CHAPTER IV.

AGRICULTURE AND IRRIGATION.

Land Utilisation.

The All-India Rural Credit Survey has published a monograph of Monghyr district in 1959. The Survey was based on field investigation and study of the main feature of the agricultural economy of the district.

The monograph quotes the following table on land utilisation in Monghyr district during 1951-52, the source being Indian Agricultural Statistics, 1951-52 :—

Classification of area.	Area (in acres).	Percentage to the total geographical area.
Total geographical area according to Surveyor-General of India.	25,43,936	..
Village papers	25,16,480	100.00
Forests	2,07,576	8.2
Not available for cultivation ..	4,24,677	16.9
Other uncultivated land excluding fallow lands.	95,596	3.8
Current and other fallows ..	2,97,754	11.8
Net area sown	14,90,877	59.2
Area sown more than once ..	1,53,119	6.1
Total cropped area	16,43,996	..

The monograph has the following comment :—

> "It is observed that about three-fifths of the geographical area was sown, of which hardly about six per cent of the total geographical area was sown more than once. Area under other uncultivated lands and under fallows constituted about 4 per cent and 12 per cent of the total geographical area, respectively. Area not available for cultivation and area under forest was about 17 per cent and 8 per cent, respectively, of the total geographical area."

From the same source Indian Agricultural Statistics, 1951-52, the crop pattern in Monghyr district during 1951-52 was as follows :—

Crop.	Area under crop (acres).	Percentage of the area under this crop to the total-cropped area.
Rice	4,49,171	27.3
Maize	2,26,192	13.8
Wheat	1,42,758	8.7
Gram	2,60,104	15.8
Barley	43,924	2.7
Tur or *Arhar*	89,952	5.5
Other pulses	2,13,848	13.0
Other food crops	95,096	5.8
Sugarcane	13,652	0.8
Condiments and spices	19,437	1.2
Fruits and vegetables	56,456	3.4
Oilseeds	25,820	1.6
Other non-food crops	7,586	0.5
Total ..	16,43,996	100.00

The following observation is quoted from the same monograph :—

"Gram is a crop of considerable importance in South Monghyr, especially in the belt of land bordering the Ganga between the river and the Kharagpur and Lakhisarai hills. It is grown to a lesser extent in North Monghyr. In 1951-52, about 260 thousand acres or about 16 per cent of the total cropped area was occupied by the gram.

Maize is no less an important crop in the district. It is regularly sown in *diara* areas on the chance of the flood coming sufficiently late to allow of the crop being reaped, and also in low-lying land liable to flood from the Ganga, the Gandak and other rivers. In 1951-52, it occupied about 226 thousand acres or about 14 per cent of the total cropped area.

Wheat is cultivated largely in North Monghyr, particularly in Begusarai thana, on lands on which the annual incidence of the Ganga leaves a rich deposit of silt. In 1951-52, about 143 thousand acres or about 9 per cent of the total cropped area was under wheat."

The following statement from the *Bihar Statistical Hand-book*, 1955 gives the classification of land during 1955-56 :—

Classification of land.	Area in acres.
Total area of the district	25,16,000
1. Forest	1,62,000
2. Not available for cultivation	2,85,000
3. Other uncultivated land excluding current fallow.	2,59,000
4. Current fallow	4,07,000
5. Net area sown	12,16,000
6. *Bhadai* crops	1,84,000
7. *Aghani* crops	4,46,000
8. *Rabi* crops	7,35,000
9. Fruits	13,000
10. Potatoes	4,000
11. Vegetables including root crops	56,000
12. Total area sown	14,38,000
13. Area sown more than once	1,90,000

Thus, in 1956-57 of the total area of the district about 49 per cent are under cultivation, about 13 per cent under not available for cultivation, about 12 per cent under uncultivated land excluding current fallow, 7 per cent under forest and 18 per cent under current fallow.

It is appreciated that the conclusions from the figures at a gap of only five years at places look rather peculiar. For example, according to 1951-52 figures of net area sown represent 59.2 per cent as against 49 per cent from the figures of 1955-56. The area under forest from 1951-52 figures comes to 8.2 per cent of the total geographical area while the figures of 1955-56 make it 7 per cent. It has to be recollected that the present machinery for actual compilation of the statistics in the field is not perfect and eye-estimate of only a certain percentage of lands of the particular category still forms the basis of such statistics. Later detailed discussion as to the utilisation of lands has been given. In course of the discussion, it will be seen that observations have been made that 72 per cent of the land has been put under cultivation including orchards and current fallow. From the way the statistics are compiled and made available it will not be possible to stick to any firm conclusion but the general trends are obvious.

In a closely cropped district like Monghyr there is not much scope for reclamation of waste lands. Even *chaurs* (water-logged area) and lands even beyond the level of marginal utility have been put under the plough. Lands covered with small shrubs have been cultivated.

The small reclamation that is being done is with ordinary plough and other agricultural implements. There is practically no field for reclamation of waste lands by tractors unless marginal forest lands are taken up. There has not been much headway in reclamation and the figures are negligible.

IRRIGATION.

Irrigation plays a very important role in agriculture. It is often said that agriculture is a gamble in the hand of monsoon. This is only because of inadequate and insecured irrigational facilities. It is also a fact that the crop harvest can be raised from 20 to 30 per cent through secured irrigation. From the figures it is clear that very little area is under secured irrigation.

There are several types of irrigational schemes like major, medium and minor. This district according to its soil and situation can be divided into two main parts for the feasibility of the irrigational schemes.

In North Monghyr only tube-wells, surface percolation wells, *rahat* pumps, electric and diesel pumps are some of the sources through which irrigation is possible. Irrigation is not common in low-lying area of North Monghyr.

In South Monghyr irrigation is practised in larger area than North Monghyr and the main sources of irrigation are canal, surface percolation wells, *rahat* pump and electric and diesel pumps.

The percentage of the net cropped area in South Monghyr irrigated from these sources is as follows :—

	Per cent.
Thana Monghyr	20
Thana Jamalpur	25
Thana Kharagpur	22
Thana Surajgarha	38
Thana Lakhisarai	40
Thana Sheikhpura	25
Thana Sikandra	45
Thana Jamui	30
Thana Chakai	10

Very little irrigation is possible in hilly region of the district, the only source of irrigating the hilly region is water reservoirs which is a costly affair and can only be done through the Governmental agencies or through the help of Government. A good deal of rice is grown in the beds of hill streamlets and their bed beneath the embankments levelled into fields which continue one below the other like the steps of a stairway, down the whole length of the stream, till it reaches the main stream or sterile soil which cannot be cultivated.

Some of the reservoirs found in the hilly region are very large and supply water for big area, but a good deal of cutting is required in order to provide channels leading from the bed of the stream in which water originally collected. This is not possible by the cultivators as a considerable outlay is involved. Some of the medium schemes in Jamui and Sadar subdivisions have been done by the Department of Agriculture and they have become a good source of water-supply.

Kharagpur Reservoir.

The only large irrigation work in the district consists of a reservoir in the Kharagpur and which was constructed about fifty years ago by Maharaja of Darbhanga. About two miles south-west of Kharagpur, the river Man runs through a gorge between two steep hills and at the narrowest point of the gorge there is an outcrop of rock across the river bed. This was taken advantage of as a natural foundation on which a great dam has been raised, the length of which is 725 feet and 20 feet wide on the top. Height of dam is 76 feet and the storage capacity of the reservoir is 10,200 acres feet. The construction of the lake was taken in the year 1870 and was completed in the year 1877 with an expenditure of Rs. 6,84,916.

The following account of the capacity of the reservoir is condensed from the statistical account. The area of the catchment basin is 36 square miles and the area of the reservoir at the level of the hill is 1.7 square miles. The capacity of the reservoir is 10,200 acres feet as mentioned above which is meant for irrigation.

The area of the land to be irrigated was fixed originally at 26,240 standard *bighas,* but ten years later the area under irrigation from the water of the reservoirs and the springs was 47,500 *bighas* after allowing for the share of Banaili Raj. Now the water is distributed by means of irrigation channels over about 18,000 acres. The main irrigation channels consist of the Rahmatpur, Parsanda and Bhusichak canals on the north of the river Man and the Muzaffarganj, Kathutia and Buhara branch canal on the south.

Sources of water-supply served by those of—

	No. and area.	
(*a*) Canals	41,288 acres	(private source).
(*b*) Tanks	16,226 acres.	From Season and Crop Report of 1953-54.
(*c*) Wells	19,025 acres.	Ditto.
(*d*) Water reservoirs or *Ahars* or other resources.	2,00,523 acres.	Ditto.
	2,77,002 acres.	

Achievement of Irrigation Schemes done by the Agriculture Department in the First Five-Year Plan.

The following were the irrigational schemes done in the district by the Department of Agriculture in First Five-Year Plan :—

(1) Medium Irrigation Schemes.
(2) Minor Irrigation Schemes.
(3) Surface Percolation Wells.
(4) Open Boring.
(5) Tube-wells.
(6) Lift Engine and Pumps.
(7) *Rahat* and Pump.

These schemes had been much advantageous due to large area benefited by them which can be had from the statement below :—

Year.	Allotment in rupees.	Target.	Achievement.	Expenditure incurred in rupees.	Estimated area benefited in acres.
1	2	3	4	5	6
	Rs.			Rs. a. p.	
	MEDIUM IRRIGATION SCHEMES.				
1951-52 ..	2,12,907	12	9	2,09,905 0 0	25,020
1952-53 ..	1,38,000	10	7	1,37,587 0 0	86,000
1953-54 ..	50,000	10	5	47,697 8 0	4,988
1954-55 ..	97,822	10	4	97,792 4 3	7,092
1955-56 ..	1,65,000	8	6	1,62,603 6 0	8,472
Total ..	6,63,729	50	31	6,55,585 2 3	1,31,572
	MINOR IRRIGATION SCHEMES.				
1951-52 ..	48,000	25	30	33,394 11 0	3,000
1952-53 ..	86,000	90	60	85,629 7 0	6,000
1953-54 ..	1,00,000	60	44	99,907 0 0	4,400
1954-55 ..	1,20,000	90	63	99,536 7 6	6,300
1955-56 ..	2,00,000	100	122	1,99,958 1 3	12,200
Total ..	5,54,000	365	319	5,18,425 10 9	31,900

Year.	Allotment in rupees.	Target.	Achievement.	Expenditure incurred in rupees.	Estimated area benefited in acres.
1	2	3	4	5	6
	Rs.			Rs. a. p.	
			SURFACE PERCOLATION WELLS.		
1951-52 ..	2,08,688	260	253	2,08,687 13 6	2,118
1952-53 ..	49,982	300	125	48,069 15 9	750
1953-54 ..	18,706	138	68	13,669 13 9	408
1954-55 ..	1,27,850	500	308	1,27,849 3 0	1,848
1955-56 ..	2,85,000	500	739	2,84,443 6 9	4,434
Total ..	6,90,226	1,798	1,593	6,83,720 4 9	9,558
			OPEN BORING.		
1951-52 ..	26,500	225	113	21,407 2 0	2,034
1952-53 ..	5,750	100	50	6,326 1 6	900
1953-54 ..	5,750	47	46	5,750 0 0	823
1954-55 ..	12,000	50	84	11,714 0 0	1,512
1955-56 ..	29,000	150	151	26,943 12 9	2,718
Total ..	79,000	672	444	72,141 0 3	7,987
			TUBE-WELL.		
1951-52 ..	Not available.	5	1	Not available.	100
1952-53 ..	..	2	..	..	..
1953-54 ..	..	2	1	..	100
1954-55 ..	..	2	..	..	..
1955-56 ..	..	3	3	..	300
Total ..	..	14	5	..	500

LIFT ENGINES AND PUMPS.

Year.	No. of pumping sets supplied to the cultivators.				Area benefited in acres.
	3 H. P.	5 H. P.	10 H. P.	Total.	
1	2	3	4	5	6
1951-52 ..	77	95	21	193	48,250
1952-53 ..	2	3	Nil	5	1,250
1953-54 ..	Nil	Nil	Nil	Nil	Nil.
1954-55 ..	Nil	7	Nil	7	1,750
1955-56 ..	Nil	Nil	Nil	Nil	Nil.
Total ..	79	105	21	205	51,250

RAHATS AND PUMPS.

Year.	No. sold.	Area benefited.
1951-52 ..	24	144
1952-53 ..	7	42
1953-54 ..	6	36
1954-55 ..	24	144
1955-56 ..	30	120
Total ..	91	486

During the First Five-Year Plan, Ajan River Scheme and Gidheshwari Canal Scheme were taken up and completed. The following, ie., Kharagpur lake, Ganaili, Kundghat, Lower Kiul, Magi and Kaurihari Irrigation Schemes were also started in addition to the above completed schemes. The total outlay on the schemes is Rs. 185.75 lakhs and it will irrigate about 1,15,850 acres on completion. The budget provision for the year 1956-57 was Rs. 61.31 lakhs and area brought under irrigation was 45,200 acres. Morewe Reservoir Project at an estimated cost of Rs. 40 lakhs was to be taken up and in 1956-57 Rs. 15 lakhs was to be spent. On completion 10,000 acres will be irrigated from this scheme.

Hanumanpahar Dam across Budua located at Bhagalpur will also irrigate a part of Monghyr district on its completion.

Name of the schemes.	Budget Estimate.	Area brought in 1956-57 in acres.
	Rs.	
1. Gidheshwari Pyne ..	2,00,000	..
2. Anjan River ..	87,000	..
3. Kharagpur Lake ..	8,62,000	..
4. Ganaili Irrigation Scheme ..	40,000	..
5. Kundghat Irrigation Scheme	1,42,000	..
6. Lower Kiul Scheme ..	25,00,000	..
7. Magi Irrigation Scheme ..	10,00,000	..
8. Kaurihari Irrigation Scheme	13,00,000	..
Total ..	61,31,000	..
New Scheme.		
Morewe Scheme	15,00,000	..

Description of the Schemes.

Gidheshwari Canal.—The head work consists of a head regulator of span of 5 feet each, and 5 feet high, with shutter and regulating arrangements and also river protection works. This canal is about 15 miles long with 10 falls and crossings. Ten distributaries with head sluice take of from this canal.

Anjan River Scheme.—The scheme consists of 2 feet high concrete weir with 3 feet high shutter across the Anjan river. The length of this weir is 100 feet.

Kharagpur Lake Scheme.—This scheme comprises of renovating the existing earthen dam and also remodelling the entire canal system. The storage capacity of the lake will be almost doubled and additional areas assured of guaranteed irrigation. The estimated cost is Rs. 16.43 lakhs and 12,000 acres will be irrigated on completion.

Kundghat Scheme.—The head work of Kundghat Scheme is situated about 12 miles south of Kiul in Sikandra police-station. The present scheme has been prepared to bring the area under assured irrigation by a diversion concrete weir 120 feet long 2 feet 6 inches high with 3 feet high automatic collapsible steel shutter and a scouring sluice of 15 feet length.

Lower Kiul Scheme.—There exists Sharwandnadwan *pyne* which takes off from Kiul river in Nabinagar village near Tali Pahar. This *pyne* has silted up badly and it has been found that re-excavation of the *pyne* will not serve the purpose. Hence this scheme has been envisaged to revive the old scattered irrigational system in Lakhisarai.

Magi Reservoir Project.—The project consists of construction of a reservoir 3 miles north-east of Jhajha on the Magi river in the district of Monghyr. The earthen dam across the river is about 5,900 feet in length and 50 feet in height and has a reservoir storage capacity of 8,300 acres.

Kaurihari Irrigation Scheme.—This is an irrigational scheme over the rivers Nata, Baghol and Kaurihari in the districts of Monghyr and Gaya. The head work is situated about 20 miles south of Sheikhpura. Three weirs on rivers Nata, Baghol and Kaurihari will be constructed and the three rivers will be interlinked by channels.

Morewe Reservoir Project.—The Morewe Reservoir Project consists of planning a storage reservoir on the Morewe river, 5 miles east of Kiul. An earthen dam 1,900 feet long and 80 feet high will be constructed across the river and the lake formed will have a capacity of about 15,000 acres.

It was proposed to increase the area under irrigation through Medium Irrigation Schemes, tube-wells, wells, *rahat* and pump, open boring and electric pump in 1956-57.

The area irrigated in 1953-54 from all sources, i.e., canals, *ahars*, tanks, wells, and other sources in the district was 2.77 lakh acres. This means that up to 1953-54 only 19 per cent of the net cultivated area was irrigated in the district.

In the year 1956-57, 12,000 acres additional area were irrigated and thereby an increase of food production by 300 tons was expected by the department concerned.

Medium Irrigation Schemes.—It was proposed to construct Medium Irrigation Schemes on subsidised basis. A sum of Rs. 2.50 lakhs was provided in the plan for expenditure in the year 1956-57.

Installation of Tube-wells.—It was proposed to sink irrigation tube-wells on subsidised basis. A sum of Rs. 0.12 lakh was provided in the plan for expenditure during 1956-57.

Surface Percolation Wells.—It was proposed to construct surface percolation wells in the plan and some were constructed during 1956-57.

Rahat *Pumps.*—To encourage cultivators to purchase *Rahat* Pumps for irrigation, it was proposed to distribute these Pumps

to the cultivators on subsidised basis. A sum of Rs. 0.8 lakh was provided in the plan for expenditure during 1956-57.

Open Boring Scheme.—It was proposed to sink open boring wells on subsidised basis to augment the water-supply. A sum of Rs. 0.19 lakh was provided in the plan for expenditure during 1956-57.

