CHAPTER IV.

AGRICULTURE AND IRRIGATION.

Agricultural Population.

The population of Champaran district is predominantly agricultural. To arrive at the actual population dependent on agriculture we have to look into the decennial census tables. It may, however, be observed that owing to different methods of enumeration and occupational classification adopted in different census operations, they do not exactly give comparable data.

According to the census of 1891 the number of persons dependent on agriculture was 72 per cent of the total population. But in his Final Report on Survey and Settlement Operations (1892—1899) C. J. Stevenson-Moore observed that this percentage was nothing less than 85. According to the census tables of 1901, the percentage of population dependent on agriculture was just above 80. But this also appears to be an underestimate if the percentage of 90 as stated in the census of 1911 is taken as fairly correct. Mr. J. A. Sweeney in his Final Report of the Revisional Survey and Settlement Operations (1913—1919) agreed with this percentage. Since then this percentage has continued to be more than 90 of the total population.

According to the census of 1951 the agricultural population of the district is subdivided into the following groups :—

Table I.

	Males.	Females.
Cultivators of land wholly or mainly owned and their dependents.	6,15,609	6,09,539
Cultivators of land wholly or mainly unowned and their dependents.	1,40,364	1,41,976
Cultivating labourers and their dependents	4,16,271	4,23,097
Non-cultivating owners of land, agricultural rent receivers and their dependents.	7,373	6,406

The allied occupations of forestry, stock raising, etc., give employment to very few persons as is seen in the following table taken from the census of 1951 :—

TABLE II.

Name of allied occupations.	Employers.		Employees.		Independent workers.		Total.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
1	2	3	4	5	6	7	8	9
1. Plantation ..	..	..	..	1	..	16	..	17
2. Forestry and wood cutting.	4	2	4	..	103	44	111	46
3. Stock raising..	..	3	34	24	118	71	152	98
4. Rearing of small animals and insects.	..	1	..	..	3	3	3	4

The following table of 1951 census shows the number of persons who derive their secondary means of livelihood from agriculture which is quite sizeable :—

TABLE III.

Number of persons deriving their secondary means of livelihood from—

	Males.	Females.
Cultivation of owned land	7,701	5,253
Cultivation of unowned land	9,032	4,708
Employment as cultivating labourers ..	35,324	20,274
Rent on agricultural land	2,098	568

The figures in Table I show that the number of persons cultivating their own land is numerically the largest group followed by the groups of cultivating labourers, cultivators of unowned land and the agricultural rent-receivers, respectively. The recent land reforms measures must have changed the numerical structure leaving the overall picture as it was.

The figures of Table II, particularly for forestry and stock-raising do not appear to be very correct. The extensive jungles and good pasturage in Champaran district might have attracted more persons

to forestry and sheep-rearing. But even conceding that there may have been some error the persons employed on these occupations will not be very sizeable, changing the percentage of agricultural population.

Importance of Rainfall.

Rainfall has been the most important factor in India's agricultural economy. Champaran is no exception to the rule. This district has also been subjected to the whims of monsoon so much so that in some years Champaran had a bountiful production due to sufficient rainfall and in others complete scarcity due to continued droughts. Mr. Stevenson-Moore, I.C.S., in his Final Report on Survey and Settlement Operations in Champaran during 1892–1899 discusses about the importance of rainfall in Champaran's agricultural economy in the following manner :—

"Rainfall, as I have implied in my comments on the soils of the district, is the most important factor in the agricultural economy of Champaran. The importance cannot be better emphasised than by the following quotation from Mr. Macpherson's famine report :—

'The famine in Champaran was brought about by deficient and unfavourably distributed rainfall in 1895 and 1896.'

"The figures below show the normal distribution of rainfall over the several months of the year :—

	Inches.
January	.67
February	.38
March	.37
April	.77
May	2.59
June	8.19
July	11.57
August	11.94
September	9.30
October	3.54
November	.02
December	.21
Grand Total	49.55

"The heaviest fall comes between June and September, when it is required by both the autumn and winter crops. Substantial rain is also required in May and October, in May for the sowing of the autumn crops and in October to bring the *aghani* paddy to maturity and to supply moisture but not very essential.

