua. In 1957-58 only 250 birds had been distributed in the district. In 1961-62 as many as 1,631 birds and 2,530 eggs were distributed. Even this number is small and it must be said that there has been very poor overall progress. There is a very great scope for improving the breed of ordinary birds besides and for including higher breeds like White Leghorn, Minorca or Rhode Island Red. Ideas of improved poultry management, storage of eggs, rearing of chicks, incubation in village conditions and protection against poultry epidemics have to be spread. Better facilities for the marketing of eggs and birds have to be made available. The centres often supply one-day old chicks and it is difficult for villagers to keep them alive.

The table below will show the figures of poultry in Shahabad district for 1945* and in 1956**:—

Year.	Hens.	Cocks.	Chickens.	Ducks.	Drakes.	Ducklings.
1	2	3	4	5	6	7
1945	31,519	13,323	44,358	1,368	1,024	599
1956	46,937	27,698	57,032	3,118	1,610	1,498

The figures indicate that more poultry is being kept now.

Animal Diseases and Veterinary Dispensaries.

Cattle diseases frequently spread in epidemic form. The common disease are rinderpests, haemorrhagic, blackquarter, anthrax and foot and mouth diseases.

The table below will show the incidence of outbreak and death from diseases from 1940-41 to 1962-63†:—

Year.	Rinderpest.		Haemorrhagic.		Blackquarter.		Foot and mouth disease.		Ranikhet disease.	
	Seizure.	Death.	Seizure.	Death.	Seizure.	Death.	Seizure.	Death.	Seizure.	Death.
1	2	3	4	5	6	7	8	9	10	11
1940-41	..	962	..	89	..	..	..	0	..	..
1941-42	..	55	..	522	..	..	..	2	..	..
1942-43	..	31	..	96	..	..	..	4	..	..
1943-44	..	46	..	106	..	..	..	1	..	..
1944-45	..	704	..	63	..	..	..	4	..	..
1956-57	1,916	666	..	444	273	194	1,800	..	15	10
1957-58	1,037	379	..	118	52	35	1,906	1	77	52
1958-59	35	15	..	200	199	130	3,037	2	195	174
1959-60	6	1	..	266	493	301	2,522	2	52	48
1960-61	..	..	..	123	78	40	2,548	25	22	16
1961-62	..	..	..	235	75	67	861	..	156	136
1962-63	..	..	..	204	122	65	1,215	1	241	92

* Report on the Livestock Census of Bihar (1945), pages 54-55.

** Ibid (1956), pages 94-95.

†The figures up to 1944-45 have been taken from Report on the Livestock Census of Bihar (1945), pages 86-87 and figures from 1956-57 have been supplied from the Animal Husbandry Office, Arrah.

It is correct to think that the figures are underestimated as all the cases of seizure and death are not reported.

The incidence of cattle mortality appears to have decreased for some diseases owing to medical aid available in the veterinary hospitals, static and mobile dispensaries. Outbreaks are tackled with sera and vaccine.

Mass inoculation is done for which specific vaccines are available. The Rinderpest Eradication Scheme sponsored by the Government has controlled to some extent the spread of this epidemic.

Regarding the dispensaries the last District Gazetteer (1924) mentioned that there was a veterinary hospital at Arrah, and veterinary dispensaries at Arrah, Buxar, Sasaram and Bhabua under the District Board. The hospital at Arrah treated 1,260 animals in 1922, as against 764 in 1909; and it was evidently growing in popularity.

The most prevalent disease among cattle was rinderpest which was particularly rife in 1916-17, when 9,462 cattle were affected of whom 6,810 died.

Now the District Board dispensaries have been provincialised.

Following class I dispensaries are now running in this district (1964):—

Sadar subdivision.—(1) Arrah, (2) Piro, (3) Behia, (4) Jagdishpur, (5) Koilwar, (6) Barhara, (7) Shahpur, (8) Sandesh, (9) Sahar, (10) Tarari, (11) Charpokhari, and (12) Udwanthnagar.

Buxar subdivision.—(1) Buxar proper, (2) Brahmpur, (3) Dumraon, (4) Rajpur, (5) Chausa, (6) Nawannagar, (7) Semri, and (8) Itarhi.

Bhabua subdivision.—(1) Bhabua, (2) Kudra, (3) Durgauti, (4) Bhagwanpur, (5) Adhaura, (6) Chainpur, (7) Chand, (8) Mohania, and (9) Ramgarh.