Electric Pumps.—It was proposed to distribute electrically operated pumping sets on subsidised basis to the cultivators for the purpose of irrigation in the areas where no other irrigational facilities are available but electricity. A sum of Rs. 0.19 lakh was provided in the plan for expenditure during 1956-57.

Minor Irrigation (Revenue).

During the First Five-Year Plan a diesel generating station at Begusarai was erected to feed the tube-wells in the area. Power was also extended to several towns and villages by extending line from Biharshariff and Mokameh.

During the Second Five-Year Plan there is a proposal to instal a power station at Barauni with an installed capacity of 30 MW and connected transmission lines.

The schemes which were to be benefited during 1956-57—

(1) Extension from Maithon to Bhagalpur, Monghyr, Jamalpur and Sahebganj, etc. (5).

(2) Extension of power supply in Mica Mines area (4).

(3) Extension in Patna and part of Monghyr district.

(4) Steam station in North Bihar and distribution Extension (17).

(5) Rural Electrification in Bihar (19).

Flood Control (Irrigation).

The total area of the district is 25,16,000 acres out of which about 9,50,000 acres are in North Monghyr. In bad years about 4,00,000 acres are flooded causing damage to crops and cattle, etc. The flooding is caused by the rivers Ganga, Burhi Gandak, Kosi, Bagmati and Balan. There are many deep pockets which remain submerged and people clamour for drainage after the subsidence of floods.

In the First Five-Year Plan, one drainage scheme costing Rs. 14,96,000 benefiting an area of 17,600 acres and six flood control schemes costing Rs. 53,25,368 benefiting an area of 1,05,000 acres have been completed and three drainage schemes, seven flood protection schemes and one town protection scheme have been taken in

hand at an estimated cost of Rs. 2,75,92,249 benefiting an area of 3,83,462 acres.

Name of scheme.	Budget figure, 1956-57.	Area to be benefited. (in acres.)
	Rs.	
Spill over schemes.		
1. Embankment from Rosera to Nima ..	13,47,500	1,155
2. Embankment from Khagaria to Nima ..	5,00,000	53,178
3. Embankment from Rosera to Parihara	14,25,000	17,100
4. Embankment from Khagaria to Parihara	6,00,000	13,134
5. Protection of Khagaria town ..	1,10,000	250
6. Teai and Katentia Chours	1,500	Nil.
7. Tilrath Chour	13,940	W. A.
8. Shovri Bhowara Chour	15,000	W. A.
9. Sultana Nala Scheme	8,000	Nil.
10. Embankment on Bainti	15,00,000	N. A.
11. Embankment on Balan	15,00,000	N. A.
.. Total ..	70,34,440	84,867

EMBANKMENTS.

The most important embankments are those of the North Eastern Railway, viz., (1) the main line which runs along the south of the north Gangetic portion of the district, at an interval from the Ganga varying from about 12 miles to less than a mile and (2) a branch line called the Manshi-Bhaptiahi section, which runs almost due north from Mansi and divides Gogri thana into two equal portions. Both the main line and its extension run along high embankments and there has been much controversy regarding their effects on the drainage of North Monghyr and its liability to flood. There is, however, a general consensus of opinion that the embankment of the main line is on the whole a blessing to the country, in that it protects the area north of the line from the floods of the Ganga—an opinion which is supported by the evidence collected from raiyats by the Settlement Officers.

The case of the Mansi-Bhaptiahi extension is more difficult. Its embankment runs straightcross the natural drainage line of Gogri thana, and the sufficiency of the water-way provided in it is a matter of life and death to the cultivators. By an unfortunate coincidence, the two first years of its construction were marked by exceptional floods. In 1905 there were heavy local falls of rain, which laid the whole country under water and breached the earthwork of the line in many places. This experience was repeated in a more serious form in 1906 when the local floods were due to sub-Himalayan

rainfall. It was found on enquiry that the allowance of water-way was insufficient and a considerable increase had to be arranged for.

A small area in the west of the Teghra thana is protected by a Government embankment; and in the south and south-east of Begusarai town there is a large triangular area confined between the Ganga and the railway, the major portion of which is protected by the Gupta Bandh, though the existence of the railway embankment no doubt intensifies the effects of flood. The rectangular area in the south of thana Gogri lying between the railway and the river to the south of the Mansi and Maheshkhunt station, is similarly protected to some extent by the Gogri *bandh*.

There are two small private embankments in some villages belonging to Babu Ram Bahadur Singh and in the Government estates of Dhanupra in the extreme north besides an embankment about four miles long constructed in Amosi village in the Khagaria thana during the year 1903. These zamindari embankments as Sir Hugh McPherson wrote in 1907, when he was Director of Land Records, "are a source of much difficulty to the District Officer. The greater portion of thana Gogri must, in my opinion, revert to the uncultivated condition in which it was seventy or one hundred years ago, unless the petty embankments are maintained in such a state of efficiency as will protect the country from injurious flood in ordinary years. They are useless in years of exceptional flood like 1905 or 1906, but they give the cultivators confidence and make cultivation possible in average year. When maintained at ordinary flood level, they do not, I think, seriously endanger the welfare of adjoining tracts. In the winter of 1907-08, about Rs. 20,000 was taken by the Bahadurpur, Shankarpur and Bakhtiyarpur estates of *pargana* Pharkia in the shape of land improvement loans, and spent on the repair of estate embankments. The expenditure of this money not only improved the efficiency of the embankments, but also afforded relief to the impoverished cultivators and labourers who had suffered so severely from the loss of crop and destruction of houses attending to the floods of 1905-06".

The following is an account of the principal embankments in the district :—

In the west of thana Teghra a Government embankment, called the Monghyr *bandh*, runs along the left bank of the Baya river from the district boundary to Barauni, and protects a large part of Teghra thana from inundation. Further east, its place is to some extent taken by the high road from Teghra to Begusarai.

South of the latter place is an old zamindari embankment which was strengthened and repaired after the floods of 1889 by the late Mr. Ashutosh Gupta, who was Subdivisional Officer at Begusarai from 1889 to 1890. It is

consequently known as the Gupta Bandh. It is an embankment about 13 miles long, starting from near Garhara and terminating on some high land near Saiyadpur below Samho, a large village south-east of Begusarai. This embankment gives partial protection to a large tract of country to the south of the present North Eastern Railway embankment. In 1891 a proposal was made that it should be raised and strengthened, which was negatived by Government. In 1894, the question of remodelling and maintaining the embankment was again raised and negatived, on the ground that the construction of marginal embankments blocks the spill and tends to raise the flood-level and cause damage elsewhere. On the latter occasion it was decided, not to bring it under the Embankment Act, but that the zamindars might keep it in repair. It was accordingly, the custom for the Subdivisional Officer to issue notices upon the zamindars to keep it in repair. This experiment, however, was not altogether successful for the embankment was not properly maintained. Moreover, conditions were made worse, and the danger of allowing it to fall into disrepair accentuated by the construction of the Bengal and North Western Railway line to the north (now the North Eastern Railway). This line was opened to traffic in March, 1900.

It was found that its high embankment blocked the natural drainage of the country and prevented flood water escaping to the north; and to make matters worse, a large number of habitations sprang up to the south of it, which were more or less dependent on the imperfect protection afforded by the Gupta Bandh. The villagers were, in fact, living as they would in a protected tract and cultivating the land as if it were properly protected, whereas it was not. Their danger was realised when the embankment was breached in the floods of 1904. It was finally decided, in 1907, that Government should take over and maintain the embankment under the Bengal Embankment Act (II B. C. of 1882) and that it would be remodelled and raised 3½ feet above the high flood level of that year.

Further to the east is a short embankment about 7 miles long known as the Gogri embankment, running from north-west to south-east at a distance of about half a mile from the bank of the Ganga. It was raised by the District Board to protect Gogri and a number of villages situated between the Bengal and North Western Railway line (now in North Eastern Railway), and the Ganga.

An embankment at Gogri has existed from a very long time to protect the town of Gogri and the villages to the east and north but some years ago the southern portion of it was carried away by the river, and within it the old town of Gogri, as shown in the original survey maps. In 1899-1900 the remaining portion of the embankment was continued as a high raised road running south-east past Gogri-Jamalpur to a mile from the river. The flood of 1901, however, breached the new earthwork in the dip where the embankment crossed what is known as the Ratan or Kauwa Kol channel; and it was at the same place that the embankment gave way in 1904.

New Retired Line to Gupta Embankment.

The entire area of the subdivisional headquarters at Begusarai and other adjoining places are lowland and are liable to be inundated by the Ganga flood. The old Ganga Bandh served as a spur in warding off the flood water of the Ganga protected the town of Begusarai and its adjoining places for a long time. But it became ineffective when its south-eastern portion was encroached by the Ganga water. Thus the necessity of constructing the New Retired Line to Gupta Bandh became imperative to make it more effective and to protect the area in question. This was constructed for the protection of Begusarai and other adjoining country from the Ganga floods. The capital cost of the embankment was Rs. 93,886 only.

Gogri-Narainpur Embankment.

This embankment of about 27 miles was constructed along the left bank of the Ganga at an approximate cost of about Rs. 22,00,000 for protection of the villages of Gogri and Parbatta thanas from the floods of the Ganga. The construction was completed in 1952.

A number of embankments, viz., (*a*) Gupta-Lakhminia *bandh*, (*b*) Fafaut bandh, (*c*) Kasba Rupnagar embankment, all in Begusarai subdivision and (*d*) Surajgarha embankment in Sadar subdivision have been constructed for protection purposes.

Soils.

The soils of the district are (1) heavy clay called *karail*, (2) clay called *kewal*, *kariya* or *kathauk*, (3) clayey loam called *dhust kewal* or *phulauk*, (4) loam called *dhurs*, *dhusri*, *doras* or *balmat*, (5) sandy loam called *balsumbhri* and (6) sand or *bal*. The clay soils of the district are classified as follows :—(*a*) *Kachhua kewal* is the typical clay soil of *chaur* or lowlands, which remain too long and too deep under water to admit of paddy cultivation. The soil, however, grows all sorts of *rabi* crops. Its colour is black. (*b*) *Karail* or *karari* is a black, tenacious rich soil also found in the *chaurs*, which

grows only *rabi* crops. (*c*) *Dhusri* or *dhusri kewal* is a little lighter than *kacchua kewal* and grows both paddy and winter crops. (*d*) *Gorki* is an extremely stiff soil suitable neither for paddy nor wheat or barley, which grows only *rahar*, gram, *kulthi*, etc. It has a mixed white and red colour. (*e*) A brick-red soil found near the hills, very stiff and impervious to water, rather poor, growing only *rahar*, gram, *kulthi*, etc., has no special local name.

The usual loamy soil is *bhusni* or *dhusri* or *dhus*, a light rich soil suitable for crops. A sandy soil is known as *balsumi* or *balsumbhri*. It is not a rich soil, but will grow both *bhadai* and *rabi* crops. *Dhus*, *balmat*, or *dora* is a *diara* soil containing about three-fourths sand and one-fourth clay, which yields only inferior *rabi* crops. Alkaline soils are known as *nonchhal* or *usar* when impregnated with saltpetre (potassium nitrate); as *reh*, when impregnated with sodium carbonate, used by washermen for washing clothes; and as *kharwa*, when apparently containing sodium sulphate. But there is a good deal of confusion about these names.

Principal Crops.

The statement showing the areas under principal crops during 1955-56 as mentioned in the *Bihar Statistical Hand-Book*, 1955, was as follows :—

Classification.	Acreage.
1. Rice	4,05,000
2. Wheat	1,81,000
3. Gram	1,53,000
4. Barley	44,000
5. Maize	3,21,000
6. *Masoor*	14,000
7. *Arhar*	25,000
8. *Khesari*	46,000
9. Peas	15,000
10. Sugarcane	15,000
11. Potatoes	4,000
12. Tobacco	..
13. Jute	..
14. Chillies	7,000

Rice (Oryza sativa).—Rice is the most important cereal occupying the maximum acreage in the district, grown in both north and south Monghyr, the acreage in the latter being more than the former. In the South Monghyr it is mainly grown in the Kharagpur *pargana* to the east, in the wide plain stretching from Jamui to Sheikhpura on the west, and on the alluvial land in the Sheikhpura thana. In North Monghyr winter rice is grown chiefly in the Gogri thana.

Bhadai rice, also called *sathi* rice because of the period between sowing and reaping is about 60 days, is cultivated mostly in the south of the district, ordinarily on high and somewhat poor land. Usually the transplanted crop is taken but in very limited areas broadcasting is also practised. The seeds are sown with the onset of monsoon usually by the middle of June. The seed rate used by the cultivators varies between 20 to 30 *seers* per *katha* but the introduction of Japanese method of cultivation has reduced the seed rate to 7 to 10 *seers*. After a month or so when the seedlings are ready for transplanting the fields are puddled and the seedlings transplanted. But the transplanting is fully dependent on the rainfall. Since 1954 some area has come under Japanese method of paddy cultivation and where such process is practised, application of ammonium sulphate and single superphosphate is done, the dose varying according to the type of soil. Line sowing is also strictly followed under third method and distance between plant to plant and row to row given is 10 inches or so. As both early medium and late *aman* varieties are grown, harvesting generally starts from the month of November and continues up to the end of December, which depends on the maturity of the varieties. It cannot be said that the Japanese method has become quite popular, mainly because it is expensive.

Harvesting is usually done by cutting the plants with a sickle and the harvested plant is collected in a heap and threshed by treading with bullocks. In South Monghyr the harvested paddy plants are usually tied into bundles and are threshed on the wooden planks. In the National Extension Service and Community Development Blocks the Japanese thresher locally known as 'Akshat Thresher' has been introduced which has minimised the time of threshing and is also facilitating threshing inside the rooms during the rough weather.

Rice straw, which is known as *pual* and *nebari* is used in fodder and in thatching the roof.

Wheat (Triticum vulgore).—It occupies the important acreage amongst the cereals in *rabi*. It is grown extensively in the north of the Ganga in *diara* areas and in other pockets of Begusarai and Khagaria subdivisions. In the north the usual practice followed in its cultivation is wheat mixed with maize but fields with pure cultivation can also be seen extensively. In the north the inundation of the Ganga leaves a rich deposit of silt. In such areas the ordinarily heavy cost of cultivation of this crop is to a large extent avoided, and the cultivator is then able to bear with comparative equanimity the chances or loss through blight, to which this crop is particularly liable.

The sowing generally starts from the middle of October and continues up to the end of November. The usual practice in manuring is the application of farmyard manure but that too is not much prevalent. The soil is finely prepared and seed sown behind

the plough. The seed rate generally varies from 30 to 40 *seers* per *bigha,* but where mixed cropping practice is followed the seed rate is reduced to 20 *seers.*

After the sowing of seeds and germination very little care is taken, except one or two waterings wherever possible. The harvesting starts from the month of March and continues up to April. The harvesting is done by cutting the plants with sickle. After the crop has been cut it is tied into bundles and carried to a central place and stocked. Threshing is generally done by treading with bullocks. The wheat is spread on a threshing floor, which is generally made of earth. The bullocks are driven round and round until the grain is separated from the chaff. The final separation of the grain from the *bhusa* or broken chaff is done by winnowing.

After winnowing, the grain is stored either loose or in bags in rooms. Sometimes it is stored in mud-bins.

Maize (Zea mays).—Maize, locally known as *bhutta* or *makai,* is one of the most important crops of this district specially in the north of the Ganga and it is consumed in enormous quantities by the people of this place, the green cobs as well as the fried grains are consumed with relish.

Two crops are raised in the district—the hot-weather maize as well as the *Kharif* maize, that is the crop which is taken during the monsoon months. The hot-weather maize is sown generally in the end of February or so in such places where irrigation facilities are available but the area under hot-weather cultivation is very small. The cultivation of the *Kharif* crop is the usual practice and bumper harvests are taken in years of favourable climate.

With first shower of rain in May the land is ploughed and then prepared by three to four ploughings. The usual manuring is the farmyard manure. The seeds are sown broadcast. Line sowing is only prevalent in National Extension Service and Community Development Block areas. The seed rate is 8 to 10 *seers* per acre. The practice of weeding and hoeing are also in vogue. The abnormal rains or droughts during the seed-setting period reduce the yield to a considerable extent.

If the crop is grown for green cobs, the cobs are harvested while they are green, the stalks are cut and fed to the cattle but when grown for seed the cobs are allowed to dry up in the field until they are fully ripe. The cobs are then harvested by breaking them off from the stalks, and are allowed to dry. This is usually done in cultivators' home where they can be carefully watched. When dry, the grains are not shelled from the cobs; the cobs are kept hanging in well ventilated rooms. The stalks left are tied in bundles for feed of the cattle. The harvesting usually continues up to the end of September.

The implement used for harvesting is the ordinary sickle. Numerous local varieties of the crop are grown but they are generally poor yielders. The improved variety under cultivation is Jaunpur released by the State Department of Agriculture. The grain of this variety is medium sized, white and heavy-yielding. This variety when sown in the middle of June, are ready for harvest in the first week of September.

Rahar.—Rahar or pigeon pea (*Cajanus cajan*) is the most important pulse crop under cultivation in the district. The *dal* is most liked by the people and is consumed in enormous quantities. Moreover, the crop is very hardy and can thrive in any adverse climatic condition with little or almost no care. It is usually grown as a mixed crop with maize and the acreage under pure crop is almost negligible.