"Unfortunately, however, the rainfall of the district is extremely capricious sometimes varying very widely from the normal. The

normal rainfall given above also differs considerably from that noted for 1874 by Sir R. P. MacDonnell, as the following comparative table will show :—

	1874.	1896.
January	.60	.67
February	.34	.38
March	1.50	.37
April	.45	.77
May	2.98	2.59
June	8.35	8.19
July	11.75	11.57
August	10.39	11.94
September	11.93	9.30
October	8.16	3.54
November	0.	.02
December	.35	.21
Total	56.0	49.5

"The difference of 7.25 inches in the totals is remarkable. It is mainly accounted for by the months of September and October, the normal total for these two months in 1874 being 20.09, against 12.84 November.If it is true that the rainfall of these two important months is growing lighter, it is a very evil sign. The normal for March in 1874 too was one inch higher than now."

After giving detailed rainfall figures for the two subdivisions Mr. Stenvenson-Moore, I.C.S., reviews the following for the district as a whole :—

"The total annual fall ranges between 88.63 in 1893 and 30.84 in 1896, the normal being 49.55. 1883 and 1884 were years of deficient rainfall but were followed by three consecutive years of very abundant rain reaching the maximum (61.80) in 1887. In 1888, however, there is a sudden drop to 38.63 followed by an equally unusual rise to 78.44 in 1889. The record of 88.63 was reached in 1893. In 1894, again the fall was slightly short, succeeded by an abnormal rise to 64.92 in 1895. In the year that led to the great famine, 1896, the total fall was only 30.84 inches.

"Taking individual months too the variations are most startling. The critical months of the year are June to October. Now the normal fall for June is 8.19, but in June 1886 only 4.11 inches fell, while 22.39 inches were recorded in the corresponding month of 1889. Similarly July varies between 6.30 of 1894 and 31.92 of 1893, against the normal fall of 11.57. Perhaps September is the most capricious of all going so low as .78 in 1883, whilst rising to 29.88 in 1896, against the normal 9.30. Extreme variations are noticeable in every month with the results that even where the total rainfall reaches the

normal it may be so unreasonably distributed as to cause acute distress. The following quotation from Mr. Macpherson's report fully illustrates this point :—

" Although the rainfall of 1895 to 1896 was above the normal by 17.5 per cent, it was badly distributed. It was on the whole favourable for the crops until August, but it ceased prematurely none falling after the 21st of September and not even in the *hathiya* asterism when good rain is considered essential for the autumn rice crop, and for providing moisture for the *rabi* and indigo crops. There was moreover practically no rain at all throughout the cold weather, the total fall from October to March inclusive, amounting to only half an inch.

" In both the famine years 1873-74 and 1896-97 there were serious deficiencies in the rainfall, from May to October 14.10 inches, or 30 per cent, below the normal in the former, and 19.19 inches, or over 40 per cent in the latter. As Mr. Macpherson puts it : 'The inevitable results in both the cases were acute, widespread and long distress'.

" The rainfall of the Champaran district is heavier than that of any other district of the Bihar Division. Owing to this and to the general character of the soil, the Champaran *raiyats* place a most absolute reliance on it, and make little effort, towards extraneous means to guard against its failure. But it is very capricious, and though as a consequence distress pays periodical visits to the more susceptible parts of the district, the cultivators are not spursed into effort and their absolute faith in the monsoon's beneficence remains unshaken. No wonder then that the records of the rain-gauge are most anxiously watched by the Collector of Champaran."

This exclusive dependence upon rainfall for agricultural purposes continued even to later years and Mr. L. S. S. O'Malley in his District Gazetteer for Champaran published in 1907 observed as follows :—

" For the *bhadai* and late rice harvests the distribution most favourable to agriculture the husbandman's year is when premonitory showers, falling in May or early in June, facilitate that spade husbandry which, to secure a really good crop, most precede ploughing operations. The rain in the end of June and in July should be heavy. Then should come an interval of comparatively fair weather, in which weeding operations may be successfully prosecuted. The September rains must be heavy, shading off into fine weather with October showers. On the sufficiency of the September rains, more than of any other month, depends the character of the winter rice crop. Finally, periodic showers from December to February inclusive are essential to a good *rabi* harvest (A. P. Mcdonnel, Foodgrains Supply of Bihar and Bengal, Calcutta, 1876).