Sasaram subdivision.—(1) Sasaram, (2) Tilothu, (3) Bikramganj, (4) Darigaon, (5) Kochas, (6) Sheosagar, (7) Chenari, (8) Akbarpur, (9) Nauhatta, (10) Dehri, (11) Chilbilla, (12) Nasriganj, (13) Rajpur, (14) Karakat, (15) Dawat, (16) Dinara, (17) Nokha, and (18) Karaghar.

Dairy Farming.

Mostly *goalas*, who are professional cowherds, keep herds of cows and buffaloes and trade in cow and buffalo milk. There are four privately-managed *goshalas* in the district located at Arrah, Buxar, Dehri and Sasaram. At these *goshalas* cows and buffaloes are maintained but the standard of maintenance seems to be poor.

In order to organise the sale of pure milk and improve the quantity of milk, the State Government have encouraged the existing *goshalas* to adopt modern lines. The Government have distributed Hariana bulls and cows to the *goshalas* at Arrah, Dehri, Sasaram and Buxar. Government has contributed Rs. 5,000 for each *goshala* for construction of building and has also added 10 Hariana cows for each *goshala*. Over and above this the Government had given economical aid and Rs. 2,000 per year for maintenance of cows in a better way. Only since 1963 the aid has been stopped.

The sheep population of the district according to 1951 and 1956 Livestock Censuses was 76,813 and 1,18,321 respectively. There has been a marked increase in the population of sheep which is apparent from the figures. The areas where sheep population is concentrated in the district are at Dehri, Sasaram, Buxar, Nasriganj, Bhabua, etc.

There is no specified pasture ground in the district. Only idle and fallow lands are used as pasture grounds for the sheep population. Hilly tracts also provide some grazing for the livestock. One special unit for each area, viz., Bhabua, Dehri and Nasriganj have been operating. The object of which is to concentrate their activities for development works, control of diseases, distribution of Bikaneri rams for cross-breeding, distribution of Scissors for shearing sheep with latest method of shaving and grading of wool, etc. The shepherds are trained in the art of shaving.

The shepherds of the district rear wool out of sheep and manufacture blankets. It is a good cottage industry for the shepherds. The State Government has started three sheep breeding centres at Nasriganj, Dehri and Bhabua.

Haryana Cattle Breeding Farm, Dumraon.

It was started in 1949 under the Post-War Development scheme at Dumraon. The cows and bulls were purchased from the Haryana breeding tracts of the Punjab in 1950 with a view to produce pedigree bulls for distribution in district for improving the local breeds. The people of the district feel the need of improved breeds and the demand of pedigree bulls is on the increase.

About 394.76 acres of forest land which was locally known as *Bhikna Bundh* at Dumraon, was selected for the establishment of a cattle breeding farm and the same land was acquired at the total cost of Rs. 1,97,660. The farm has up till now (1963) reclaimed 4,081 acres of land growing green fodder and 44.76 acres have been used for constructing farm building, cattle sheds and roads.

At present (1963) the farm has a total strength of about 1,400 Haryana and Shahabadi cattle. The maximum lactation range has gone up to 5,000 lbs. a day. The surplus milk products are booked by rail for Arrah and Patna.

Pedigree bulls produced at the farm are distributed to the breeders and farmers of the districts of Shahabad, Patna, Gaya and Saran in Bihar and Ballia and Ghazipur in Uttar Pradesh.

Cattle Breeding.

Except Haryana breed the other local breed is of poor 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 Haryana breed. Haryana breed cattle serve double purposes. They are better milk producer and their bull calves are more virile and useful for improved cultivation. Artificial insemination centres have been opened at Arrah, Bhabua, Sasaram, Buxar, Dehri, Dumraon, and Bihea with 30 sub-centres for improving local breed. Improved rams and *jamunapari* bucks are also distributed for upgrading the local sheep and goat.

The following statement will show the number of insemination work done at in the district:—

1959-60—12,448.

1960-61—21,033.

1961-62—23,862.

1962-63—24,063.

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 total area under fodder crops varies widely and not much reliance can be put on the available figures.

FISHERIES.

The large number of rivers, streams, low-lying fields where water accumulates in the rainy season, ponds and marshes indicate a rich fish potentiality for this district.

In 1952, the fisheries section which was under the Industries Department before was transferred to the Agriculture Department. The Fisheries Development Schemes of the district are managed by an Inspector of Fisheries posted at Arrah under the administrative control of the District Agriculture Officer at Arrah and under the Assistant Fishery Development Officer posted at Patna. Similarly the fisheries schemes of the subdivision are looked after by fisheries nurseries supervisors posted at each subdivisional headquarters under

the control of the Subdivisional Agricultural Officers and the Inspector of Fisheries at Arrah. Besides that there is an additional Fisheries Inspector posted at Arrah to look after the Fisheries Development Works of Sone Canal. There are three Fisheries Supervisors posted at Banjari, Dehri and Koilwar to regulate the conservational measures in river Sone.