The lands where the pigeon pea is sown mixed with other crops, are the same as that for the crop sown singly, when sown with maize the land is more especially prepared to suit the proper germination of the maize crop rather than that of the pigeon pea. The seeds of both the mixed crops are broadcast in the middle of June. After the harvest of the maize crop, *rahar* is allowed to grow until it is fit to be harvested. The usual seed rate used by our cultivators varies between 6 to 8 *seers,* but when grown as mixed crop as is usually done the seed rate comes to 4 to 5 *seers.* No intercultural operation is given. The harvesting starts from the end of February and continues up to the end of April in case of very late varieties.

Vast areas under this crop can be seen in the different corners of the district. The yield per acre is very low due to the cultivation of low-yielding local varieties and due to the occurrence of phyllody in which the plants turn sterile by transformation of floral parts into vegetable parts. This phenomenon is locally known as *banjhi,* in which case the reduction in yield comes down to almost 40 per cent in some fields.

When the plants are ripe the stalks are cut as near the ground as possible by means of sickles. They are then tied in bundles and then taken to the threshing floor and allowed to dry for a few days. The leaves and pods are then stripped off from the stems and heaped in pile. These are usually threshed by bullocks treading on them. Winnowing is necessary to separate the grain from pods and leaves. The leaves and broken pods are fed to the cattle while the stalks are used for roofing, basket-making, fuel, etc.

Gram (Cicer arietinum).—Gram is the most important winter pulse crop grown here. Its *dal* is very popular and liked much by the people. The green gram plant locally known as *jhangri* is consumed in enormous quantities during the months of January and February specially by the poor classes. It is mainly cultivated as a

diara crop. In the north of the Ganga one can find its cultivation as a mixed crop with wheat, barley and in some pockets with chillies too. The progressive cultivators grow it as a pure crop and get a bumper harvest but acreage under such cultivation is very small.

The land where gram is sown is not prepared so finely as that of wheat but where mixed cropping of wheat and gram is practised the land is prepared in such a way as to suit the former. The seed rate is 20 to 25 *seers,* which is usually sown broadcast. The manuring of the plot before sowing is not done. No intercultural operation is practised and no irrigation is given.

When the leaves of the crop begin to turn yellow and the plants begin to dry up, the crop is ready for harvesting. Harvesting is done by cutting the plants with sickles and they are then taken to the threshing floor. The harvested plants are allowed to dry for a few days, and are then threshed by having the bullocks trodden on them as in the case of wheat.

Barley (Hordeum vulgare).—Barley is mainly cultivated in North Monghyr. In the poorer lands of Gogri this, to some extent, takes the place of the more valuable spring crops which can be raised in other thanas.

Minor Legumes.

The following are the legumes which are grown throughout the district, but they are of minor importance in comparison to the other leguminous crops described previously. These are (*i*) sun-hemp (*Crotalaria juncea*), (*ii*) lentil or *masur* (*Lens esenlenta*), (*iii*) *moong* (*Phaseolus radiatus*), (*iv*) *urid* or black gram (*Phaseolus mungo*) and (*v*) *khesari* (*Lalthyrus sativus*), etc.

Sun-hemp.—The crop is grown here rather extensively for two purposes—(*i*) for getting fibres and (*ii*) for green-manuring purposes, that is, for renovating the soil. Cultivation for the fibre-purposes is only limited in certain pockets of Begusarai and Khagaria subdivisions.

The land is ploughed with the first rains and the seed is sown as soon as the soil is moist enough for the proper germination of the seed. The amount of seed rate per acre is generally 30 to 40 *seers* whether grown for fibre or green-manuring purposes.

When grown for green manuring, the crop, when about 2 or 3 feet high, is run over by a heavy beam or plank in order to make it lie flat on the ground in the direction in which the ploughing will be done. The crop is then ploughed under by means of mould-board plough. This operation is done while the plants are still succulent and while the ground is quite moist in order to ensure rapid decay of the crop.

When grown for fibre, the crop is sometimes harvested when in full bloom. In other cases, it is allowed to remain in the field until the fruits have developed or in some cases until the crop is dead ripe. Harvesting is done by cutting the plants as near the ground as possible by means of sickles. The cut plants are allowed to remain in the field exposed to the sun for two or three days until the leaves have shed. The stalks are then tied in bundles of convenient size and stacked for some days. The bundles are then placed in water about two feet deep, only the lower portions being covered. This is to allow the thicker portions more time for rotting. Later the whole bundles are immersed, weighted down, and left until the bark is separated from the stem. The plants are then taken out and dried, and the fibre is extracted by hand.

Masur.—Lentil or *masur* (Leno esculenta) is a winter crop and generally cultivated in poor lands. The bed for sowing of this crop is roughly prepared, two or three ploughings being considered sufficient. The seed is then sown broadcast at the rate of 10 to 15 *seers* per acre when sown alone. But when some mixed with such crops as barley and mustard the amount of seed is approximately half of the usual seed rate. Harvesting, threshing and winnowing is done as in the case of most *rabi* crops.

Mung.—Mung or green gram (*Phaseolus radiatus*) is cultivated for grain purposes as well as fodder crop during the rainy season as also utilised as a green-manure crop. The preparation of the fields is similar to that of the lentil. The seeds are usually sown broadcast and the amount of seed when sown alone is about 4 to 5 *seers* per acre.

The crop is harvested before it is fully ripe as there is a danger of the shattering of the dry pods. The plants are cut by means of sickles and removed to the threshing floor and dried. The grains are then threshed by means of bullocks, and cleaned by winnowing.

Urid.—Urid or *kalai* or black gram (*Phaseolus mungo*) is cultivated for grain purposes during the months between August and November and as a fodder crop during the rainy months (June—September). It is utilised as a green-manure crop also. The preparation of the land for sowing is similar to that for the *mung* crop. It consists of two or three ploughings at the commencement of the rains. Thorough preparation of the seed bed is not considered necessary as this tends to encourage excessive vegetative growth at the expense of seed development. The seeds are then sown broadcast at the beginning of the rains. When sown alone the seed rate for this crop varies from 4 to 6 *seers* per acre, but when sown as mixed crop the seed rate is very much less.

The harvesting is done in the usual way as in the case of *mung* crop.

Khesari.—Khesari (*Lathyrus sativus*) is cultivated both as a full *rabi* crop and also as a *paira* crop in the paddy fields in winter months in some pockets of the district. It is also used as a fodder crop. The preparation of the land for sowing is similar to that of *mung* and *kalai*. The seeds are then sown broadcast, the seed rate used varies from 18 to 20 seers per acre. When grown as a *paira* crop in paddy fields the seed rate is considerably reduced. Before the plants are fully ripe they are cut and removed to the threshing floor and stalked for about a week or so until they are dry. When dry, they are threshed by bullocks in the usual way and cleaned by winnowing.

Oil-seeds.

The oil-seed crops grown in the district are linseed (*Linum usitatissimum*), rape and mustard (*Brassica campesties* and *Brassica junca*) and ground-nut or pea nut (*Aroachis hypogaea*) and castor (*Ricinus communis*). The method of cultivation followed in the district is given below cropwise :—

Linseed.—Linseed (*Linum usitatissimum*), is a winter oil-seed crop, grown in this district mainly for the oil which the seed contains.

The land where linseed is grown is prepared in almost the same way as wheat lands are prepared. Land is ploughed for several times, followed by harrowing for removal of all weeds and trash. The usual method of sowing the seed consists of broadcasting or behind the plough. The seed rate used varies from 5 to 7 *seers* per acre. When grown as a mixed crop with wheat as is followed in some pockets the seed rate is considerably reduced.

Practically no care is taken after sowing. The crop becomes ready for harvesting by the middle of March. When ripe, the crop is harvested by sickles and then taken to the threshing floor where the seeds are beaten out and winnowed. The seeds are then ready for marketing.

Rai and *sarson.—Rai* (*Brassica juncea*) and *sarson* (*Brassica campestris*) are the two important species cultivated in this district in the north of the Ganga. They are both grown during the *rabi* season and usually sown mixed with other crops, such as wheat, gram or barley, but in certain pockets pure crop is also taken. The preparation of the land for the sowing of mustard crop is generally that for the crop with which it is associated but as this is also taken as a pure crop the seed-bed is finely prepared. The seed rate generally varies from 2 to 3 *seers*, but when grown as mixed crop the seed rate is considerably reduced. The seeds are sown in the month of October and the crop becomes ready for harvest during the months of January and February.

The plants are cut by hand with a sickle, dried in the sun and threshed. The yield goes up to 5 to 6 maunds per acre.

Castor.—Castor (*Ricinus commernis*) is another important *rabi* crop grown extensively in the district specially in the north of the Ganga. It is generally cultivated as a mixed crop with chilli but acreage under pure crop can also be seen. The method of preparation of the seed-bed is the same as that for the crop with which it is associated. The seeds are sown usually in the month of August by dibbling method. Intercultural operations consist of only weeding and light hoeing.

The crop is ready for harvest during the months of February and March. The harvesting consists in picking the mature capsules (fruits) by hands. The picking usually continues for one or two months. The capsules are exposed to the sun and on drying the shells split open. If they do not open they are beaten until the seed separates from the shell. The seeds are then dried and stored until ready for sale. From the seeds the oil is extracted which is used extensively for medicinal purposes and as an illumination.

Ground-nut.—The acreage under ground-nut (*Arachis hypogea*) is very small in spite of suitable soil and climatic condition existing here. It is grown as a *Kharif* crop. The land prior to sowing is thoroughly ploughed 2 to 3 times and bed finely prepared.

The seeds are sown usually in lines behind the plough and fully covered with soil for fear of being eaten by birds, jackals and other animals. The seeds are sown after they have been shelled.

Intercultural operations consist of weeding and earthing up with soil during the flowering period.

The maturity of the crop is usually indicated by the yellowing and shedding of the lower leaves. Harvesting consists in digging up the pods with spade and carefully pulling up the plants by hand and separating the pods which are then dried.

Chilli.—Chilli (*Capsicum annum*) locally known as *mirchai* is the important cash crop grown here. The district is proud of being the second greatest chilli-producing district in the State, the first being Darbhanga. Green chillies are used extensively by the people and also sent outside the State and the dried chillies are consumed throughout the year by the people as well as sold to distant markets both inside and outside the State. Chilli is mostly grown in the north of the Ganga.

The seeds are sown in the months of July and August in the raised nursery beds and they are transplanted when the seedlings are one month old. Intercultural operations consist of only weeding and hoeing.

The harvesting of fruits usually starts from month of November and continues up to February by plucking the fruits by hand. The yield per acre varies from 100 to 150 maunds.

TOBACCO.

The Begusarai and Khagaria subdivisions of Monghyr district are relatively very unimportant tobacco-growing area of Bihar. The tobacco cultivation in these subdivisions is generally done in very small fragmented plots and principally around or near homesteads of individuals primarily for the consumption of the family members of the cultivators and very little tobacco is marketed except for the Bachhwara police-station of Begusarai subdivision, and to a certain extent in certain areas of the Simri Bakhtiarpur police-station of Khagaria subdivision where tobacco is grown for commercial purposes and is marketed outside the localities also.

Tobacco cultivation is a lengthy and difficult process and yet very interesting. It exacts much of labour and care. Cheap labour is essential for the cultivation of tobacco as machines cannot replace labour in the cultivation of tobacco. Fortunately this area abounds in cheap labour and woman labour is abundantly employed for sowing, planting and transplanting although not so profusely for curing or packing of the tobacco for marketing.

Principally one variety of tobacco—*Nicotiana tobacum,* commonly known as *deshi* tobacco is grown in this area in selected plots both for commercial purposes and for household consumption. The tobacco is generally utilised for the manufacture of *hookah* tobacco or is used as chewing tobacco.

Previously Virginia tobacco (superior quality of tobacco than *deshi* tobacco utilised in admixture when properly blended with imported tobacco for the manufacture of inferior quality of cigarettes) was grown in Bachhwara police-station but due to the closing of the factory at Dalsinghsarai in the year 1951 owing to some labour trouble, people have left growing of this variety. Proper facilities assured and technical help extended this area may produce better quality of Virginia tobacco and even specialise in growing of *biri* tobacco.

Rich, sandy loam is the soil that is suitable for tobacco cultivation. Dew and sea breeze are very healthy to its growth. The distribution of rainfall is also very important. Certain showers of rainfall before the plots are made ready for sowing of seeds are necessary. Rainfall at the time when plants are very small in growth and before or immediately after transplantation is harmful. Irrigation of some sort or other to nourish the plants to full growth is essential. Methods of irrigation adopted here is, however, crude. Wells are dug near about certain plots and water is made to pass

through small channels made in the fields for irrigating the plants. Tobacco being a rich crop exhausts the soil very easily. Manuring is, therefore, essential. Commercial manuring is not practised but cow-dung is profusely used. Unfortunately as the cow-dung is also used for fuel sometimes the crops suffer for sufficient manuring. Rotation of crop and keeping the plots fallow would have been very helpful for recouping the soil but is not generally practised as the cultivators are more eager for yearly return of crop than in getting the best crop from the yields cumulatively spread over years. This also gives an insight into the rather callous attitude of the cultivators, which may be attributed to the poor standard of living of the average cultivators and the traditional attitude of leaving things to fate.

Sufficient and proper supply of seedling will definitely help the cultivators in increasing cultivation of tobacco which sometimes suffer for sufficient supply of seeds in the neighbourhood specially in years when due to the untimely rain when seeds are sown, the seeds are washed away or otherwise destroyed for any reason. In some years certain pests commonly known in the locality as '*hudd*' which grow at the root of the principal tobacco plants, hamper the growth of the plants and work devastatingly to the growth of the plants. But no remedial measures are yet known to the cultivators against its development, except destroying the same from individual plants.

Seedling starts early in October and extends to the fag end of the month followed by transplanting, which is generally completed by the middle of November. Then the plants are left to flourish and grow on. As a principle the upper portion—the baby leaves of the plant—is chopped off for the remaining leaves to extend in dimensions which help also to gain weight in the leaves. When the leaves mature, harvesting starts—generally from the middle of February to the middle of March. Then comes at the rear the last but not the least—the process of curing upon which alone depends the quality of the "tobacco-in-the-making". Universally in this area curing is done in the air and so unmanufactured tobacco is called as 'Air-cured tobacco'. The growers are also the curers, practically always. After harvesting, plants are left in the field to dry up in the sun for about 7 days and then for further 7 days the plants are dried up in some open places in the air and nursed like 'a favourite child in the cradle' and reared up tenderly to the last process after completion of which tobacco is graded as per quality and used and packed securely with great craftmanship in bales and packages and made ready for transport or warehousing. Dew for two days of this period when the tobacco is cured is very helpful. Tobacco is very susceptible and sensitive to climatic changes. Care is, therefore, taken in its packing, storage and transport. Sometimes tobacco is sold in the green stage and is cured at a different place.

The following chart will illustrate the extent to which tobacco cultivation is done in this area and the number of cultivators or growers as also the people engaged in curing of tobacco :—

Serial no.	Name of Central Excise Range.	No. of growers/curers engaged in tobacco cultivation.	Acreage under tobacco cultivation.	Total yield in lbs.	Yield per acre in lbs.	Remarks.
1	2	3	4	5	6	7
1	Begusarai ..	34/34	15.93	18,949	1,184	(a)
2	Bakhri ..	23/23	3.72	3,685	921	
3	Bachhwara ..	544/547	141.55	1,89,429	1,334	
4	Khagaria ..	335/335	54.81	61,995	1,127	
	TOTAL ..	933/939	206.01	2,74,058	..	
	Crop year, 1951-52.					
1	Begusarai ..	91/91	22.93	29,350	1,279	(a)
2	Bakhri ..	25/25	4.10	4,291	1,947	
3	Bachhwara ..	722/727	193.53	3,17,325	1,635	
4	Khagaria ..	271/271	52.28	68,231	1,312	
	TOTAL ..	1,109/1,114	272.84	4,19,197	..	

SUGARCANE.

Sugarcane is a crop of little importance in North Monghyr. It is to some extent cultivated in South Monghyr, where it is of some importance to the north-west and also round Sikandra. On the whole cultivation of sugarcane has not had wide areas.

OUTTURN OF THE CROPS.

A statement from the *Bihar Statistical Hand-Book,* 1955, showing the outturn of principal crops (by crop-cutting experiment and eye estimation) for 1955-56 is given below :—

	Tons.
1. Rice (autumn and winter)	125,000
2. Wheat	58,000
3. Gram	26,000

(a) Figures shown under column 3 only show the assessable curers excluding the garden cultivators who produce tobacco for household consumption which is not subjected to Central Excise Duty.

		Tons.
4.	Barley	15,000
5.	Maize	24,000
6.	*Masoor*	3,000
7.	*Arhar*	5,000
8.	*Khesari*	5,000
9.	Peas	3,000
10.	Sugarcane	34,000
11.	Potatoes	3,000
12.	Chillies	3,000

HORTICULTURE.

The notable features in horticulture, which comprise fruits, vegetables and flowers are many and varied in the district. The total acreage under fruits is about 19,433.0 acres which is mainly commanded by mango, *litchi*, guava, citrus (limes, lemons, oranges, etc.), banana and other minor fruits.

The mango (*Mangifera indica*) commands the maximum acreage under fruits being nearly 15,000 acres, which is more common in the north of the Ganga and along its southern bank. About 20 per cent of the existing acreage is under grafted varieties of early mid-season and late types, viz., *Bombai, Malda* and *Fazli*, etc., and remaining 80 per cent is being commanded by seedling and inferior types. The yield of mango is very uncertain partly due to no measures being taken by our orchardists against irregular and alternate bearing rhythm to which this crop is subjected to and partly due to the attack of serious pests, viz., mango hoppers (*Indiocerus clypealis* Leth and *Indeocerus atkinsoni* Leth) locally known as *madhua* and mealy-bugs (*Drosicha mangefera* green) locally known as *dahia*; and ultimately due to the utter neglect of the orchards. Another pest which has been very recently found out is the "Shoot Galls" (*Asylla cistellata Buchton*) more common in North Monghyr.