" Owing to the absence of artificial irrigation the cultivators of Champaran are at a disadvantage, as compared with other parts of

Bihar. Usually the district is blessed with sufficient natural moisture, for the rainfall is heavy in normal years. Unfortunately, however, it is exceedingly capricious extreme variations occurring with the result that even when the total amount reaches the normal, it may be so unfavourably distributed as to cause a failure on the crops. The most critical months of the year are June to October, and the rainfall in the *hathiya* asterism at the end of September is the most important in the year, for not only is it required to spring the winter rice to maturity but also to provide for the sowing of the *rabi* crops."

Mr. J. A. Sweeney, I.C.S., in his Final Report on the Revisional Survey and Settlement Operations in the District of Champaran during 1913—1919, published in 1922 without going into much detail about the vagaries of monsoon in the district, nevertheless mentions that " rainfall is still a factor of enormous importance in agricultural economy ".

Not only during the time of settlement operations of the district by Mr. C. J. Stevenson-Moore that the rainfall was capricious and varied widely from the normal, the same trend has been continued down to our times. In 1874 the normal rainfall was 56.80 inches which went down in 1896 as low as 49.55 inches. This was considered by Mr. C. J. Stevenson-Moore as very ominous as the rainfall for the vital months of September and October began to show lighter showers, which were 12.84 inches as against 20.09 inches in 1874. The situation now can be realised from the fact that in the months of September and October the rainfall inches were 4.74 and 0.07 in 1950-51, 3.74 and 0.36 in 1951-52, 11.40 and 0.52 in 1952-53, 9.57 and 0.63 in 1953-54, 4.31 and 0.97 in 1954-55 and 13.66 and 0.66 in 1955-56, respectively. Out of six years four years show abnormally low rainfall in the months of September and October when rainfall is absolutely essential to bring the *aghani* paddy to maturity and to supply moisture for the sowing of spring crops. Following is the chart showing average rainfall in inches in Champaran from 1936-37 to 1955-56 :—

TABLE I.

Statement showing the average rainfall in inches in Champaran from 1936-37 *to* 1955-56.*

Year.	Average Rainfall in inches.
1936-37	72.26
1937-38	56.57
1938-39	72.11
1939-40	47.27

* *The Bihar Statistical Hand-Book*, 1953, pp. 14-15 and *Statistical Hand-Book*, 1955, pp. 16-17.

Year.	Average Rainfall in inches.
1940-41	50.34
1941-42	57.32
1942-43	44.25
1943-44	47.22
1944-45	49.28
1945-46	43.06
1946-47	59.62
1947-48	52.49
1948-49	55.38
1949-50	55.92
1950-51	48.35
1951-52	51.56
1952-53	60.78
1953-54	59.38
1954-55	51.41
1955-56	62.31

The average normal annual rainfall being 56.18 inches.

The total annual rainfall ranges between 72.26 inches in 1936-37 and 43.06 in 1945-46, the normal being 56.18 inches. 1936-37, 1937-38 and 1938-39 were years of abundant rainfall but were followed by the two years of 1939-40 and 1940-41 when the rainfall average were below the normal. In 1941-42 the rainfall reaches a slightly higher than the normal figure but was followed by four years of extremely deficient rainfall, always remaining far below the average normal figure, the figures being 44.25, 47.22, 49.28 and the lowest figure of 43.06, respectively. In 1946-47 the rainfall was somewhat satisfactory and again went down to 52.49 in 1947-48, 55.38 in 1948-49, 55.92 in 1949-50, 48.35 in 1950-51 and 51.56 in 1951-52. From 1952-53 the rainfall again reached a satisfactory incidence excepting for the year in 1954-55 when the total fall was 51.41 inches only.

The district, therefore, suffered alternately between floods in the years when there were excessive fall and draughts and as a result wide-spread scarcity in those years when the fall was absolutely inadequate.

The individual months too show great variations. Following is the statement showing rainfall in inches in Champaran from 1950-51 to 1955-56 :—

TABLE II.

Statement showing monthly rainfall in inches in Champaran from 1950-51 *to* 1955-56.

Year.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.
1	2	3	4	5	6	7	8	9	10	11	12	13
(A) 1950-51	1.24	0.11	3.52	14.55	8.53	14.68	4.74	0.07	Nil	0.15	0.64	0.12
(B) 1951-52	0.27	0.02	0.42	7.72	18.14	13.46	3.74	0.34	0.37	Nil	0.12	0.29
(C) 1952-53	1.91	1.94	3.23	11.73	11.67	16.10	11.40	0.52	0.10	Nil	2.05	0.13
(D) 1953-54	0.95	0.75	1.74	13.52	23.60	8.17	9.57	0·63	0.12	0.03	0.26	0.07
1954-55	0.02	Nil	2.65	7.08	20.27	15.60	4.31	0.97	Nil	0.04	0.28	0.19
1955-56	0.05	0.52	1.41	10.09	22.82	10.77	13.66	0.66	Nil	Nil	0.71	1.62

(A) *vide* Bihar Statistical Hand-Book, 1951 pp. 8-9.