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

Seed collection and distribution.

Since seed plays an important role, the four species of quick growing major carps, i.e., the *rohu*, *catla*, *naini* and *kalbose* have been selected for culture in tanks and ponds. These fishes breed only in rivers and not in stagnant water. The spawn are collected every year during the rains from river Sone at Dehri and Koilwar and from river Ganga at Buxar. The spawn collected are sent to the nursery tanks at subdivisional headquarters and reared. When they attain a size of $\frac{1}{2}$ " they are sold to the tank-owners at the subsidised rate of Rs. 7 before August and Rs. 9 after that per thousand fish fry for culture in their tanks.

Sanctuary in river Sone.

Fishes have got the tendency of moving up and down in the current in search of food and for breeding purposes. With the construction of anicut in river Sone at Dehri, fishes used to congregate on both the sides of the anicut and consequently they were being caught in large quantity. This naturally resulted in depletion of fish in the river. To save fishes from mass slaughter near the anicut and to protect the breed fishes, spawn and fry of major carps, the whole course of the river in this district has been declared as sanctuary through the following measures:—

- (i) Complete prohibition of fishing in an area two miles up and one mile down the river near anicut.
- (ii) Prohibition of capture and race of young carps of the species of *rohu*, *catla* up to 6" size from the month of June to October.
- (iii) Prohibition of capture and sale of breed of major carps for consumption from June to September.

Fisheries Storage and Marketing.

Facilities are given for the preservation of fish at the surplus market and their transport to deficit ones. One Fisheries Marketing Supervisor has been posted at Buxar for this purpose.

Demonstration and Propaganda.

(a) *Exhibition.*—Each block has been provided with a set of fisheries charts, models, etc., to educate the public regarding the technique of pisciculture on scientific lines.

(b) *Supply of fisheries nets.*—Each block has been supplied with cast net and drag net to supply the public on hire for the exploitation of the fisheries.

(c) *Paddy-cum-fish culture.*—Demonstration of fish culture in paddy fields has resulted in 10 to 15 per cent increase in the yield of paddy. The site of the demonstration is changed every year from one *halka* to another and fish fry are supplied free of cost to the villagers for demonstration purposes.

(d) *Manurial Demonstration.*—Manuring in fish ponds gives better result. To educate tank-owners for proper manuring in tanks, one demonstration is conducted by the Fishery Department and manures are supplied free of cost for the purpose.

Fishermen Welfare.

Fishermen as a class are very poor, illiterate and backward. To help them the following schemes have been taken up in this district:—

(a) *Supply of craft and tackles.*—Fishermen are supplied yarns and twines for making the nets. Boats and other fisheries articles for helping fish exploitation are supplied through the Fishermen's Co-operative Societies.

(b) *Night Schools.*—Three night schools have been started at Arrah, Buxar and Sasaram to give primary education to the fishermen and their children. In these schools they are also supplied with free books, slates, pencils, etc. Besides literacy the fishermen are also given some ideas of pisciculture. At present (1964) there are about one hundred and fifty students on the roll and three teachers in these schools but the percentage of the adult students is very poor.

Development of Fisheries in the Sone Canal.

There are vast stretches of water available to develop fisheries in the distribution system of the Sone Canal, the *jheels*, under drainage scheme and behind the dams of major irrigation projects. It has been found that there is a potential for the prospect of large number of seedlings and fish food supply.

The statement given below will show the development of fisheries in the district from 1956-57 to 1961-62:—

Serial no.	Name of Scheme.	1956-57.	1957-58.	1958-59.	1959-60.	1960-61.	1961-62.
1	2	3	4	5	6	7	8
1.	Spawn collection (in <i>Batties</i>)	190	327	299	293	284	184
2.	Fry distribution (in lakhs)	5.66	6.65	7.42	7.92	9.02	7.26
3.	Management and Exploitation of Government Tanks (in acres).	30	30	35	66	82.5	90.15
4.	Paddy-cum-Fish Culture (in acres).	3	7	17.5	23	26	30
5.	Manurial demonstration of tanks (nos.).	3	7	12	14	26	29
6.	Development of the Sone Canal Fisheries —	..	..	..	..	..	..
	(a) Fingerlings collection (in lakhs).	..	0.70	2.45	2.07	3.04	3.50
	(b) Fingerlings stocked in Canal.	..	0.32	1.54	0.74	1.42	2.10

There are certain castes like Mallah, Turha, Bind, etc., whose traditional occupation is to catch fish. Owing to their poor finances and want of organisation, they hand over the bulk of the catch to the middlemen who are usually Kurmis and Muslims. The middlemen make much more money than the actual fishermen. There are also a few big fish-merchants in the district.