Attempts are being made in the National Extension Service Blocks for planting new orchards mainly under grafted varieties and renovating the old and uneconomic mango orchards by judicious manuring which will cure the irregular and alternate bearing rhythm and by spraying different pesticides against pests during the flowering period and lastly by adopting other improved cultural practices, such as irrigation, weeding, etc.

The next important fruit to mention here is *litchi* (*Nephelium litchi*) of many varieties which occupies mainly on the north of the Ganga and along her southern bank, but the plantation gradually becomes thinner as one proceeds to the south and practically nil at the extreme south. The guava (*Psidium guyava*) belt is situated on the north of the Ganga where the market is over-flooded with fruits during the peak-season and in the southern side the acreage is

not much except in certain pockets of Sadar subdivision. Among the citrus type, the most common are the limes and the lemons mostly grown on the north of the Ganga. The other citrus types grown are the oranges and pomelos whose acreage is very negligible and the fruits are of inferior quality. The banana (*Musa sapientum*) is purely found on the north of the Ganga and in the southern side they do not perform well except in certain pockets of Sadar subdivision. The jack fruit or *kathal* (*Artocarpus integrifolia*) is very common in Jamui subdivision and in certain pockets of Sadar subdivision too. The papaya or *papita* (*Carica papaya*) is also grown throughout the district. The custard apple (*Anona souamosa*) locally known as *sharifa* is grown in the hilly and sub-hilly areas of the south. The *mahua* (*Basia latifolia*) occupies extensive areas as forests in Jamui subdivision. The cocoanut (*Cocos nucefera*) is found on the north of the Ganga where cultivation of arecanuts or betel-nuts (*Areca-catechu*) has been introduced.

In the year 1956, cashewnut or *kaju* (*Anacardium occidentale*) has been introduced in the district mainly in block areas and drive for its plantation has brought a total area of nearly 35 acres under this fruit.

The vegetables command nearly 24,000 acres in the district including the root crops. The important vegetable-growing tracts are Monghyr, Lakhisarai, Sheikhpura, Jamalpur, Begusarai and Khagaria. The potato occupies nearly 4,000 acres. The other winter-season vegetables extensively grown in the district are onion, cauliflower, cabbage, brinjal, tomato, radish, carrot, turnip and spinach (*palak sag*). Lettuce and knol-khol have been introduced in Begusarai and Khagaria subdivisions, but it will take some time to be popular amongst the public. The hot-weather and rainy-season vegetables are grown in abundance in every nook and corner of the district specially in pockets where surface percolation wells have been sunk by the Agriculture Department. The most common amongst them are the different cucurbits, such as bottle-gourd (*kaddu*), bitter-gourd (*karela*), sponge-gourd (*parol*), ridget-gourd (*jhingly*), pumpkin (*kohra* or *kadima*) and cucumber, etc. The other vegetables, which can be seen in the market are the brinjal, lady's finger (*ramtorai* or *bhindi*), *parbal* (*Trichosanthes dioica*) and different *sags* (spinachs).

The sweet melon or *kharbuja* grows luxuriantly on the sandy *diaras* bordering the Ganga, and the water-melon (*tarbuja*) is equally common. The water-melon of Lakhisarai commands reputation and has wide local markets.

In the horticultural development programme of Community Development and National Extension Service Blocks growing of vegetables and fruits for self-consumption and marketing has been emphasised and under this plan a family consisting of five members will grow sufficient vegetables and fruits by utilising its spare time

and spare plot and get a continuous supply of the same throughout the whole year. During the last few years a considerable area has come under the commercial plantation of fruits and vegetables also where facilities for irrigation, marketing were available.

The floricultural aspect of the district also needs a mention. It is one of the oldest rose-growing area in the whole State which can be seen in many public and private gardens in Monghyr, Begusarai and Jamui. The other winter-season flowers that beautify the gardens and public residences are the holyhocks, the sweet peas, dahlias, calendula, aster, phlox, etc. An annual flower show is held since 1955 in order to promote a healthy spirit of rivalry among the growers. Roses and other expensive flowers are getting rarer now.

The hot-weather and rainy-season flowers grown here that attract a flower lover are the different types of balsams, cosmos, canna, celosia and marigold. Monghyr town has a few parts with good trees, plants and shrubs and mostly seasonal flowers are grown. The *Rais* element being on the decline, good gardens in private compounds have become a rarity now. Jamalpur has some good but small private gardens in the railway colony. Gardening as a hobby is on the decline.

The avenue and shade trees that are come across on the road-sides and at parks, etc., include the *siris* (*Albizzia lebbek*), *chhatim* (*Alstonia scholaris*), the margosa or the *neem* tree (*Azardirachta indica*), the teak or saigon (*Tectona grandis*), the *sal* (*Shorea robusta*) and *deodar* (*Polvalthia longifolia*). The flowering avenue plantations consist of gold mohar (*Poinciana region*), *asoka* (*Saraca indica*), different species of cassias, jacaranda (*Jacaranda mimosaefolia*), etc. Arboriculture is not receiving much attention.

Extension of Cultivation.

The normal cultivated area is roughly 72 per cent of the total area of the district, but the possibility of any considerable extension of cultivation is limited by the fact that in the south of the Ganga a large tract consists of hills, while in north of the river there is a large area of swamp in Gogri thana. There is ample evidence of the extension of cultivation both in the north and south of the district. Fifty years ago the Collector reported : "There appears little doubt that so great is the demand for land, that a good deal of land which ten years ago was considered not worth cultivation, has during the past two or three years been broken up. I may mention the broad belt of land adjoining the Kharagpur hills west of Kharagpur road, and a very considerable area to the north-west of Pharkiya and throughout the central parts of that pargana. The jungle lands, conspicuous in the survey maps in Pharkiya, are now very generally studded with fields of corn." The advance made in *pargana* Pharkiya or Kharagpur during the eighty years which have elapsed since the revenue survey may be gathered from the fact that only

35 per cent of its area was then cultivated, while now 72 per cent is under cultivation. Much of the land under village has only recently been reclaimed, and more might be reclaimed were it not for the liability of this tract to flood owing to constructions of several embankments.

In South Monghyr the construction of the Kharagpur reservoir and a large number of minor and medium schemes and wells have resulted in a considerable extension of cultivation in the north-east, and in the north-west practically all culturable land has been taken up except at the foot of the hills. Much of the waste in this latter tract has been cleared within the last eighty years to judge from the revenue maps, but the process of clearing has now apparently well-nigh reached its limits.

In the south there is a good deal of jungle and waste land and the area under cultivation is extending every year by reclamation of waste lands and by provision of extension of different kinds of irrigation works, e.g., wells, tube-wells, lift irrigation tanks, *bandhs,* dams on rivers, etc. Thus there is a definite extension towards irrigation work and in course of a few years it is expected that 75 per cent of the total area under cultivation will receive irrigation.

Improvements in Cultivation.

Iron roller sugarcane mills have come into favour. Formerly the cane was squeezed by being passed between two revolving wooden cylinders, but the pressure thus obtained was weak and uneven, and the operation had to be repeated several times and even then the juice was not wholly extracted. This indigenous mill has been superseded by one of iron, by means of which not only is the work done much more expeditiously, but far less juice is left in the cane. The new machine has come into use everywhere, and the raucous creaking of the old wooden mills, once so characteristic of the early spring, is now no more to be heard. The value of catch crops is well understood, i.e., of crops taken of the lands between the crops of an ordinary rotation when otherwise the land would remain fallow. As an example, of such catch crops may be mentioned, *khesari,* which is grown broadcast in the rice fields. In this case a double advantage is reaped. There is the additional crop of straw and grain, and *khesari* being a leguminous crop, increases the store of nitrogen, i.e., it adds some plant-food to the soil. Gram is similarly sown in rice fields after the paddy has been harvested. With the exception of rice, few of the crops are grown singly. The common mixed crops grown are mixtures of wheat and gram or barley and gram or linseed and gram and so on.

There has been a great advancement in the different kinds of implements used. Improved implements, such as use of Bihar implements like Bihar plough, Bihar cultivation and Bihar ridging ploughs are commonly used by good cultivators for doing different

kinds of field operation, e.g., ploughing, earthing and hoeing. The big cultivators are gradually becoming more conscious of mechanised cultivation and there is a great demand for tractors now from people who have consolidated blocks of land. There are approximately 100 tractors in the district now doing cultivation work. Tractor owners also hire out their tractors to others. But at present there is a small number of firms for repair of tractors and the spare parts are not easily available. Mechanised farming has a future only when there are big blocks of cultivable land either belonging to individual cultivators or co-operative farmers.

Cultivators have now realised the use of improved seeds. Large quantities of such seeds are made available to them and they are encouraged to grow better seeds under seed multiplying scheme. The Agriculture Department give the cultivators good seed and buy back a certain amount after they have grown the crops. The advantages of better manuring is also appreciated. Some details have been given later. Improved varieties of sugarcane are replacing the indigenous varieties formerly grown.

Agricultural Implements and Machines.

In addition to indigenous implements that are used in performing different types of agricultural operations, there are several other improved implements which are used in performing the operations now-a-days.

They are as follows :—

Mould Board Ploughs.—These are the soil inversion ploughs in which Bihar Junior, Bihar Senior, Sukhada plough, Wah Wah plough are some of the most important ploughs which are used in this district.

Over and above the work of *deshi* plough is used for the following :—

(*i*) Where soil inversion is necessary.

(*ii*) Undesirable plants like different types of weeds can be ploughed in.

(*iii*) Every bit of land can be ploughed in by these ploughs while it is not possible by *deshi* plough because of its shaped ploughing.

(*iv*) Deep ploughing can be done by these, whereas by *deshi* plough it is not possible to plough deep more than 3 inches.

Cultivators.—These are the implements, which are used for interculturing either in the standing crops or in fallow lands. There are several types of the cultivators but Bihar Cultivators are most commonly used in this district.

Bihar Ridger.—This is not very common in this district, but in hilly region of Jamui subdivision and Sadar subdivision this implement is in use to some extent.

Jap. Weeder.—This is very popular in this district, where paddy cultivation is done, particularly it is used for weeding and hœing in line sown paddy field.

Chaff Cutter.—This implement is used for chaffing the dry or wet fodder to feed the animals. It is available with all the cultivators who have more animals.

Maize Sheller.—This implement is used for threshing the maize crops, only available with the big cultivators of maize-growing tract, but it is being popular with the common cultivators.

Seed Drill.—It is used for sowing the seeds in lines. By this implement more than one or two rows can be sown as the case may be. This depends upon the adjustment of the coulters; quantity of seeds can also be economised by this implement.

In addition to the above implements, scraper, bund former, wet land puddler are some of the improved implements which are also used, but in a very limited area of the district.

Deshi plough, *phawara, kudali, khurpi, yoke* with other adjustments, *patela* being some of the old implements are widely in use in the district.

The approximate price of the implements used in the district is as follows :—

(1)	Mould Board Plough (Bihar).	Rs. 20 to Rs. 26 per plough.
(2)	*Deshi* Plough ..	Rs. 10
(3)	Bihar Cultivator ..	Rs. 30 to Rs. 42
(4)	Bihar Ridger ..	Rs. 40
(5)	Ordinary Seed Drill ..	Rs. 75 to Rs. 80
(6)	Jap. Paddy Weeder ..	Rs. 15
(7)	Chaff Cutter ..	Rs. 150 to Rs. 200
(8)	Maize Sheller (Land drive).	Rs. 30
(9)	*Phawara*	Rs. 5
(10)	*Kudali*	Rs. 5
(11)	*Khurpi*	Rs. 2-8-0
(12)	*Patela*	Rs. 5

Facilities for Repair and Replacements.

There is no firm in this district which can supply the improved implements, but purchase could be made from Patna or Muzaffarpur.

Agricultural tractor and pumping sets are the only machines which are utilised for ploughing and irrigation. The tractor is very useful for those who have at least 50 acres or more land at their disposal and at a consolidated place.

There is a scheme of Agriculture Department like tractor loaning scheme in which the tractor is given to the cultivators for ploughing their fields on loan. Pumping sets are very useful to small cultivators also.

The comparative figures of agricultural implements and machinery of 1945 and 1956 are given below :—

Name.	Number.	
	1945.	1956.
Wooden ploughs	1,29,505	1,60,082
Iron ploughs	1,049	2,436
Tractors	40	81
Carts	24,594	31,322
Oil Engines with pumps for irrigation purposes.	..	155
Electric pumps for irrigation purposes	44	23
Sugarcane crushers—		
Power	55	188
Bullocks	1,467	1,505
Ghanis	..	2,530

SEED SUPPLY.

Proper and timely supply of seeds is one of the most important factors, which is directly associated with increased crop production. In the earlier days seeds were being distributed to the cultivators through some village merchants and seed merchants. There were also some rural development associations which used to supply seeds to the cultivators. But these organisations of seed supply were found both inadequate and ineffective to reach every cultivator. These systems of distribution of seeds are no more in vogue now.

Rapid development and improvement of the Department of Agriculture in this State, has changed the entire system of seed distribution which has taken a new shape. Supply of improved seeds is a necessary sequence of successful crop research. This is the final state in which the tiller of the soil is directly interested.

It is now a well known fact that improved seeds of crop plants give nearly 25 per cent better yield than the local one when grown under similar conditions.

Previously the recommended seeds of improved varieties were multiplied and supplied to the cultivators from the depot, farms and the demand was small and whatever were produced at the farms were sufficient to meet the demand. During World War II and post-war period shortage of food necessitated launching the Grow More Food Campaign. The quickest and simplest way of increasing food production by at least 15 per cent was by extending the area under improved varieties and by replacing cultivation of low-yielding local varieties.

Rice and wheat are the two most important major crops of this district. A scheme of multiplication and distribution of these crops started in 1944 as a Grow More Food Campaign. The scheme, however, did not fare well due to the large disparity of price between prevailing market rate and Government controlled rate. The differences of price were not covered by the premium offered to the cultivators. The recovery of seeds was necessarily very low. The expenditure involved was not commensurate with the advantage derived. Loss in handling departmental stores was high. There was difficulty in maintaining strict control over the purity of seeds recovered from a large number of registered growers. The scheme was closed in 1951.

Available evidence shows that the decline in yield and quality potential is due to the improved seed gradually becoming a mixture, lack of proper method of cultivation resulting in loss of vitality and consequent susceptibility to pests and diseases and absence of proper method of storage thereby impairing the efficiency in germination.

The desirability of a new approach to the problem was necessary because of the revised policy of the Agricultural Extension Service and Community Project areas and National Extension Service Blocks. A revised scheme has come into operation in April, 1952. According to the present scheme Research Stations provide nucleus seeds of improved varieties to departmental farms enough to replace the old farm stock once in three years. Pedigree seeds grown in departmental farms are supplied to 'A class' registered growers for multiplying in Community Project areas and National Extension Service Blocks.

It is essential that along with purity and quality of seeds the time factor of supply must also be taken into consideration. This can only be done if the seed is multiplied locally and purity is maintained. The local multiplication has to be done scientifically and process has to be a continuous one integrating the production of new and improved varieties at the Research Stations of the Agriculture Department with the general sowing of the cultivators in their fields, which has to be achieved through a number of intermediate growers and seed producing farmers.

There are three farms in this district which supply seed. They are at Monghyr, Mallehpur and Khagaria.

Monghyr Farm.—This is a 207 acre farm. The Botanical Sub-station of this district is situated in this area. Unfortunately there is no irrigational facility and hence no major crop is grown here. The farm, however, supplies gram, barley, *jowar,* maize, *arhar,* etc., of improved varieties.

Mallehpur Farm (*Jamui*).—This farm has 47 acres of land. Almost all the important varieties of paddy are multiplied here and supplied to various blocks of the district and also outside it. Besides, this farm grows wheat, sugarcane, gram and minor legumes, i.e., *khesari, kalai,* etc.

Khagaria Farm.—This farm has recently been opened and is quite a prosperous one. Main crop grown in this farm is wheat of all the varieties, gram and sugarcane.

MANURES.

Cow-dung, the droppings of sheep and goats and farm refuse are common manures. Cow-dung is very popular. As cow-dung is also used as fuel, there is a great dearth of manure. The cultivators are no longer allergic to use chemical and organic fertilizers. They are also becoming compost-minded.

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

The outskirts of the urban areas are now being used by municipal bodies and notified area committees to prepare town compost out of the town sweeping and night soil. The apathy of the cultivators to use this type of manure is now being liquidated. Among the chemical manures ammonium sulphate, single superphosphate and bone-meal are widely used while the use of urea is still very limited. Oil-cakes are also widely used. Among the green manures only *sanai* is popular as the manure of paddy.

Regarding the use of different types of improved manures it may be mentioned that about four to five maunds of oil-cakes are used per acre for food crops and eight to ten maunds for sugarcane and potatoes. About one maund of sulphate is used per acre in the food crops. There is some apathy to use bone-meal manure.

ROTATION OF CROPS.