(B) *Vide* Bihar Statistical Hand-Book, 1952 pp. 10-11.

(C) *Vide* Bihar Statistical Hand-Book, 1953 p. 16.

(D) *Vide* Bihar Statistical Hand-Book, 1955 pp. 18-19.

If the above table is scrutinised with the help of the table put in below showing normal rainfall for each month in Champaran (in inches) and also with the statement showing figures for the years 1874 and 1896 (given before) the vagaries of the monsoon and the dangerous trend for uneven distribution of rainfall will be apparent :—

TABLE III.*

Statement showing normal rainfall each month in Champaran (in inches).

March	0.49
April	0.68
May	2.47
June	9.17
July	15.66
August	13.30
September	10.41
October	2.37
November	0.28
December	0.18
January	0.47
February	0.70

For the month of June (when the rainfall is needed for autumn crop) the rainfall was 8.35 in 1874, 4.11 in 1886, 22.39 in 1889, 8.19 in 1896 and 9.17 in 1955. Similarly for July the rainfall was 11.75 in 1874, 31.92 in 1893, 6.30 in 1894, 11.57 in 1896 and 11.55 in 1955. These wide variations due to imbalanced distribution of rainfall cause acute distress.

LAND UTILISATION.

The district was full of forests before. According to the census of 1951, the present area of the district is 3,525 square miles or 20,56,000 acres. The area assessed by Todar Mal in 1582 was only 155 square miles. During the next two centuries there was a great progress in reclamation of lands and in 1790 we find that an area of 1,041 square miles had been assessed. From 1793, when the Permanent Settlement took place to 1845, when the revenue survey was done, the progress in cultivation was very rapid. In 1879 it was estimated that 67 per cent of the area of the district had come under cultivation. By 1907 about 70 per cent of the area had been brought under the plough.

In the Report of the Revisional Survey and Settlement (1913—1919), Mr. Sweeney, Settlement Officer, had observed that 69 per cent of area of the district excluding the hills and forests was under cultivaton. The total area of the district, as mentioned in this report, consisted of 2,77,735 acres, excluding about 290 square miles of hills

* *Vide* Bihar Statistical Hand-Book, 1955, p. 20.

and forests. There has been no further settlement after 1919 and a valuable source of information regarding land utilisation since 1919 has thus been denied.

There have, however, been sample and other surveys from Agriculture Statistics Section of the State Government. The Directorate of Economics and Statistics, Government of Bihar, has published *Bihar Statistical Hand-Book of* 1953, giving the results of such surveys. The following table of land utilisation is from that publication :—

TABLE IV.

During 1952-53 (*inthousand of acres*).

Forest	108
Not available for cultivation	288
Other uncultivated land excluding current fallow	148
Current fallow	221
Net area sown	1,499
Total area of the district	2,264
Bhadai crops	507
Aghani crops	826
Rabi crops	549
Fruits	40
Potatoes	3
Vegetables including root crops	19
Total area sown	1,944
Area sown more than once	445

According to this table the area of the district has increased by about 187 thousand acres over the acreage calculated by Mr. Sweeney. These figures appear to include the forest and hills. The net area under cultivation is over 80 per cent of the total area of the district, excluding forest and hills. This is a distinct advance since 1919 when Mr. Sweeney found that 69 per cent of the total area was under the plough.

The above table (Table IV) will show that the double cropped area forms nearly 30 per cent of the net cropped area. It may be mentioned, however, that any comparison of the areas under different crops in different years would be rather far-fetched as the growing of different crops from year to year depends on various factors, chiefly rainfall which is rather uncertain. There have also been cases where cultivation of particular crops has declined. Indigo, which used to be grown on a large scale in the district at the instance of the European planters, has completely died out. There was a time when it covered an area of 96,000 acres. This acreage declined to 47,800 acres in 1905 and to 38,600 acres in 1906. Partially because of the synthetic indigo at a cheaper price and the campaign against the oppressions of the indigo planters, indigo cultivation rapidly declined