Details of the fish trade have been given in the text on "Banking, Trade and Commerce".

FORESTRY.

Regarding Forests, the last District Gazetteer (1924) mentioned as follows:—

"The only forests in the district are those scattered over the Kaimur hills; the growth, however, is not luxuriant, and there is now no large timber left. The first scientific examination of these forests appears to have been made in 1872, when an officer of the Forest Department visited the plateau. The result was disappointing; not one tree was met with from which a twenty-foot beam could be cut; the height and girth of most of the trees were small, and it was reported that the timber was not worth conserving. The local officers thereupon pointed out that owing to the absence of any system of conservancy in the past, the forests had

suffered from reckless clearance and repeated conflagrations, and they urged that it was advisable to develop what remained and to stop the indiscriminate destruction which was going on. As a result of this representation, an Assistant Conservator was sent in 1876 to re-examine the tract; and he reported that though the forest on the Rohtas plateau was inferior, the slopes were fairly wooded, bamboos were plentiful and the mixed forest contained a fair amount of *sida*, *persar*, *khair* and ebony. On the Rehal tableland *sal* and a considerable growth of ebony was found, and the Bans-i-Khoh valley contained an ebony forest in which that tree grew to fine dimensions. None of the blocks contained much large timber, but there was a fair amount of young growth; and it was held that large timber would be produced if the forests were protected against reckless cutting. The Conservator accordingly recommended that they should be reserved, and Government having decided to reserve an area of thirty-eight square miles divided it into four blocks (the Rohtas-plateau, the Rohtas slopes, the Rehal plateau and the Bans-i-khoh), a notification was issued in September 1876 declaring them Forest Reserves. It was subsequently ascertained, however, that this notification included areas which were not the property of Government; and it was accordingly cancelled in 1879. Until 1895 nothing was done to protect or develop the natural forest growth; but in that year the area which had been reserved in 1876 was proclaimed protected forest.* Much of the forest has, however now gone; the southern half of the Rohtas plateau is almost completely denuded and even the northern part is very poorly stocked; it is covered for the most part with scrub jungle and there is no continuous area of large timber; but some fine trees grow near the Fort which give the grounds a park like appearance. On the Rehal plateau there are some patches of fair timbers, but the *sal* is stunted and of small dimensions, and the old trees are gnarled and twisted. Timber of all sorts appears to decay early, and the *sal* grows in narrow irregular belts interspersed with mixed forest of inferior character. Practically the only articles of export are bamboos, which grow in great profusion along the slopes of the hills and plateau."**

* Notification no. 5441, dated December 16th, 1895 (*Calcutta Gazette*, 1895, part I., page 1208).

** *District Gazetteer of Shahabad*, 1924, pages 72-73.

At present (January, 1964) the forests of this district have been divided into six ranges, viz., Sasaram, Rehal, Rohtas, Chenari, Adhaura and Bhabua. Each of the ranges is placed under a range officer. They are under the administrative control of Divisional Forest Officer, Sasaram with his headquarters at Sasaram.

Sasaram range consists of 97.05 square miles. There are two beats, namely, Darigaon and Tilauthu and 14 sub-beats under this range.

Rehal range consists of 123.70 square miles. There are two beats, namely, Rehal and Jadunathpur and 14 sub-beats under this range. Afforestation work is going on in this range.

Rohtas range consists of 71.91 square miles. There are two beats, namely, Akbarpur (30.93 square miles) and Pareha (40.98 square miles) and 15 sub-beats under this range. Afforestation work is going on.

Chenari range consists of 126.97 square miles. There are two beats, namely, Malhipur East (72.52 square miles) and Malhipur west (54.46 square miles) and 18 sub-beats under this range.

Adhaura range consists of 106.94 square miles. There are two beats, namely, Adhaura (59.81 square miles) and Chandharna (47.13 square miles) and 11 sub-beats under the range. Afforestation work is going on.

Bhabua range consists of 163.95 square miles. There are three beats, namely, Bhagawanpur (51.33 square miles), Sheopur (59.20 square miles) and Kasar (53.72 square miles) and there are 21 sub-beats under this range.

The details will be found in the Chapter 'General'.

STATE ASSISTANCE TO AGRICULTURISTS.

Agriculturists, big or small, usually need credit facilities. The normal sources of credit have been discussed elsewhere. The State assistance to farmers by giving loans under the Agriculturists' Loans Act, 1884 and the Land Improvement Loans Act, 1883. Loans are normally given for relief of distress, purchase of seed or cattle or any other purpose in connection with agriculture.