The cultivators from time immemorial are conscious of the beneficial effects of rotation of crops. Crops are generally sown in rotation but there are certain tracts especially in the *tal* and the *diara* areas where rotation is not strictly followed. In the *tal* area only *rabi* crops are grown. Crop rotations maintain or improve the fertility of the soil by supplying organic matters and nitrogen.

increase the yield of crop, improve the quality of crops and the physical condition of soil, help in the conservation of soil, control the incidence of diseases and pests and keep the land free from weeds and ensures constant employment of labour and live-stock throughout the year. The crop rotation practice is generally followed by the cultivators in the district to ensure the desired yield of crops, though they do not understand the scientific principles underlying the rotation of crops. Some of the rotation of crops followed in the district are given below :—

Kharif.	*Rabi.*
(*i*) Maize	Wheat, barley, mustard, gram, peas, etc.
(*ii*) Late paddy ..	Pira, gram or *khesari.*
(*iii*) Early paddy ..	Gram, *khesari,* peas, wheat, barley and onion.
(*iv*) *Jowar* for fodder ..	Wheat or barley or wheat and mustard.
(*v*) Fallow	Chilli, tobacco.
(*vi*) Maize and *arahar* ..	*Arahar.*
(*vii*) Maize	Potato.
(*viii*) Maize	Sugarcane.

In most of the parts of the district 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, *arahar* and turmeric; (*ii*) maize and *moong*; (*iii*) wheat and gram; (*iv*) barley and gram; and (*v*) wheat and mustard.

Rest is necessary for conserving the fertility of the fields. But as the holdings are small, the farmer does not willingly want to leave the land fallow for successive seasons. However, most fields get a period of rest in the gap between *rabi* and *kharif.*

The National Extension Service and Community Development Blocks have been spreading agricultural education to follow rotation of crops, use of legumes and chemical manures, etc., to improve the soil.

Agricultural Disease and Pest.

Growing crops are occasionally exposed to damage from an immense variety of pests and diseases. The major pests and diseases are described below :—

Maize and Jowar Borer.—It is major pest of maize and jowar, only young plants are attacked while the older ones are totally ignored. The attack starts from the middle of March and gradually increases till it is maximum in

the first week of August and continue to middle of September. The caterpillars start boring from the top and may enter through side holes also, but they may be found in stems even up to three inches from the ground and interfere with the circulation of sap and the plant withers.

Control measures.—(1) Field should be carefully examined for pest, after March onward.

(2) After harvesting, fields should be ploughed and stubbles and trash collected and burnt away.

(3) All dead hearts should be pulled out.

(4) Moths are attracted by light trap.

(5) Thinning of crops arrests spreading of pests.

(6) Dusting the crop with 5 per cent D. D. T. or with 5 per cent B. H. C. may reduce the insect attack.

Rice Gundhi Bug (Leptocorisa yericorins).—This is a common pest of rice. The bugs attack the ripening grains from middle of August to October and suck their milky juice with the result that the ears turn white and do not mature into grains. The affected seeds may show the marks of punctures due to a black fungus.

Millets, *jowar,* maize, *bajra, rai* and *marua* are the secondary hosts.

Control.—(1) Bagging of insects and killing them in strong crude emulsion oil, would lead to their complete extermination.

(2) Irrigating the fields with crude emulsion oil or flooding them with water having within a film of kerosene oil is extremely beneficial.

(3) Putting up light traps would destroy them.

(4) Sowing of late paddy varieties may escape attack.

(5) Wild grasses should not be allowed to grow in the vicinity otherwise the insect will continue to live there.

(6) Dusting with 5 per cent B. H. C., at the rate of 20 lbs. per acre is very effective.

Gram Cuttwork.—It is a major pest of *rabi* crops and specially of gram. The attack is extremely serious during winter, when young seedlings' root and leaves are nibbled at night by the caterpillars, which drag them to their holes to be finished during the day. As many as 350 very small whitish eggs are laid down singly or in heaps on weeds, grasses, stems or surface of soil under the plants.

Control.—(*i*) Hand picking is useful for a small area.

(*ii*) Small heaps of poison baits, prepared by a paste of one maund *bhusa,* one seer arsenic, two seers *gur* with six gallons of water (efficient for 5 acres) should be placed in the field.

(*iii*) Spray the young plants with lead arsenate.

(*iv*) Fields should be often flooded moderately.

Green Mustard Fly (Aphis brassical).—This pest attacks mustard, rape and cabbage and the sap rendering the attacked crop pale, weak and exhausted incapable of bearing any seed. Leaves are most susceptible and soon dry up.

Control.—(*i*) Growing of early maturing varieties has proved to be very useful.

(*ii*) The sprays of crude oil emulsion, petroleum emulsion, fish oil scrap and tobacco emulsion (its two parts of water) or nicotine sulphate solution, check the multiplication of insect in the early stages.

(*iii*) Dusting of 5 per cent B. H. C. with ash act as a nerve poison and kills all the insect.

Red Rumpkin Beetle (Alacophora foveicoties).—It is a serious pest of cucurbitaceous plants chiefly found in melon, gourds, pumpkins, cucumber and others. The adults eat up the leaves especially of germinating young seedlings in March to April and kill them. They also attack fruits rendering them unfit for human consumption.

Control.—(*i*) The cucurbits should be sown earlier so that by the time the beetles resume activity after liberation, the creepers have grown considerably to resist the insect attack.

(*ii*) Hand-picking in the morning.

(*iii*) When the seeds are germinating, the young cucurbits may be dusted with cow-dung ashes in March and April with a little kerosene oil to act as repellent.

(*iv*) Dusting the plants with one part of parish green or lead arsenate or sodium fluesilicate mixed with 16 parts of fine road dust or ashes, kills most of the insect but this should be done in the morning.

(*v*) Dusting with 4 per cent D. D. T. is also effective.

Mango Leaf Hopper.—It is a major pest of mango, during flowering time. The juice of the young shoot and flower buds or entire inflorescence is sucked up. A characteristic fungus grows and the whole crop is lost.

Control.—(*i*) The trees may be sprayed with resin wash or resin soap, kerosene or crude oil emulsion during winter before blossoms open.

(*ii*) Dusting the inflorescence and young shoots with weak mixture of sulphate and lime keeps away the pest. Two or three dustings at an interval of ten days kill most of the insects.

Mango White Bug (Drosicha stebbingi).—It is a pest of mango and damages young growing shoots by sucking cell sap. The attack is much more serious during spring when shoots are richly supplied with overflowing cell sap. They secrete a sugary material from their body, which falls upon the leaves and inflorescence causing a fungus to grow.

They have also been found attacking banyan, *pipal, gular,* fig, citrus, etc.

Control.—(*i*) The soil round trees should be dug deep after monsoons. This will destroy the eggs.

(*ii*) Grease or tar bands round the trunks of trees, at the end of October will prevent the nymphs from crawling up.

(*iii*) Spraying with resin compound is useful to kill the early stages of bug.

White Ants (Termites).—Termites cause a good deal of damage. The food of the termites is in large part of cellulose, which they obtain from living or dead vegetation, books and other articles of wood, fabric, flooring material, etc. Timber is completely tunnelled and consumed. It is generally found as a pest in the crops of sugarcane, groundnut, wheat, maize, etc., and causes great damage to them.

Control.—(*i*) 5 per cent B. H. C. at the rate of 25 per acre can control the insect.

(*ii*) 40 per cent Aldrin at the rate of 2½ lbs. per acre is the sure control of this insect.

(*iii*) Irrigation to the attacked field destroys the insects.

(*iv*) In case of sugarcane, the setts should be dropped in crude oil emulsion before planting.

(*v*) Before planting, field should be treated with B. H. C. or Aldrin or *neem* cake.

Store-Grain Pests.

Rice Weevil (Sitophieus oryzae).—It is a pest for paddy, all cereals and their products. It is common in every kind of grain store. The adult and the larvæ bore the grain and devour the cornmeal. The

husk of the seed only is left behind and the grain becomes useless for consumption and incapable for germination.

Control.—(*i*) Grain should be dried and stored in clean, dry, ventilated and brick-cement built granaries.

(*ii*) If infection has started, the godown may be heated up to 150 degree for twelve hours and the grain should again be exposed to sun before storing.

(*iii*) Fumigation of grain and granaries by 2 per cent to 5 per cent hydrocyanic acid gas for 18 hours or by carbon-disulphide is extremely useful.

(*iv*) The bags should only be stored up to 80 per cent of the total height of the granaries.

Potato Tubermoth.—The larvæ eat the green tissues of the tuber, exposing it to bacterial and fungal infection. It is also found on the leaves of tobacco, tomato and some wild solanaceous plants.

Coming into the godown with the harvested potatoes, the moth breeds rapidly.

Control.—(*i*) Fumigation of the stored tubers.

(*ii*) Storage of tubers on 18 inches high racks (*machans*) under a layer of 2 inches to 3 inches thick dry sand in a cold dry place. No tubers should remain exposed or touched each other.

(*iii*) Sowing seed potato at a depth of at least 4 inches keeping the tuber completely covered with earth.

(*iv*) Prompt removal of crop in bag.

(*v*) Prompt destruction of affected tubers.

(*vi*) Proper ventilation of potato godown.

(*vii*) Plants can be treated with 2 per cent D. D. T. dust and uniformly covered with insecticides.

Wheat Weevil (Trogodemea granarium).—It is a major pest of wheat. It is noteworthy that only superficial layers of the grain are attacked and the insects do not burrow into layers deeper than 6 inches to 12 inches. This pest occasionally attacks *jowar,* oat, rice, maize.

Control.—(*i*) The affected grains should be sorted out and should be treated adequately.

(*ii*) Trapping by spreading gunny bags over the infested grains during the active season.

(*iii*) The stores should be thoroughly cleaned before storing the grains.

In addition to the abovenoted described pest there are some more pests though not less important when the attack becomes serious but

in normal condition they are not very serious in this district. Some of them are—

(*i*) Grain and flour moth (*Sitotroga cerealella*).
(*ii*) Pulse beetle (*Pachymerus chinensis*).
(*iii*) Red cotton strainer.
(*iv*) Cotton leaf roller.

Rust of wheat.—Three rusts are known to attack wheat, namely, black or stem rust, yellow rust, orange leaf rust.

Control.—(*i*) Improved strains of crops which are resistant or can tolerate the rust attack only be sown.

(*ii*) Destruction of alternate host is very necessary.

(*iii*) Seed treatment with Agrosen G. N. at the rate of 2 to 3 ounces per maund is a precautionary measure which should be practised before sowing.

(*iv*) Sun drying of the seeds before sowing is also beneficial.

Blight of potatoes.—There are two types of Blight, namely, Early Blight of Potatoes and Late Blight of Potatoes.

Climate and soil exert a controlling influence on the development of the disease. It becomes serious when the season begins with abundant moisture followed by high temperature unfavourable to the host plant.

Control.—(*i*) Crop rotation is one of the important items of the control of this disease.

(*ii*) Dead leaves, etc., should be raked together and burned immediately after harvest.

(*iii*) Timely and thorough spraying with bordeaux mixture effectively controls early blight. Weekly spraying must be given from time to time the plants are 6—8 inches high and continued throughout the period of their growth.

Tikka Disease of Groundnut.—A serious leaf spotting and defoliation of groundnut plants is rather common in many areas.

All parts of the plant above the soil level are attacked. The disease is disseminated by wind which blows the spores from leaf to leaf. Attacks in the new crops are apparently initiated by the spores which lie in the soil.

Control.—(*i*) Seed treatment has given clean crops, indicating that seed infection cannot entirely be ruled out.

(*ii*) Spraying with bordeaux mixture.

(*iii*) Beneficial results have also been obtained by good cultivation and proper rotation.

(*iv*) Early maturing varieties can also escape the attack.

Red-rot of Sugarcane.—Of all the diseases that affect sugarcane, red-rot is the most serious and destructive. It is widespread.

The fungus attacks all the parts above the ground level but specially the stem and mid-rib of leaves. When the affected stems are split open, the tissues of the internodes, which are normally white or yellowish white, will be found to be longitudinally reddened in one or more internodes.

Control.—(*i*) One of the principal methods of controlling red-rot is to use healthy setts.

(*ii*) Long rotation should be practised.

(*iii*) The affected canes should be pulled out and burnt.

(*iv*) Sowing of improved varieties, resistant to disease should be grown.

Smuts of Wheat, Barley, Sugarcane and Jowar.—There are several types of smut, i.e., loose smut, covered smut, etc., which are generally found attacking grains' ears and are very serious.

Control.—(*i*) The seed is soaked in water at a temperature of 26.30 degree C for four or five hours which induces the dormant mycelium to germinate. The seed is quickly transferred to warmer water at 54 degree C for ten minutes which helps in killing the germ.

(*ii*) Immune or resistant varieties offer the best method of controlling loose smut.

There are several other diseases like leaf curb of chillies, wilt of citrus, canker, etc., which are also found in this district. Leaf curb of chilli is very common in this district. It is a virus disease and the only control measure is spraying with bordeaux mixture 5 : 5 : 50, two to three times before the attack of disease.

Agricultural Labour and Wages.

Generally landless people who reside in villages offer themselves for agricultural labour. The cultivators who possess a large area of land require to engage labour for the agricultural operations. Small cultivators who own little land do not engage labour and they themselves do the agricultural work with the help of their family in their fields. There is no statutory obligation on agricultural labour.

There are two types of labourers engaged for agricultural operations—one is of permanent nature and the other is of casual work. The permanent labour is generally called as ploughmen or *halwaha*. These ploughmen are generally allotted some land by the owner in order to keep them permanently.

The job of the permanent type of man is to feed the cattle, to attend the ploughing of land, to cart the manures, seed and the harvested crop, to look to the drainage of the fields, sowing of crops, and irrigating the land if required. They are generally paid a fixed pay per month, in addition to breakfast every morning.

The other type of labour, i.e., the casual labourers are only engaged during the sowing, transplanting, weeding and harvesting stages of agricultural operations. They are paid wages in kind or in cash according to the prevalent wage in the locality in addition to a breakfast. In general the agricultural wages do not exceed Rs. 1-4-0 per adult, but there is a different rate for females and children. The females get about one rupee a day and the children from six annas to twelve annas according to their age. Scarcity of agricultural labour at harvesting season is often felt.

Animal Husbandry and Fisheries.

Live-stock and Pasturage.—The cattle of Monghyr district are of an inferior breed and are generally small and of poor quality. Healthier and fairly big-sized cattle are often found as one goes towards western side of the district bordering Patna. A vast field of cultivable land popularly known as 'Barahiya Tal' which is rich in *rabi* crop lies in this part. Big cultivators here keep well bred bullocks amongst which many are of *hariana* breed.

There is good pasturage among the hills to the south during the rainy season and in pasturage grounds of Pharkiya, in the dry season, but elsewhere grazing lands are scarce. Even in the south of the district, jungles yield poor grazing during the dry season, and only those who can afford to send their animals to the north gangetic plains in *pargana* Pharkiya keep good stock. The area under fodder crops is negligible. But the State Government is active to improve the availability of fodder and grazing condition. There is a scheme of making of hay of *kans* grass and spearhead grass in forest areas. For experiment, development and demonstration of fodders, different exotic and indigenous grasses and legumes were tried under local conditions and seed roots as well as cuttings were distributed among the National Extension Service Blocks. But the scheme is in its initial stage and has not made much headway.

The existing fodder used may be classified as dry and green fodder. Under dry and green fodder come the following :—

(*i*) *Dry fodder.*—(*a*) Cereals, origin-straws of paddy, *kodo, marua, kauni, china, jowar* and maize, etc., and (*b*) pulses, green *bhusa* of gram, *khesari,* cowpeas, *arhar, moth, kulthi, masur* and *urid,* etc.

(*ii*) *Green fodder.*—(*a*) Maize, *jowar,* alone or mixed with *moth,* oats alone or mixed with peas, *khesari, khesari* alone or mixed with *akta* and *sosna,* green *sama, kauni, china, kulthi, urid, moong, masur* and creepers of potatoes and sweet potatoes, tops of sugarcane during its harvest season, carrots and bamboo leaves. Sweet potatoes are at times given to milch animals when prices are low.

The table below will show the comparative live-stock population of Monghyr district taken in the Live-stock Censuses of 1951 and 1956 :—

Name of the district.	Serial no.	Stock.	Number, 1951.	Number, 1956.
Monghyr ..	1	Total cattle ..	10,65,633	9,21,588
	2	Total buffaloes ..	1,69,366	1,87,817
	3	Total bovine ..	12,34,999	11,09,405
	4	Total sheep ..	19,507	21,096
	5	Total goats ..	3,60,950	3,62,600
	6	Total horses and ponies	8,316	7,218
	7	Total donkeys ..	664	715
	8	Total mules ..	29	147
	9	Total pigs ..	20,526	34,381
	10	Total camels ..	35	481
	11	Total livestock ..	16,45,026	15,36,043

In course of five years there had been a decrease of 1,08,983 heads of cattle or 6.6 per cent in the livestock population. The reason for decrease was partly due to the outbreak of epidemics which visited North Bihar every year after the Kosi ravages and partly owing to large slaughter of cattle in 1955-56. The *Livestock Census Report* (1956) does not discuss the reasons of decline in detail under total cattle.

Horses are scarce, good horses which were often found in the stables of larger zamindars are gradually decreasing in number as with the abolition of zamindari the fancy for keeping horses has disappeared. Even the ordinary ponies are not very numerous. There is no reason why camel population should have had an increase. Pigs are reared by Santhals and other lower labouring castes for their own consumption. The multiplication of goat population is a menace to cultivation. Omnivorous goats are kept by Goalas and other poor class people. They thrive on the *jungly* herbage and crops. The total number of live-stock population of Monghyr in 1951 was 16,45,026 as against 15,36,043 in 1956.

Development of cattle.—The development of the breed cattle and buffaloes is essential for agricultural purposes, milk products and to add to the agricultural prosperity. There has been a concentrated move on behalf of the State Government to tackle this problem. The All-India Key Village Scheme sponsored by Government of India is in operation in the district. The scheme aims at improving the

general efficiency of the cattle by adopting scientific methods of breeding, feeding, disease control and marketing. Selected bull-calves are reared in this key village for distribution after maturity for the purpose of upgrading. An intensive cattle breeding programme to produce superior bull-calves is in operation at Barbigha and its suburb. Four hundred stud bulls have been distributed in the area falling under key village scheme.

In order to improve the breed of cattle quickly and also at low cost, artificial insemination centres with sub-centres have been opened in the district. These centres are at Barhiya and Begusarai with Mokameh and Abhaypur and Majhaul, Ballia, Khagaria and Dalsingsarai sub-centres respectively. Important *goshalas* or farms for keeping cattle of the district have been supplied with improved breeding bulls to upgrade their cattle and also of the neighbouring locality. There are 12 *goshalas* in the district. They are at Monghyr (Shri Goshala Committee), Teghra, Begusarai, Lakhisarai (Shri Lakhisarai Charitable Goshala Society), Khagaria, Haveli Kharagpur, Barbigha, Bakhari, Jamui, Sheikhpura, Gogri, Jamalpur and Jhajha. Apart from *goshalas* there is a *gosadan* at Bahaura. The *gosadan* scheme aims at segregation of practically useless and unproductive cattle. But the progress of the scheme is rather slow due to the unwillingness of the public in parting with their old and useless cattle.

Housing condition.—Ordinary cattle sheds, i.e., mud sheds or bamboo huts with thatch roof or local tiles or tins are generally provided by a cultivator for his cattle and repaired when necessary. In forest areas, cattle are more generally kept in open enclosures all the year round. In rains and winter cattle are kept in sheds and part of the house. In the *diara* areas cattle are kept in open fields throughout the year. Pucca cattle sheds are a rarity and provided only by the well-to-do cultivators.

Dairy-farming.

In order to organise the sale of pure milk the Government have encouraged to start new dairy farms as well as expanding the old ones. A scheme for organising the existing *goshalas* on modern lines is also initiated. There are two dairy farms in the district—Monghyr Jail Barbigha, Bakhari, Jamui, Sheikhpura, Gogri, Jamalpur and Jhajha. In order to encourage the dairy development scheme, loans are given.

The statistics of production of milk during 1955-56 in the district were as follows :—

	(In maunds.)
Cow-milk	31,17,784
Buffalo-milk	10,43,648
Goat-milk	12,031

Considering the vast population of the district the production of milk is quite inadequate which comes to about 4 ounces *per capita*.

Poultry.

The indigenous method of keeping poultry is defective. Poultry is kept by a good number of people, but there is practically no system of proper housing and feeding except in a very few cases where improved types of birds are maintained. Normally the birds are let loose to feed and they do not always get healthy food. Birds are shut up in a dark corner in the night. They are not given any balanced diet and whatever is given in the form of paddy, rice, *marua*, etc., is often small in quantity, insufficient for even proper maintenance and growth. Improved types of birds are, however, better looked after in the Government farms and a house is provided for them with enclosures. Hand feeding is practised at places. There is only one poultry farm in the district, which is located at Simultala. It is a very small affair.

The number of poultry in 1951 was 1,75,915 as against 2,03,105 in 1956. The break-up figures of poultry of 1956 are given below :—

Fowls—		
Hens	.. .. ..	68,121
Cocks	.. .. ..	31,802
Chickens	.. .. ..	83,233
	Total ..	1,83,156
Ducks—		
Ducks	.. .. ..	2,084
Drakes	.. .. ..	720
Ducklings	.. .. ..	688
	Total ..	3,492
Others	.. .. ..	16,457
	Total ..	2,03,105

Cattle Fairs.—In a number of *melas* mentioned elsewhere cattle are sold and purchased. The Animal Husbandry Department deputes officers to visit such *melas* and impart instruction for the improvement of the breed. The Department also occasionally holds demonstrations to spread proper ideas of upkeep of livestock.

Fisheries.

In the text of the first chapter the principal species have been indicated. Under the Second Five-Year Plan development of fisheries has been taken up and one Inspector of Fisheries had been appointed under the administrative control of the District Agricultural Officer. Owing to the development of communications there is a large export of fish from Monghyr, Jamalpur, Khagaria and other

places. Khagaria is particularly important for trade in fish. Fish trade is still in the hands of a group of financiers who exploit the fishermen. The organisation of Fishermen Unions had not yet been successful.

Forestry.

The forests of Monghyr district have been briefly described in the first chapter. All the forests had so far been privately owned, the principal owners being the Estates of Darbhanga, Banaili, Gidhaur and Khaira. With the implementation of the Bihar Land Reforms Act, 1950, the State Government have become the proprietor of these forests. All the forests of the district are now managed by the Government and there is no forest left in the hands of the private owners.

Animal Diseases and Veterinary Hospitals.

The common livestock diseases are rinderpest, hæmorrhagic, septicæmia, blackquarter, anthrax, surra and foot and mouth diseases. The Animal Husbandry Department deals both with the treatment and prevention of cattle-diseases. All outbreaks are attended to promptly with sera and vaccine, as the case needed. The affected animals are treated medicinally wherever possible. Mass inoculation is done against those diseases for which specific vaccines are available.

Veterinary assistance.—Veterinary activities have been extended throughout the district. In 1926 there were only four veterinary institutions of which two were veterinary hospitals and two dispensaries. The veterinary hospitals were at Monghyr and Begusarai and the dispensaries were at Khagaria, Jamui and in addition a touring assistant was attached to the Monghyr Hospital. The number of veterinary institutions has been increased by 1954 to three hospitals and eleven dispensaries. Veterinary hospitals are at Monghyr, Begusarai and Jamui and dispensaries are functioning at Haveli Kharagpur, Surajgarha, Sheikhpura, Barahiya, Khagaria, Simri Bakhtiarpur, Teghra, Ballia, Sikandra, Jhajha and Manjhaul with two field veterinary dispensary centres under each dispensary; of these veterinary institutions one class I veterinary dispensary at Manjhaul is under the direct control of the Government and the rest are managed by the District Board excepting the Monghyr Hospital which is under the management of the Monghyr Municipality. The services of the Veterinary Assistant Surgeon, Manjaul, have also been placed to National Extension Service Block of Bariarpur. There is one Veterinary Inspector whose headquarters have recently been shifted from Begusarai to Monghyr.

Reports on outbreaks of contagious diseases are promptly attended. Preventive as well as prophylactic inoculations are successfully carried out in controlling the outbreaks of anthrax,

hæmorrhagic, septicæmia, blackquarter, rinderpest and such contagious diseases amongst cattle.

Besides attending to epidemics, treatment of general diseases of animals, operation cases, castration of scrub bulls are undertaken scientifically at every hospital, dispensary and field centres within the district. It cannot, however, be said that the veterinary assistance provided is adequate.

State Assistance to Agriculture.

The district monograph on Monghyr by the All-India Rural Credit Survey published by the Reserve Bank of India, Bombay in 1959 has discussed the aspect of Government finance in Chapter X of the book. The chapter summarises the legal structure under which Government grant loans and subsidies under the various Acts and schemes and also the data relating to Government finance collected during the Survey. The summary is given here.

Government provide finance in the shape of loans and subsidies under the following Acts and schemes :—

(1) The Land Improvement Loans Act, 1883, and The Agriculturists' Loans Act, 1884;

(2) The Bihar Waste Lands (Reclamation, Cultivation and Improvement) Act, 1946;

(3) The Bihar and Orissa Natural Calamities Loans Act, 1934; and

(4) Minor Irrigation Schemes.

The main provisions of each of the Acts and schemes are set out below :—

The Land Improvement Loans Act, 1883, and The Agriculturists' Loans Act, 1884.

Under the Land Improvement Loans Act, 1883, loans are granted for effecting any improvement in land which adds to its letting value. The improvements included are—

(*i*) the construction of wells, tanks and other works for the storage, supply or distribution of water for the purposes of agriculture, or for the use of men and cattle employed in agriculture;

(*ii*) the preparation of land for irrigation;

(*iii*) the drainage, reclamation from rivers or other waters, or protection from floods or from erosion or other damage by water, of land used for agricultural purposes or waste land which is cultivable;

(*iv*) the reclamation, clearance, enclosure or permanent improvement of land for agricultural purposes;

(*v*) the renewal or reconstruction of any of the foregoing works, or alterations therein or additions thereto; and

(*vi*) such other works as the Government may, from time to time, declare to be improvements for the purpose of the Act.

The Agriculturists' Loans Act enables Government to give loans for relief of distress, purchase of seed or cattle or any other purpose not specified in the Land Improvement Loans Act but connected with agricultural objects.

Under the Land Improvement Loans Act, the Collector is competent to sanction loans up to Rs. 2,000. The loans exceeding Rs. 2,000 but up to Rs. 5,000 require the sanction of Government. In respect of the Agriculturists' Loans Act, the Subdivisional Officer can grant loans up to Rs. 250 and the loans above it but up to Rs. 700 are granted by the Collector. The loans above Rs. 700 require the sanction of the Commissioner.

On receipt of an application for loans under any of the two Acts, the Collector or Subdivisional Officer first ensures that the application has been made or recorded in the prescribed form. If the grant of loan appears *prima facie* to be desirable, the Collector or Subdivisional Officer makes an enquiry or causes an enquiry to be made by an officer not below the rank of *Kanungo,* or by a reliable non-official agent, for the purpose of ascertaining several particulars such as the area of the land owned or occupied by the applicant, status of the applicant, that is, whether proprietor, tenure-holder, etc., nature and value of immovable property offered as security, the pre-existing encumbrances on the property, names, status and means of sureties, suitable date for the repayment of the first instalment with reference to the circumstances under which the loans are applied for, proposed instalments and period of repayment and the date on which the loan should be received by the applicant. In the case of a loan under the Land Improvement Loans Act, the estimated utility and the value of the work proposed to be undertaken, probable cost of the work, and the probable date on which the work will begin to yield profit are also required to be reported by the official conducting the enquiry. Particular care is also taken to ascertain what encumbrances there are on the land to be improved, and in cases in which doubts arise, a notice is issued by the Collector or Subdivisional Officer, calling upon any person objecting to the loan, to appear before him at a time or place to be fixed in the notice and to submit his objections. Such notices are published by being fixed in a prominent place in the village in which the land to be improved is situated. After considering such evidences as the

objecting parties may produce, the Collector or Subdivisional Officer may admit the objections or overrule them.

After completion of the enquiry and the disposal of the objections, if any, the Subdivisional Officer sends the application to the Collector with his opinion as to whether the loan is to be sanctioned or not. In considering the application for a loan, the Collector is to decide (1) whether the need for the loan is established, (2) whether the security offered is sufficient, (3) what amount should be advanced, (4) the number of instalments and (5) what period is to be allowed before repayment commences. The rules require the Collector to satisfy himself that the advance made to the cultivator is sufficient to cover so much of the total outlay required for the construction of the work as the borrower is unable to provide out of his own resources.

In the case of loans given under the Land Improvement Loans Act, where the amount of the loan does not exceed three-fourths of the value of the applicant's transferable interest in the land after carrying out the improvement no collateral security is required. Where this condition is not satisfied, further security consisting of transferable interests in other lands belonging to the applicant or to other persons willing to become his sureties or of personal security, is demanded. Lands which are not transferable without the landlord's consent are not ordinarily to be accepted as security. Where a body of five or more co-villagers bind themselves jointly and severally for the repayment of the loan, their personal security will generally be sufficient, provided the loan does not exceed five times the annual rent of the land held by members of the group.

In the case of loans given under the Agriculturists' Loans Act, the loan may be given against the guarantee of a third party possessing transferable interest in the immovable property, provided the applicant does not himself have the transferable interest in immovable property; otherwise the transferable interest in immovable property of value sufficient to secure the loan is mortgaged.

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 to accrue. The ordinary rate of interest on both the types of loans is $6\frac{1}{4}$ per cent per annum.

By a Government notification, dated May 22, 1951, Monghyr was declared as one of the districts affected with distress. Special statutory rules for the grant of loans became applicable. The scale of finance under special rules of the Agriculturists' Loans Act was fixed as Rs. 20 per acre for first 5 acres and Rs. 15 per additional

acre if the land was up to 10 acres. In case the land exceeded 15 acres, the rate was Rs. 20 per acre for first 5 acres, Rs. 15 per acre for next 10 acres and Rs. 10 per acre for the remaining lands.

The Bihar Waste Lands (Reclamation, Cultivation and Improvement) Act, 1946.

Under the Land Improvement Loans Act, 1883, the loans were generally given when the cultivator approached Government, whereas under the Bihar Waste Lands (Reclamation, Cultivation and Improvement) Act, Government empowered themselves to take possession of the waste or unproductive lands by notification and to arrange for their reclamation, cultivation and improvement in the prescribed manner at the cost of Government. Government after keeping the possession of the lands for a period not exceeding 10 years may direct the landlord or tenant by general or special order to take back the delivery of the land. The expenditure incurred by Government on the reclamation, cultivation and improvement under this Act may be recovered from the landlord or the tenant with interest rate not exceeding 3 per cent per annum.

The Bihar and Orissa Natural Calamities Loans Act, 1934.

This Act enabled the Government to grant loans to owners of buildings which were damaged or destroyed by earthquakes or other natural calamities for purposes of construction or repairs of buildings.

Minor Irrigation Schemes.

The Minor Irrigation Drive was initiated in April 1948 by the Revenue Department in order to repair and extend the existing minor irrigation works, which had fallen into disrepair due to negligence of the landlords, and for the construction of new ones, wherever required.

The Collector or the Deputy Commissioner is responsible to Government for the execution of the projects under Minor Irrigation Drive in the district. The Collector can sanction schemes costing up to Rs. 5,000; schemes costing more than Rs. 5,000 but not exceeding Rs. 10,000, require the sanction of the Divisional Commissioner; and schemes costing more than Rs. 10,000 have to be sanctioned by Government. In the selection of the sites for the projects, the Collector is assisted by the District Irrigation Committee constituted under the Bihar Private Irrigation Works Act, 1922. The Collector is the *ex-officio* Chairman of the Committee. During 1950-51, Rs. 12.0 lakhs were expended on these schemes.

GOVERNMENT AS THE CREDIT AGENCY.

In this section, the data collected by the field staff regarding the loans advanced by Government for agricultural purposes are

discussed. Table below shows the number and amount of loans sanctioned by Government during 1950-51 for agricultural purposes.

GOVERNMENT FINANCE FOR AGRICULTURAL PURPOSES DURING 1950-51.

(Amount in thousands of rupees.)

District data.	APPLICATION RECEIVED.		APPLICATION SANCTIONED.			PURPOSE FOR WHICH AMOUNT WAS SANCTIONED.		
	Number.	Amount applied.	Number.	Amount applied.	Amount sanctioned.	Purchase of seed.	Well digging and other irrigation.	Land improvement.
1	2	3	4	5	6	7	8	9
Loans under the Land Improvement Loans Act, 1883, or similar Acts in force.	312	250.9	59	70.9	49.2	..	..	49.2
Loans under the Agriculturists' Loans Act, 1884, or similar Acts in force.	6,926	3,965.5	5,673	2,273.8	1,819.4	1,819.4*	..	..
Loans under the Grow More Food Campaign.	..	..	..	..	..	..	..	..
Cash subsidies under the Grow More Food Campaign.	..	..	..	..	355.2	..	355.2	..

Under the Land Improvement Loans Act, 1883, out of 312 applications received 59 or 18.9 per cent were sanctioned. The amount applied for was Rs. 250.9 thousands of which Rs. 49.2 thousands were sanctioned. Under the Agriculturists' Loans Act, the applications received were 6,926 of which 83.2 per cent were sanctioned. The amount applied for was Rs. 3,965.5 thousands and that sanctioned was Rs. 1,819.4 thousands or about 46 per cent of the total amount applied.

* Includes the amount sanctioned for purchase of draught animals.

The data on borrowings from and debt owed to Government were also collected through General Schedule in respect of cultivating, non-cultivating and rural families and four classes of cultivating families. The relevant data are given in the table below :—

ROLE OF GOVERNMENT AS A CREDIT AGENCY.

(General Schedule data.)

Group.	BORROWINGS.			DEBT.		
	Proportion of families borrowing from Government (per cent).	Borrowings per reporting family (Rs.).	Borrowings from this agency as percentage of total borrowings.	Proportion of families indebted to Government (per cent).	Debt per indebted family.	Debt owed to this agency as percentage of the total debt owed.
1	2	3	4	5	6	7
Big cultivators ..	12.2	211	3.6	14.0	295	3.8
Large cultivators..	7.5	257	4.6	14.8	259	5.5
Medium cultivators	9.4	109	5.1	13.8	150	6.0
Small cutivators ..	3.3	54	2.2	3.0	91	1.5
All cultivators ..	6.0	149	4.5	10.8	191	5.1
Non-cultivators ..	0.6	111	1.1	0.7	149	0.9
All families ..	3.9	147	3.9	6.0	188	4.3

The proportion of the cultivating families borrowing from Government was 6.9 per cent and the average borrowings per reporting cultivating family were Rs. 149. Very few non-cultivators reported borrowings from Government. Even though the proportion of the borrowing families was relatively high among medium cultivators, the borrowings per reporting family were only Rs. 109 among medium cultivators as against Rs. 257 among large cultivators. The portion of borrowings of medium cultivators from Government to their total borrowings was highest at 5.1 per cent.

The pattern of debt owed to Government was also similar to that of borrowings among various classes of cultivating families.