Under the Land Improvement Loans Act, vide Board's notification no. 13-42-5, dated the 1st July 1952, the Collector is competent to sanction loans up to Rs. 5,000, and with the previous sanction of the Commissioner up to Rs. 10,000 for any one work. The Sub-divisional Officer is competent to sanction loan up to Rs. 1,000. Any loan beyond Rs. 10,000 requires the previous sanction of the Board.

Under the Agriculturists' Loans Act, 1884, vide Board's notification no. 13-42-4, dated the 2nd July 1952, the Subdivisional Officer is competent to grant loans up to Rs. 500 in each case, the Collector is competent to sanction such loans up to Rs. 5,000 and with the sanction of the Commissioner up to Rs. 10,000 in each case. Any loan beyond Rs. 10,000 requires the previous sanction of the Board. There are various formalities which have to be observed before loans are given.

It is a common complaint that the loans are not quickly available. This is due to the implementation of the formalities which are obligatory. The loans under the Land Improvement Loans Act are generally repayable in instalments within a period not exceeding 20 years, while the loans under the Agriculturists' Loans Act are repayable within one or two years. The dates for repayment of loans under both the Acts are fixed by the Collector with due regard to the dates of harvest of principal crops, and under the Land Improvement Loans Act the time when the profit begins. The ordinary rate of interest on both the types of loans is $6\frac{1}{4}$ per cent per annum.

The table below supplied by the Land Reforms Section, Shahabad, gives the figures of loans advanced under the Agriculturists' Loans Act and Land Improvement Loans Act from 1954-55 to 1962-63:—

Year.		Loans under Agriculturists Loans Act.	Loans under Land Improvement Loans Act.
		Rs.	Rs.
1954-55	..	1,43,530	62,748
1955-56	..	20,86,600	37,187
1956-57	..	2,99,144	21,480
1957-58	..	12,98,191	8,250
1958-59	..	10,05,310	13,570
1959-60	..	69,175	15,400
1960-61	..	53,400	4,400
1961-62	..	1,56,550	46,000
1962-63	..	57,600	28,600

From the figures stated above, it appears that in 1955-56 and 1957-58 the incidence of loans advanced under the Agriculturists' Loans Act was very high. It is due to the fact that in 1955-56 there were high floods in the rivers Sone and Ganga. Secondly, during 1957-58 there was scarcity in the district because of loss of *aghani* paddy due to the failure of *Hathia* rains.

CONFIGURATION OF THE DISTRICT AND THE FLOODS.

The frequent inundation in the district of Shahabad is due to the configuration of the district. The district is bounded by rivers. It is bounded on the north by the Ganga, on the south and the east by the Sone, on the west and south-west by Karmnasa. The low-lying tracts by the side of the river Ganga are usually liable to heavy floods. The most destructive floods, however, come from the Sone, particularly when its water is forced back over the adjoining areas by a simultaneous rise in the Ganga. The simultaneous rise of the Ganga checked the natural outlet and there was a heavy flood. Since the middle of the nineteenth century there are records of heavy floods in years 1848, 1864, 1876, 1884, 1888, 1892, 1901, 1906, 1913, 1916-17, 1923, 1934, 1946, 1947-48, 1956-57 and 1961-62.

In September, 1901, the river Sone at Koilwar rose in two days from 9 feet to 22 feet and caused a number of breaches on the eastern bank. Those breaches were responsible for the damage to the crops and to a large number of houses in many villages. Some hamlets on the outskirts of the town of Arrah were also destroyed while the country west of Sone was a vast sheet of water. It has been described that at some places the water was near about 17 miles broad. It is calculated that about 7,000 houses were destroyed by this flood.

There were heavy floods in the months of August and September of 1916 affecting the area north of the Koilwar-Buxar road and the country adjoining the lower reaches of the Sone. The Ganga at Buxar rose to 33 feet 10 inches and affected an area of about 250 square miles. The floods in 1916 were followed by another heavy flood in the next year, i.e., 1917 in the course of which about 217 houses were washed away. In both these years there was a simultaneous flood in the river Sone. In each year the flooded Sone was put up and forced back over the neighbouring country by a great wall of water which came down in the Ganga flood, and practically all the parts of Arrah town were inundated. Relief measures were undertaken by the Collector and District Board. The Maharaja of Dumraon liberally took measures for the relief of his tenantry.