Regarding loan operations the enquiry team studied 134 applications for loans from Government including 26 rejected applications selected at random at the four subdivisional headquarters for study. They came to the conclusion that loans for purchase of live-stock

and other purposes accounted for about 83 per cent of the loans disbursed; the amount disbursed for these purposes was about Rs. 32,000 or four-fifth of the total amount disbursed. About 9 per cent of the loans constituting about 13 per cent of the amount disbursed was for finding and other land improvement purposes. Loans secured against immovable property accounted for about 82 per cent of the number of loans disbursed and about 84 per cent of the total amount disbursed. A large proportion of the amount disbursed for purchase of seed and live-stock was for the duration of 3 to 5 years, while for other purposes and more than one purpose the duration of one to three years was predominant.

The time-lag between the date of application and the date of the disbursement of loans was also studied. All the loans studied were disbursed outside the place of residence of the applicants. There was a particular directive from Government for expeditious disposal of loan application as a result of the distressed conditions prevailing in the district. For this reason, it appears that about 44 per cent of the amount was disbursed within one month from the date of application. The loans for another 30 per cent of the applications were disbursed within the period ranging from one to three months. But it may be observed that usually loan applications are not disposed of within the short period of three months.

The bulk of the 26 rejected applications were for non-approval for purposes of loans and a number were rejected due to delay or irregularities in applying for loans.

The most important point which the survey data indicated was that only 3.9 per cent of the rural family borrowed from Government. It was mentioned: "The borrowings of the rural families from Government also constituted 3.9 per cent of their total borrowings. Judged against the background of disbursed conditions prevailing in the district and Government directives for liberalisation of finance in rural areas by applying special rules, the quantum of finance appears to fall much short of the requirements."*

Famine, Droughts and Floods.

Regarding the liability of famine and its visitation the last *District Gazetteer of Monghyr* published in 1926 mentions as follows:—

> "Since the creation of the district, famine has occurred twice, viz., in 1866, and there have been two years of scarcity, viz., 1892 and 1897. The experience of these years shows that the south of the district is most liable to famine, because there the people are mainly dependent

* Monograph on Monghyr district. All-India Rural Credit Survey, Reserve Bank of India, Bombay, 1959.

on the winter rice crop. North Monghyr is almost immune, the only portion affected in 1874 and in 1892 being the north of the Gogri thana, where there is a large area under rice, while in 1897 the whole tract escaped. It would appear that in this area short and even unseasonable rainfall is less disastrous in its effects than in South Monghyr, mainly because the winter rice crop is comparatively unimportant and the tenants are not dependent on a single season's crop but on two. The proverb that it is an ill wind that blows nobody any good is specially applicable to this area. A late monsoon, which elsewhere means the failure of the paddy seedlings, is usually coincident with a late rise of the Ganges;* and the result is that the cultivators in the long strip of North Monghyr bordering on the Ganges get a bumper maize crop. On the other hand, an early failure of the monsoon, which involves the drying up of land under winter rice, coincides with an early subsidence of the Ganges floods. The cultivator is consequently able to prepare the soil and sow early *rabi* crops, the money value of which is enhanced by the failure of the rice crop elsewhere, as well as by the fact that they come on the market in advance of other *rabi* crops. In the inland portions of the same area a comparative failure of the early monsoon rains is actually an advantage to the maize crop. Here, too, as in the *diaras,* an early stoppage of the rains gives an early *rabi* season, and as the cultivator relies as much on well irrigation as on rainfall for his most valuable crops, the comparative shortage of moisture is not very material. The following is a brief account of the famines from which the district has suffered.

Famine of 1866.—The famine of 1866 was most severely felt in the south-west and west of the district, in an area of about 1,300 miles, where rice is the staple crop. The crop of 1864 failed to a considerable extent, and, with the certainty of a repeated failure in 1865, the market rate of the commonest sort of rice rose in October of the latter year to 11 seers for the rupee. Other food-grains became proportionately dear and the inhabitants of the distressed localities began to flock into the town of Monghyr, where the gratuitous distribution of food was begun in November. At the close of the year there was some relaxation of the pressure in consequence of the gathering of the winter rice, and the continuation of public relief was deemed unnecessary. But this crop

* Ganges river is now known as Ganga (P. C. R. C.).

was also scanty, and after it had been reaped agricultural labour was again at a discount. The distress occasioned by the prevailing high prices of food now began to be felt in a more severe degree, the rate of rice in March being 10½ to 8 seers, for pulses 15 to 8½ seers and for maize 17 to 13 seers per rupee. In April crowds of paupers frequented the town, and in May the Municipal Committee resolved to undertake some works for the express purpose of assisting the destitute. As the object was to give employment to those who were able to work, but could find no market for their labour elsewhere, the rate of payment was fixed somewhat below the ordinary rates, but no labour was attracted on these terms.

No further relief measures were attempted till the following July, when, in consequence of the distress prevailing, the gratuitous distribution of food was resumed. The price of rice had now risen as high as 7½ to 7 seers, of pulse 10 to 8 seers, and of maize 14 to 10 seers per rupee. Relief centres were established on the south of the Ganges at Monghyr, Jamui, Parsanda, Sikandra, Sheikhpura and Chakai in July and August and on the north of the Ganges, where distress appeared later, at Begusarai and Teghra in the end of August and September. The month of greatest suffering was September when the price of rice still ranged from 7½ to 7 seers per rupee. In this month the daily average number of gratuitously relieved was 2,200 and in October 767 persons were employed on the construction of a new road between Jamui and Chakai. The highest total daily average number of persons obtaining public relief throughout the district at any period of the famine was 3,450. The distress was aggravated by an outbreak of cholera over the whole south-west of the district. Deaths from this disease were very numerous, especially in Sheikhpura and Sikandra, owing to the crowding together of large number of people, reduced by want of food to a very low condition of bodily strength. The number of deaths due to disease, assisted or engendered by want, was returned by the police at 605, and deaths from actual starvation at 642.

Famine of 1874.—As in other districts of Bihar, the rainfall of 1871 in Monghyr was above the average, but it does not appear from official reports that the crops suffered. In 1872 the rainfall, normal as far as quantity is concerned, was not happily distributed in the Begusarai

and headquarters subdivisions, while in Jamui it was appreciably deficient. The consequence was that nowhere in the district were the crops above the average, while in Jamui they were decidedly below it. On the whole, the seasons preceding the summer of 1873 had not been as prosperous in South Monghyr as in the rest of Bihar; and although there was no actual scarcity, the prices current in the latter half of 1872 and the first half of 1873 show that the foodgrain market was from 10 to 20 per cent dearer than it previously had been. This antecedent period of pressure must have had, to some extent, an exhausting effect on the resources of the people.

The rainfall of 1873 was not greatly deficient in quantity, but it was unequally distributed. In July and August it was in excess; in September, when heavy rain is necessary, it was less than half the normal fall of that month; and in October there was no rain at all. The rainfall therefore was excessive, when excess was likely to be most injurious, and deficient, when a copious downpour was wanted. The consequence of this unseasonable excess and abnormal deficiency was that only three-eighths of the autumn crops were saved; while the outturn of winter rice in the headquarters and Begusarai subdivisions was but one-eighth, and in Jamui subdivision, which is the great rice-producing region of the district, but one-fourth of the average crop. It is, therefore, not surprising that in January, 1874 the prices of rice and Indian corn, the two staple articles of food, were double the normal rates at that time of the year. 'It is', wrote Mr. A. P. MacDonnell, 'a fact pregnant with meaning that they were dearer than the prices which prevailed in January, 1866. In the latter year the high prices of January rose to famine rates in April, and all through the summer and well into the autumn these famine rates prevailed. The result was a mortality which Mr. Cockerell's figures do not attempt to measure, and scenes of ghastly misery, of which I retain a vivid recollection'.*

Fortunately, during the earlier months of the year the district food-supply received a large addition from the produce of the rabi crops, which yielded three-fourths of an average harvest all over the district. This favourable outturn was doubtless largely due to the fact that much of the soil, being liable to inundation, is to a considerable degree independent of the rainfall. This was not

* *Foodgrain supply and Famine Relief in Bihar and Bengal, Calcutta,* 1876.

all. The moisture in the soil, which brought the *rabi* to, if not full, at least nearly full maturity enabled the people, herein far more fortunate than their neighbours to the north, to sow a large crop of subsidiary food-grains, which, the Collector estimated, covered 10 per cent of the cultivated area of the district. It may therefore be said that the district drew, from internal sources, a supply of foodgrain sufficient, had it been freely available, and had none been exported, to have supported the people in their usual state for nine months, or sufficient to have supported them in straitened circumstances over the whole period of the scarcity. But the local food-supply could have done no more than this; it was by no means freely available, and it was largely exported. The consequence was a continuous pressure which, at times and in particular localities, deepened into actual distress, necessitating Government relief.

On the 24th April it was reported that, except in the neighbourhood of Bakhtiarpur, the condition of the district was on the whole satisfactory. The cold-weather crops had been succeeded by a good *mahua* crop—supplies were ample; and there had been no great export of *rabi* grain, while the number of persons on relief works had fallen to 5,364. At the end of May the condition of affairs was generally favourable, and in most cases improved; but the circle officers of Bakhtiarpur stated that 'there can be no doubt that, but for the timely assistance of Government, many thousands of persons would have died of starvation in this circle'. In the beginning of August none of the subdivisional or circle officers reported any distress; and a large incoming *bhadai* harvest was spoken of, except on the low lands near Lakhisarai, where this crop was destroyed by floods in the Kiul. On the 3rd October all relief ceased.

The average daily number of persons employed on relief works was 4,210 in December, 1873 and 5,227 in January, 1874; it rose to 10,596 in May and to 11,148 in June, and then fell sharply to 3,912 in July, 1,972 in August and 332 in September. The average daily number of persons gratuitously relieved was 3,402 at the end of May and reached the maximum of 5,150 in the beginning of August. It fell to 2,084 in the first part of September and to 100 at the end of that month. Altogether, Rs. 4,03,322 were spent on relief, viz., Rs. 83,865 on charitable relief, Rs. 1,32,993 on wages of labour and Rs. 1,86,464 on loans.

Famine of 1892.—Scarcity occurred in 1892 owing to the scanty outturn of the winter rice crop of 1891, preceded by a short crop in 1890. Anxiety was felt chiefly for the low tract of country in the Monghyr subdivision, on the north of the Ganges, extending to the boundaries of Darbhanga and Bhagalpur; but eventually relief operations were found necessary only in the extreme north of this belt, within the jurisdiction of the Bakhtiarpur outpost of the Gogri thana. Several influences combined to accentuate the distress in this tract, the extreme poverty of the population in all seasons; the sandy nature of the soil over the most of the area; and the failure of the rains for two successive seasons. The tract covers an area of some 400 square miles, of which the western portion is flooded during the rainy season and is devoted to paddy. The almost complete failure of the paddy in 1891, after a very small crop of 1890, rendered the larger part of the population wholly dependent upon *sag* and roots.

Relief works were started in February, 1892, but were at first very poorly attended, apparently because of the recollection of the relief operations in 1874. In that year also Bakhtiarpur was a relief centre, and the raiyats had a vivid recollection of how grain carts rumbled into their villages, and they fared more or less luxuriously; and they fancied they would be treated in a similar manner if they refused to do collies' work on the roads. The numbers on work continued to be low till the latter part of May, when the excavation of some tanks in the extreme north of the district resulted in a sudden rush of labourers. The highest average daily attendance on relief works (1,815 persons) was reached in the week ending the 2nd July. After that the situation was so far relieved by opportune rain and the prospect of a good *bhadai* crop, that the number of labourers rapidly dwindled away until the relief works were closed on the 23rd July. Gratuitous relief was commenced in the latter part of February, and continued till the 20th August, i.e., a month longer than the relief works. The average daily number so relieved was 235 for a period of 24 weeks, the daily number seldom falling below 200, but never exceeding 300.

The following summary of the main features of the famine is extracted from the final report of the Collector (Mr. C. A. Oldham, I.C.S.) :—'Relief operations were undertaken on but a very small scale in a small and compact area. Appearances were certainly in favour of expecting that

a very large proportion of the population would rush to the works. From the small numbers shown in the rolls, a lesson may be learnt, first, that after one year's total failure and a very small harvest of a previous year, the people could still manage to tide over the distress. The only explanation of this is that they keep a year's stock at least in store, and this was proved to me on more than one occasion in the villages. Secondly, the remarkable extent to which the poorer classes can find means of subsistence from roots and bulbs. The remarkable abundance of two roots, *chichor* and *bisaur*, the former a bulb somewhat like a very small potato growing in low-lying swamps and the latter the root of an aquatic plant, had a very potent effect in allaying the distress. In every village a crowd of women and children might be seen digging up these roots and drying them for food. I calculated that some 5,000 people were living more or less entirely on these roots, and the very unusual drought had dried up the beds of *chaurs* which, in ordinary years, remain full, and so gave access to a larger supply'.

Famine of 1897.—Monghyr was scarcely affected by the famine of 1897, which was so severely felt in the neighbouring district of Darbhanga. The rainfall of 1895-96 had been short, amounting only to 33.64 inches, and the crops had consequently been by no means full; but work and money were plentiful, and the cultivators obtained good prices for their produce. In 1896-97 the district shared in the drought which lasted till May; in the break in the rains from the 20th July to 20th August, which spoiled the hopes of the *bhadai*; and in the final drought from the 24th September to the 31st December 1896. After that date there was good rain every month, and the weather was particularly favourable to agricultural prospects, though not to the mango and *mahua* crops. Not one in twenty of the mango trees flowered, and the *mahua* blossoms being injured by the storms of March, the produce was from a half to two-thirds of the average. On the other hand the district was fortunate in receiving no less than 11.26 inches of rain in September, 1896, and the total rainfall from April, 1896 to April, 1897 was 41.80 inches. In the end, the outturn of *bhadai* was 10½ annas, of winter rice 8 annas and of *rabi* 12 annas, taking 16 annas to represent the average outturn.

In one respect the position was peculiar, viz., that the district produced enough food to support its own population but the famine in Upper India and the failure of crops

in Eastern Bengal drained off the surplus, and high prices prevailed not only for rice but for all foodgrains. The people, in fact, suffered owing to high prices caused by exportation rather than to bad local crops. Still, though there was some distress owing to the high level of prices, the pinch was felt only in parts of the Jamui and Monghyr subdivisions. Here, however, the poppy was an excellent crop, enabling the people to pay their rents, while they saved their foodgrains; and the Begusarai subdivision fared well, owing to the good crops of tobacco and pepper which are extensively grown there. Nothing like famine ensued, the necessary public relief being afforded by means of a fund raised locally and expended on charitable relief. The District Board, it is true, started a road from Chakai to Nawadih in the Jamui subdivision, as a test relief work, in order to ascertain whether the opening of relief works was necessary; but it did not attract labourers."

SCARCITY.

After the famine of 1897 a period of normalcy ensued in the district for more than two decades. The next impact which Monghyr had to face was in 1919-20. This scarcity was caused due to deficient rainfall. Again in 1928-29 and 1932-33 scarcity condition prevailed in the district due to uneven rainfall. In 1943-44, 1944-45, 1946-47 and 1947-48 especially Jamui subdivision suffered due to drought which was caused owing to deficient rainfall. Paddy crop totally failed. The year 1951-52 witnessed the total failure of the *Hathiya* rains which caused scarcity condition throughout Bihar. The agriculturist and especially the landless labourers were hard hit. Relief measures were taken to meet the situation. There had been widespread drought in 1957 due to the failure of *Hathiya* rains. This caused scarcity throughout the district and widespread relief measures had to be taken. Emergency measures had to be taken and foodgrains were rushed to the district from within and outside the State. In order to find money to the people to buy foodstuff a large number of hard manual and light manual schemes were taken up. Rs. 10,02,450 and Rs. 21,847 were spent respectively over these schemes. Gratuitous relief was also distributed—Rs. 3,27,755 in cash and 1,507 maunds of wheat in kind. Fair price shops were opened to check the rising price of the foodgrains. The number of such shops on the 1st April, 1958 was 1,050.

Floods.

Regarding floods the last District Gazetteer published in 1926 mentions as follows :—

"Though the northern portion of the district is not, as a rule, liable to suffer much from short and unseasonable

fall it is exposed to flood from the overflowing of the Ganges and its affluents. In Gogri thana, with the exception of a small area in the extreme north, and in the north-eastern portion of thana Begusarai, the whole country is regularly flooded by the overflow of the Baghmati and the Tiljuga rivers and their numerous tributaries. The extent of the flood varies from year to year, but, as no attempt is made to grow any but cold-weather crops in the area liable to flood, the damage done is confined to years when the flood subsides too late to allow such cultivation—and this can seldom or never happen except in comparatively small areas where cultivation is ordinarily precarious. In the central portion of the thanas Teghra and Begusarai floods are not, as a rule, caused by the overflow of the Burhi Gandak, which flows between high and well-defined banks, and any damage that may be caused thereby to the *bhadai* crops is counterbalanced by the increased outturn of the succeeding cold-weather crops. In the southern strips, between the Ganges and the railway embankment, there are annual inundations, which vary, however, in extent and in point of time. Much depends on the latter factor; in the floods of September, 1904 less damage was caused than in those of August, 1894 because the crops had already been partly reaped in the former year, whereas the floods of 1894 occurred a week or ten days before harvesting could be commenced.

"At the same time, it must be admitted that there is a general belief that since the building of the railway embankment, the floods invariably do damage, however seasonable they may be. In the first place, the embankment confines the flood-water to a smaller area, which is thus flooded to a greater depth than would otherwise have been the case. Secondly it banks the water up, preventing it from spreading northwards and eastwards gradually as it used to do, without doing any particular harm. Now the banked-up water either drowns the crops or flows in a rapid current eastward, breaching *bandhs* and, by its rush, damaging crops. Apart from this, however, even a destructive flood has one compensating advantage in the shape of a rich deposit of silt and a corresponding prolific *rabi* crop in the next cold weather.

Of late years the most serious floods have been those of 1894, 1901, 1904, 1905, 1906 and 1923. From the following description of the floods of 1904 and 1906

an idea may be gathered of the general nature of the floods to which the north of the district is liable.

"*Flood of 1904.*—The flood of 1904 was due to the abnormal height to which the Ganges rose. It was not quite so high as in 1901, when the gauge at Monghyr read 27.75 feet above zero on the 8th September; but in the latter year the flood rose and fell more rapidly. On the 4th September 1901, the water stood at 24.67 feet, on the 5th it rose to 25.75 feet, on the 6th to 26.67 feet, on the 7th to 27.5 feet, on the 8th to 27.75 feet but it fell again so rapidly that by the 11th it was down to 24.58 feet and by the 14th September to 17.58 feet only. It was over 25 feet for six days only. In 1904 the river rose above 25 feet on the 14th August, attained 27.25 feet on the 19th and fell to 26.83 feet on the 20th, to 25.75 feet on the 24th and to 24.58 feet on the 29th. It was thus altogether 15 days above 25 feet. Owing to the duration of this flood, the maximum attained and the existence of the Bengal and North-Western Railway embankment, it was probably one of the severest floods ever experienced in the tracts affected. These tracts were (1) the country round Begusarai to the west, (2) the country round Gogri to the east, and (3) a small tract near Monghyr town. It will be convenient to deal with each of these tracts separately.

"The flood in Begusarai was mainly due to the fact that the Gupta Bandh, an embankment about 13 miles long extending from Mahua to Samho, was breached in 10 or 12 places, and the Ganges water poured in from the south and west, flooding the whole area south of the Bengal and North-Western Railway lines from two miles west of Tilrath station up to Ballia. To the east of Ballia the country was also flooded, but this occurs nearly every year, and was not due to the bursting of the *bandh*. The area flooded in consequence of the bursting of the *bandh* has been variously estimated at 67 or 100 square miles. The depth of water varied according to the configuration of the country. In some low-lying places it was 8 to 10 feet deep; round village sites it was rarely more than 4 to 5 feet deep; and a large number of villages built on higher sites were not touched. The state of affairs in Begusarai itself may be gathered from the report of the Collector, Mr. C. A. Oldham, I.C.S.: 'All communication between the railway stations and the town and subdivisional office was cut off by the floods. The water was beyond a man's

depth, and a swift current was flowing eastwards. Luckily we spied a boat in the distance, which the police had brought to render assistance in the town, and which we hailed and got into. We first proceeded to some houses where 15 to 20 people were sitting on the roofs, and as they were in danger of being washed away, we took them off in two trips to some high land; and then proceeded through streets to the subdivisional office. Here we found the Subdivisional Officer, Mr. Ward, isolated on the upper storey of his house, with inmates of the local subsidiary jail on his roof, and records from his subordinate offices, thana, etc., in the upper verandahs. The flood had come in so suddenly, that he had scarcely had time to save the stamps and notes in the treasury and the records of his office, thana, jail, etc. When we arrived, the water was 9 inches over the plinth. It continued to rise that night, and to make matters worse for the poor people outside, it rained in torrents. Owing to the current, *kutcha* houses were falling on all sides. I decided to get to the railway line, as communication might be wholly cut off at any moment and I could better organize relief from Monghyr. We got into the boat and tried to reach the station, but could make no headway against the current where it was strongest, and were driven back to the subdivisional office and residence: the office is in the lower storey and the residence in the upper storey of the same building. Next morning, I got to the station by going down with the current in the boat and striking the railway embankment. The water was at this time more than a foot deep over the plinth of the lower storey, and three feet deep around the building.

"The flood was the highest on record in the town, the next highest flood there, according to local tradition, having occurred some 30 years before, when the water came up to the subdivisional office, but did not top the plinth. In 1901, when the Ganges reached 28 feet (the record for Monghyr since gauge readings have been taken), the Gupta Bandh was also breached, but the water only just reached the subdivisional office drain, and did not actually touch the building itself. On this occasion the water was about two feet higher than on either of the previous occasions, and, moreover, the damage done to houses was very much greater.

The tract that suffered most was that lying between the Bengal and North-Western Railway line and the Tirhut road.

Here the water, having topped and breached the road in its progress northwards, was stopped by the railway embankment, and then turned eastwards, a considerable current setting in between the road and the railway, which are not far apart. Not less than 1,125 mud-walled houses are known to have collapsed, but the houses in the *diara*, which are built of wattle and thatch, nearly all withstood the flood. The *bhadai* crops, consisting chiefly of maize, were seriously damaged. Much fortunately had already been harvested, but of the remainder some was entirely destroyed and in places 50 to 75 per cent was lost.

"In the Gogri tract the flood was due to the bursting of the Gogri embankment, which on the 18th August suddenly settled and the water bursting over it soon made a large breach. Luckily the people in the villages on the east of the embankment had been warned to get their property away and be ready to decamp at a moment's notice, and they had acted on this advice, though very reluctantly, so that no lives were lost. Nine villages were flooded, and though a large number of houses were damaged no person was drowned and no cattle lost. The area flooded in this part of the district was 13 square miles.

"In the third tract the area affected comprised only Khagaria and its immediate vicinity; but the loss of grain was much greater than anywhere else. Here the inundation was due to the Ganges flood banking up the waters of the Burhi Gandak, and the water entered the town by first overtopping, and then breaching the embankment of the Khagaria-Sisauni road, which serves as a protection to the town on the west. The breach occurred in the evening of the 7th August, and on the morning of the 18th the water entered the western bazar, completely flooding it by the afternoon of the same day, while by the 19th the eastern extremity of the town was also under water.

"Besides the above three tracts, several of the *diaras* in the Ganges were flooded, and in places cut away by the force of the current. On 19th August the Basdeopur Taufir *diara* began to cut away, and next day some 1,200 persons with their cattle and property were safely brought away in boats to the main land. Harnathpur and Raghunathpur *diaras*, in midstream north of Monghyr, next commenced to be cut away by the current. On the 21st instant 7 men, with 43 head of cattle and other property were safely brought away on

boats from Harnathpur *diara*. On the 22nd instant, news having been received that Harnathpur was in extreme danger, a Deputy Magistrate chartered a steamer and boats, and with the assistance of the police rescued some 95 persons, their property, and 2,100 cattle, leaving no one on the *diara*, which was subsequently swept away. All the inhabitants of Raghunathpur *diara* with their cattle were safely brought away next day, and the people were removed without loss of life from Chaintola on the Zamindari *diara*, which was also being cut away.

"*Flood of 1906.*—In 1906 the floods which annually visit Pharkiya *pargana* and parts of Begusarai subdivision, and which are caused mainly by the overflow of the Gandak and Tiljuga and by the Ganges spill, were unusually early. About the 14th August the Gandak and Tiljuga began to rise to an abnormal height, and about the same time the Ganges also reached a height of over 24 feet. The Collector, who was out at Chapraon, found on his way back to Khagaria on the 17th that except on very high lands nearly all the villages had suffered and that the *bhadai* crop was practically destroyed. Only in a few villages had the villagers managed to cut and save some partially ripe *marua* and maize. A large number of people had been rendered homeless and were in great distress, the more so as the outturn of *rabi* had been very poor during the previous season and the *bhadai* in 1905 had also been nearly a failure. The flood continued to rise till the 19th remained stationary for four or five days, and began to fall about the 23rd. By this time the whole of the Pharkiya *pargana* north of the railway line, with the exception of a few villages and high lands in the north-eastern corner, had been swamped, and entire villages were under water; while in the Begusarai subdivision, the Gandak, with its tributary the Balan, had done considerable damage in a strip of land, about six or seven miles broad, along the southern bank of the Gandak.

"The area between the Bengal and North-Western Railway line and the Ganges, which is liable to inundation by the floods of that river, suffered much less, for it has partial protection from the Public Works Department embankment near Teghra, the Gupta Bandh in the Begusarai subdivision, and the Gogri Bandh near Gogri; and so long as they did not give way, the only areas liable to flood were those lying outside them, viz.,

the area between the Gupta and Gogri Bandhs, and the area east of the Gogri Bandh. Fortunately these embankments remained intact and the Ganges did not rise very high; and though crops were lost in places south and east of the Gupta Bandh, the damage does not appear to have been as great as had often been the case in previous years.

"Altogether, an area of 1,074 square miles suffered from the floods, the distress being keenest in parts of Ballia thana and in the portion of the Khagaria thana bounded on the east by a line from Khagaria to Sarabjita Ghat, on the north-east by the Tiljuga river up to Mohraghat, on the north-west by the boundary of the district, and on the south-west by a line from Bakhri to Khagaria. South of the Ganges the Government tenants in Binda *diara* and Kutlupur lost their *bhadai*, and much damage was caused in the area between the river and the East India Railway line from Monghyr to Kajra. Loans were given to the distressed in the tracts most severely affected, the Gogri and Khagaria thanas and the Bakhtiarpur outpost. It was at first intended to fix the average of loans at Re. 1 per *bigha* and to distribute no loan to any raiyat possessing more than 10 *bighas*; but this idea had to be given up owing to the serious nature of the distress prevailing. The average was, therefore, raised to Rs. 2 per *bigha*, and agriculturists having 20 *bighas* were allowed loans. It soon became evident, however, that even this was insufficient; consequently, the average was again raised to Rs. 3 per *bigha*, and the maximum amount which a single individual could take was fixed at Rs. 80. Altogether Rs. 56,000 were distributed as loans.

"*Floods of 1916 and 1923.*—In 1916 there was an unusually high flood of the Ganges in the *diara* lands, while at the same time the rise of the Baghmati and Burhi Gandak flooded the northern part of the Begusarai subdivision. There was considerable loss of cattle and destruction of *kachha* houses, but only one human life was lost. In August of 1923 there was an exceptionally high flood in the Ganges, which occurred during a long break in the rains, when the river had begun to fall, and nobody thought of the possibility of a flood. But in the third week of August, though the river was low in Bihar, its higher reaches were in flood; and between the 18th and the 21st of the month there was the great flood in the Son, of which an account may be found in the Gazetteer of Shahabad district.

> The Ganges flood came down to Monghyr district on the 22nd of August, rapidly raising the river to a height only three-quarters of an inch below the highest flood-level known. There was no loss of human life, and very little loss of cattle; but the loss of houses was large, because in addition to the loss of the flimsy huts of the *diara* area, built in expectation of destruction by flood, there were many more substantial houses destroyed where the river rose over what is normally its northern high bank."

In 1924-25 parts of Sadar subdivision and Begusarai subdivision suffered due to overflow of the Ganga. There was a high flood in 1929-30 in the Begusarai subdivision which was caused owing to the flood in Ganga. There was a great damage to *bhadai* crops. In 1937-38 the district suffered badly due to flood in the Ganga. Khagaria, Begusarai and part of Sadar subdivisions were affected severely due to the flood in the Ganga and its tributaries. In 1948-49 all parts of the district except Jamui subdivision witnessed unprecedented flood due to the overflow of the Ganga, Burhi Gandak and Baghmati and their tributaries. The State Government adopted relief measures to meet the situation.

Flood of 1953.

Regarding the river Ganga the report* mentions that the course of the river of about 70 miles in the district is both wide and deep all round the year and in rains the water spread over north side for a distance of 20 square miles from its ordinary beds. It has a general tendency to spill northwards, but due to the presence of Gupta Bandh, old Gogri Bandh and the construction of the Gupta-Lakhminia and Gogri-Narainpur embankments in 1950-51, the tendency has been checked and the danger of flooding the area lying north of the embankments especially Begusarai town and the Gogri police-station and Narainpur village has been very much minimised. Intensity of the flood in 1953 was not at all high. The most important embankments on Ganga are Gupta-Lakhminia embankment, Gupta Bandh, Gogri-Narainpur embankment and other Gupta Bandhs.

The Gupta-Lakhminia embankment is 12 miles 540 feet long and the area protected is 16,000 acres. Gupta Bandh is 13 miles long starting from the village Garahra to the village Sayedpur and the Gupta-Lakhminia embankment has been constructed in continuation of Gupta Bandh. The Gupta Bandh is 8 feet high on the average.

The Gogri-Narainpur embankment was completed in 1953 on the left bank of the Ganga and the Burhi Gandak which is 26 miles

* *North Bihar Flood Report*, 1953 (Irrigation Department, Bihar).

7 furlong long and lies in both Monghyr and Bhagalpur districts. The old Gogri Bandh extended over a length of 1½ miles commencing from the railway embankment from the village Chaidah and joining the Gogri-Narainpur embankment at Gogri and from the Public Works Department it has been transferred to the Irrigation Department in 1950 when the construction of the Gogri-Narainpur embankment was taken up. This is an important *bandh* because any breach in the *bandh* will affect the important trading *bazars* of Gogri, Jamalpur, Muskipur, Balan Bazar and Maheshkhunt.

Regarding the river Burhi Gandak the report mentions that the catchment area of the river is plain and slopes from the west to east at 34 feet per mile. The catchment area is about 478 square miles. The soil on the banks is mostly *dorasa* with high percentage of sand at many places.

During the year of high flood in the Ganga, the water of Burhi Gandak is held up, and the back water raises the flood level of the Burhi Gandak, with the result that the area lying on both the banks of the river used to be highly inundated. The river was in spate on the 28th June, 1953 due to torrential rain in the upper catchment near Nepal border. Rainfall recorded at Begusarai from the 15th June to 27th June, 1953 was 6.89 inches. This water, however, remained confined within the banks. Rainfall from the beginning of July was also copious and the river started rising rapidly from 28th July again. The gauge at Siwari Ghat rose from 130.12 feet to 136.77 feet on 2nd August, 1953 and a maximum of 137.17 feet on 3rd August, 1953 as against a maximum of 136.37 feet of last year.

The river started spilling both its banks right up from Manjhaul (nearly eight miles from Parihara) to its outfall. The depth of the spill varies from 3 feet to 7 feet. Due to breaches in the embankment at Patsara and Nawkothi, 75 per cent of the area of Bakhari and Bariarpur thanas were submerged, destroying the standing *bhadai* crops and even entered the homestead lands. The river spilled over its left bank at village Samsa (6 miles east of Manjhaul) and joined with the flood water already entering into the area through the breach of Nawkothi *bandh* (locally known as Rohtha *bandh*).

The flood water after flowing due north from the above two breaches for two miles, divided itself into two directions, one entering the Kabar Tal, after causing breaches in Manjhaul-Garhpura road in north-east direction, and the other due north and combined with the spill water coming from Samsa side. This water forces its way through the Kabar drainage channel crossed over to the other side, flowed into the Chanha *nala* and ultimately discharged into the river Baghmati after crossing a number of local drainages. This caused extensive damage to the area lying to the east of Bakhri Salauna.

Regarding the remedial measures the report has mentioned as follows :—

> "It has been suggested in the flood report of Sri P. C. Ghosh that flooding of the area lying on the bank of the river Burhi Gandak, is dependent on the flood conditions of the Ganga and hence no remedial measure can be suggested, but the experience of the flood has shown that in spite of the Ganga flood level being considerably lower, the flooding of the area lying on both the banks of the river Burhi Gandak has been extensive. It, therefore, indicates that this river is capable of flooding extensively without the back-water of the river Ganga. Construction of a number of embankments in recent years restrict the spreading of spill water and hence it may be that flood water lets loose all its energy in the lower reaches and strikes the embankments with great force for finding a way either by breaching the embankment or spilling straight where there is no embankment. Besides these there were a number of *nallas* which used to work as escape channels but all these outlets have been closed due to the construction of a number of sluices, and it is just possible that these factors might also be attributing to raise the intensity of the flood.
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> "To protect the area lying in lower reaches, specially those falling within the jurisdiction of Bakhri and Barlarpur thanas, where the suffering and misery was due to ravages of flood for the last two years, construction of an embankment after taking into account flood data of recent years, appears to be absolutely essential. Besides protecting the areas referred to above, it will afford protection to costly bridges, anti-flood sluices and the Kabar channel itself, which otherwise are left exposed and the vulnerable Kabar drainage channel will not work efficiently if some protective measures are not taken".

Regarding the river Balan it is mentioned that the flood water did not overtop the embankment although it flushed the crest of the embankment at places. The embankment of the Irrigation Department on both the banks stood against the floods but the private embankment at Pakthoul and Pakri gave way inundating some 2,000 acres of *bhadai* crops.

The report mentions regarding remedial measures that "the embankments constructed under the M. P. M. Nala Scheme and the Satraji Nala Scheme on either bank, are not in one continuous chain. They are terminated at high lands as these were constructed

on the basis of hydrological data available before 1950, when the survey was done. The flood water level has gone higher up in the last two years and hence lands which were known to be high and unaffected with the flood water prior to 1950 have been affected with the flood for the last two years.

"As conditions have changed, it is necessary that continuous embankments be given all along, so that safety of the entire protected area can be guaranteed. The very purpose of providing embankments is defeated if flood water can find its way to inundate the protected area through some of the gaps which were left considering them to be high lands."

Regarding the protection from the flood of the Baiuti and the Baghmati rivers it was suggested that vigorous police patrolling is needed at all the sluice sides and other strategic points. It was further suggested to strengthen the existing embankments.