Flood of 1923.—There was a very heavy and destructive flood in August, 1923 caused by a simultaneous rise of the Sone and the Ganga. The normal level of the Sone at Dehri was 326 feet above the sea level. The level rose to 343.90 feet which was 1.20 feet higher than the highest flood level hitherto recorded at Dehri in 1906. The flood water entered the town of Arrah and widely affected the areas in the thanas of Arrah, Barhara, Sandesh and Nasriganj. The railway was breached for a distance of about three miles between Arrah and Kulharia. There were also some ravages to the west of the town of Arrah. Many of the streets of Arrah town

were flooded and nearly one-third of the houses in Arrah were destroyed or washed away including the house of the Executive Engineer. The following table will show the effect of the floods of 1923:—

Name of areas affected.	No. of houses in the area.	Houses destroyed.	Crops destroyed		Loss of human life.	Loss of cattle.
			Bhadai in bighas.	Paddy in bighas.		
1	2	3	4	5	6	7
Arrah Municipal area	8,755	2,869	..	..	3	31
Arrah rounfassil ..	16,595	7,299	18,944	14,050	8	413
Barahara ..	12,189	4,456	8,232	15	..	714
Sandesh ..	9,333	2,654	15,635	4,374	15	574
Sahar ..	3,146	1,252	386	241	1	47
Total ..	50,018	18,530	43,197	18,680	27	1,779

The total area affected by this flood was about 260 square miles. The area excluding the Sahar thana formed a triangle, the breach in the Sone bank at Turkaul north of Sandesh as its apex, the Ganga being the base and the side being a line running north-west from the Turkaul breach and crossing the East Indian Railway line (now Eastern Railway) five miles west of Arrah.

As the flood had affected the water-supply system of Arrah town the State Government gave a grant of Rs. 10,000 to the Arrah Municipality to enable them to put in order the town water-supply. A grant of Rs. 35,000 was disbursed in loans for the reconstruction of the houses in Arrah town. A sum of Rs. 65,000 was placed at the disposal of the Collector to be spent on gratuitous relief. Six lakhs of rupees was made available to the Collector for distribution as *taccavi* loans. Blankets, fodder, food-stuffs and mats were widely distributed to meet the havoc.*

Flood of 1934-35 and 1946.—There were heavy floods in the Ganga and Sone which damaged paddy crops during 1934-35 and Government granted relief to landless labourers.

The subsequent floods of 1934 and 1946 were also severe. Measures were promptly taken by the State Government and the public to give relief to the flood-affected population.

Flood of 1948.—The heavy flood in 1948 was marked by a longer duration than the floods in the past. The area under heavy inundation was about 357 square miles. The level at the gauge at Buxar

* Summarised from the *District Gazetteer of Shahabad* (1924), pages 86-87.

rose to 33 feet slightly below the level in the flood of 1916. There were two durations of the flood. In the first spell Bhabua subdivision had the worst of it. There was incessant and heavy rainfall and all the hill streams in Bhabua subdivision were overflowed and inundated the adjoining areas. The main roads like Arrah-Sasaram Road, Mohania-Bhabua Road and the Grand Trunk Road were overflowed and breached at some places. This flood occurred in the first week of August, 1948.

The second spell came in the first part of the month of September, 1948. There was heavy rainfall in the last week of August and the river Ganga began to rise from the first of September. The danger level of the flood was crossed by the 6th September and on the 11th of September the water level had reached $7\frac{1}{2}$ inches above the danger level. The water had gone over the Patna-Arrah-Buxar Road. At certain points the water went over the railway. There was another heavy rise in the Sone from the 13th September as a result of a very heavy downpour. Arrah town was inundated. From the 15th September, the water level of Ganga river began to recede in the Sadar and Buxar subdivisions. In the second spell of the flood, Bhabua subdivision was again affected. This flood in Bhabua subdivision had subsided by the end of September.

There was a very great strain on the administrative machinery and the non-official public to meet the exigencies of this heavy flood. The officials and the non-officials pooled their resources and rescue and evacuation operations were well co-ordinated. About 15,000 persons and nearly an equal number of livestock were evacuated from the flood-affected villages to the neighbouring unaffected villages on a higher level for temporary shelter. Twelve evacuation camps were opened at different places in the district and each was placed under a magistrate. About 10,000 evacuees were given shelter and food at these camps. The livestock were also looked after. Besides these camps, there were several relief centres where supply of food, rugs, mat, shelters and fodder were distributed free. A number of fair price shops were opened where foodgrains were sold at cheaper rates. Quick steps were taken to disinfect wells, tanks and ponds. Mass inoculation against cholera epidemic was arranged for. Free medicines for various other diseases were made available.

From records it appears that the total number of villages affected during this flood was 538. Out of this 57 villages in the Sadar subdivision, 57 villages in Buxar subdivision and 21 villages in Bhabua subdivision were described to be the worst affected ones. The bulk of the affected people came from Buxar subdivision. It was calculated that about 50 to 60 per cent of the mud-built houses in the affected villages were damaged or washed away.

The following statement shows the allotment and expenditure for flood relief in the district:—

Subdivision	Gratuitous grant.		House building grant.		Free seed purchase grant.		House building loan grant.	
	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.
1	2	3	4	5	6	7	8	9
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Arrah Sadar	34,000	34,000	1,65,000	1,65,000	25,000	25,000	1,25,000	3,850
Buxar ..	24,500	24,500	1,65,000	1,65,000	25,000	25,000	1,25,000	..
Sasaram	7,000	7,000	..	..	..	..	..	..
Bhabua	Figures not available.							

Flood of 1956.—The high flood in 1956 was caused by the simultaneous floods in the rivers Sone and Ganga. The highest flood level recorded by the Sone was 32 feet 8 inches on the 17th August while the danger level is 28 feet. The highest flood level of the river Ganga was recorded at 30 feet 4 inches on the 16th August. The rivers in Bhabua and Sasaram subdivisions like Durgawati and Karmanasha also had sudden rise. These rivers affected a large area in Bhabua, Mohani, Ramgarh, Chand and Durgawati police-stations.

The table below shows the area and the population affected by the flood of 1956:—

Subdivision.	Total area in square miles.	Area affected in square miles.	Total population of the subdivision.	Population affected.
1	2	3	4	5
Sadar ..	920	413	8,85,270	3,17,000
Buxar ..	683	412	5,36,754	3,14,181
Bhabua ..	1,237	334	4,40,138	1,59,000
Sasaram ..	Figures not available.			
Total..	2,840	1,159	18,62,162	7,90,181

Adequate measures for giving relief to the affected population were quickly taken. Gratuitous grants and agricultural loans were distributed for reconstruction of the damaged houses and for the cultivation of the lands. Medical relief was also arranged.

Flood of 1961-62.—The high flood in 1961-62 was caused by the flood in river Ganga which continued for a longer period and damaged the standing crops of Brahmpur, Semari and Buxar Anchals.

The flood visited Brahmpur, Semari and Buxar Anchals on 9th August 1961 and continued up to the 20th October 1961. It is remarkable that from August to October, a period of three months there were five times that the river Ganga arose. In this period, 439 houses of Brahmpur and 350 houses of Semari Anchals were affected. Some heads of cattle were lost but no human life. Boats were engaged to maintain communication and to help the flood-affected people. About 32 hired boats were supplied to Brahmpur, 37 to Semari and 15 to Buxar Anchals to maintain communication and to save the flood-affected people. Besides this, 19 fair price shops in Brahmpur, 29 in Semari and 4 in Buxar Anchals were opened. Gratuitous relief was also distributed among the flood-affected people.

FLOODS, FAMINES AND SCARCITY.

On a reference to *Hunter's Statistical Account of the District of Shahabad* (1877), it will be seen that according to him, "Droughts arising from deficient rainfall and the want, which is now being remedied, of an extensive and complete system of irrigation, frequently caused considerable distress. Four times in the course of five years in 1865, 1866, 1867 and 1869 droughts seriously affected the general harvest."*

According to him, "The great famine of 1860, coming as it did after the resources of the poorer class had been exhausted by bad harvests in the two previous years, caused considerable loss of life in Shahabad district. The distress was felt most severely in parganas Chausa, Piru, Chainpur, Nanam and in Panwar, in which rice cultivation predominates."†

He mentioned that relief measures were supplemented by private liberality. But the number of deaths from starvation, as reported by the police, came to 3,161.

W. W. Hunter observes.—"The famine of 1869 following as it did a succession of bad years, also caused much distress in Shahabad district and the scarcity was aggravated by the badness of the roads. Relief measures had to be organised, the able-bodied being employed on the roads, while the old and infirm were formed into *kangali* or beggar squads, who were paid daily in return for such light work as their infirmities enabled them to perform. The prices of food-grains varied directly with the distance of the markets from the railways."‡

* *A Statistical Account of Bengal*, Vol. XII, Gaya-Shahabad (1877), by W. W. Hunter, p. 251.

† *Ibid.*

‡ W. W. Hunter's *A Statistical Account of Bengal*, Vol. XII, page 253.

Regarding the famine of 1873-74, we find—

The following account of the scarcity of 1873-74 is taken from report by Mr. H. Alexander, the Collector of Shahabad District:—

“The spring (*rabi*) crop of 1873 had been good; and all was going well with the *bhadai* till August of that year, when, in consequence of very heavy floods, and the subsequent cessation of rain, the paddy crop throughout the district entirely failed; more than three-fourths of the expected outturn was destroyed, and much of what was saved was due to the Sone water, which was turned into the unfinished canals at the end of 1873, and freely distributed. In this way some paddy was saved, and an excellent spring harvest was ensured wherever the water had penetrated.....

“For the purposes of charitable relief, a sum of £ 2,529, 7s. 6d., subscribed in the district, was supplemented by a Government contribution of £ 900. The recipients of relief were employed in doing light work, such as rope-making, spinning, weaving. The total number of persons thus relieved was 1,18,776, and total amount expended on this account was £ 2,995 4s.”*

Famine of 1896-97. *

Regarding the famine of 1896-97 the last *District Gazetteer of Shahabad* mentioned that the prices in this district as elsewhere, ruled very high but considerable stocks were held by the cultivators; and eventually no part was really distressed except the Bhabua subdivision and the southern portion of the Sasaram subdivision, an area comprising 1,632 square miles and containing a population of 382,000 souls. In the affected area the harvest of 1895-96 had been poor and in 1896 the winter rice crop, on which the cultivators mainly depend, had an outturn of only ten annas. This was succeeded by an equally poor *rabi* crop, as there was almost an entire absence of rainfall from October 1895 to June, 1896, the fall being only 0.26 inch; and the people could only hope to recover if the monsoon was up to its usual strength.

The last *District Gazetteer* (1924) mentioned that the total cost of famine operations was Rs. 3,36,000 of which Rs. 30,000 was met from the district funds, and besides this the sum of Rs. 25,000 contributed by the Bengal Provincial Committee of the India Famine Relief Fund, was spent in relieving the distressed *Pardanashin* ladies. No deaths occurred from starvation, but owing to the ravages of cholera and small-pox and the greater prevalence of fever in the autumn of 1897, the mortality in the distressed area was nearly 3½ per mille greater than in the whole district.†

* W. W. Hunter *A Statistical Account of Bengal*, pages 253-254.

† Summarised from the *District Gazetteer of Shahabad* (1924), pages 91-94.

* Scarcity from 1900 to 1923.

The history of Shahabad in the twentieth century has hitherto happily been free from any such major disasters. The failure of *Hathia* rains in 1908 seriously affected the winter rice crop in those portions of the district which were not irrigated from the Sone canals; and the early drying of the ground also unfavourably affected the *rabi* cultivation; but there was only local scarcity which was relieved by the grant of *taccavi* loans. The unirrigated tracts again suffered in 1914 from the absence of rain from September to the end of the year.

In 1918 there was an early cessation of the monsoon rains, which again affected the vulnerable areas; causing a partial failure of the winter rice crop in the Bhabua subdivision. The *rabi* crops were affected by the drought in the beginning of the season but the mischief was largely repaired by rain in January of 1919. There was serious scarcity in Bhabua. The District Board spent over thirty two thousand rupees on relief works; but the scarcity was not so serious as to be taken as a famine.

Water Scarcities. *

Hailstorms and frost had caused heavy damages to the *rabi* crops in the Bhabua subdivision in the years 1932-33 and 1933-34. In 1934-35 also hailstorms had damaged the *bhadai* crops of Bhabua subdivision to a considerable extent.

For three years continuously, i.e., 1949-50, 1950-51, 1951-52 there was a failure of rainfall causing failure of crops. This failure of rainfall caused serious scarcity in some parts of the Bhabua subdivision. In 1950-51 Durgauti, Ramgarh, Adhaura and the eastern portion of Bhabua thanas were badly affected. The situation became worse during 1951 and 1952 especially in Chand, Adhaura, Chainpur and the eastern portion of the Bhabua thanas.

The scarcity was mitigated to some extent by the opening of Fair Price Shops in the mofassil areas and a number of minor irrigation works were taken up which provided work to the unemployed on emoluments. The middle class people were also driven to a state of intense distress. They were given small contracts to execute some irrigation works and other relief works. Light manual labour in the form of *khadi* spinning and weaving was made available at few centres.

In 1951-52 the entire *kharif* and *rabi* crops were lost. The affected area was large and included some portion of the Sadar and Buxar subdivisions although the major portion of the Sasaram subdivision and nearly the whole of the Bhabua subdivision were seriously affected.

In 1957-58 there was scarcity due to loss of the *Aghani* paddy and *rabi* crops due to the failure of *Hathia* rains and drought in the major portion of the Sasaram subdivision. Relief measures were taken.