In the early thirties it completely died out. Lalsariah was the last concern to grow and manufacture indigo. The consolidated blocks of land which grew indigo are now growing sugarcane and other crops. Another crop that used to be very extensively grown in the district was poppy. Letter no. 48, dated the 24th November 1854, from F. A. Glover, Joint Magistrate, Champaran, to the Commissioner of Revenue, Patna Division, mentions that opium was grown in a very large amount in the district, the average outturn being 14,000 to 16,000 maunds. It was a favourite crop with the ryots although zamindars bothered them very much by charging enhanced rents. However, the area under this crop at that time has not been mentioned. At the Survey and Settlement of 1892—1899 it was found to be grown on 54,000 acres. But the area gradually declined largely owing to the competition of more paying crop and the area under this crop had fallen to 47,000 acres in 1905-06. Poppy cultivation has practically died out from the district now. The latest figures for land utilisation are as follows :—

Statement showing the classification of areas (in thousand acres) during 1953-54, 1954-55 *and* 1955-56.*

Year.	Forest.	Not available for cultivation.	Other uncultivated land excluding current fallow.	Current fallow.	Net area sown.	Total area of the district.	*Bhadai* crops.	*Aghani* crops.	*Rabi* crops.	Fruits.	Potatoes.	Vegetables including root crops.	Total area sown.	Area sown more than once.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1953-54	1,03	3,01	1,11	2,05	15,43	22,64	4,44	7,94	6,90	42	5	24	19,99	4,56
1954-55	1,02	3,18	1,27	1,87	15,29	22,64	4,63	7,72	4,91	34	5	25	17,90	2,61
1955-56	1,69	3,91	1,49	2,74	12,13	22,64	5,59	6,96	6,15	41	8	11	19,30	7,69

A scrutiny of the statement will show that generally agricultural condition is still unsteady and as is dependant upon various factors, the figures of areas under respective crops show alternatively rise and fall. Forest area reaches the peak in 1955-56 though, in the previous years it is less by 67,000 of acres. This is really a queer figure because it is incredible that forest area can vary so widely from year to year. The area not available for cultivation also shows an upward trend and rises by another 1,03,000 acres from the 1952-53 figures to 1955-56

* *Vide* Bihar Statistical Hand-Book, 1955, pp. 24—26.

figures. The figure for other uncultivated land excluding current fallow falling in 1953-54 and 1954-55 again rises to the level of 1952-53 figure in the year 1955-56. Current fallow in 1955-56 also shows a distinct increase though it also reached a low figure in the preceding two years. Net area sown, however, records a steep drop in 1955-56 from the 1952-53 figure. From the figure for the area under *bhadai* crops in 1952-53, the two succeeding years fall perceptively but again leaps up in 1955-56 by more than 52,000 of acres. In 1952-53 the area under *aghani* crops was 8,26,000 acres but it shows a steady decline and reaches the figure of 6,96,000 acres in 1955-56. The area under *rabi* crops rises and falls alternately and reaches the figure of 6,15,000 acres in 1955-56 showing an increase of 1,24,000 acres more over the figure for preceding year though remaining much less than the figure for 1953-54 when it reached the figure of 6,90,000 acres. The area under fruits shows a decline in 1954-55 only but otherwise remains steady. The figure for the area under potatoes distinctly rises from 3,000 acres in 1952-53 to 8,000 acres in 1955-56. There is a marked fall in the figure for the area under vegetables including root crops, from 19,000 acres in 1952-53, 24,000 acres in 1953-54 and 25,000 acres in 1954-55, it falls to only 11,000 acres in 1955-56. The figure for the total sown area also fluctuates and after a marked fall of 2,09,000 acres in 1954-55 it again recoups and reaches the figure of 19,30,000 in 1955-56. The average, however, remains normal. The area sown more than once rises from 4,45,000 acres in 1952-53 to 7,69,000 in 1955-56 thus increasing in a very marked way. It, however, shows a decline only in 1954-55, i.e., 2,61,000 acres.

Agricultural Pattern.

A picture of agricultural pattern sixty years ago will be apparent from the following extract from the Final Report on the Survey and Settlement Operations in the Champaran District conducted by C. J. Stevenson-Moore, Esq., I.C.S., during 1892—1899 and published in 1900.

"The extent and percentage of net cropped area appropriated to each harvest, the area twice cropped, the total net cropped area, and the percentage of it that is irrigated are as follows :—

Bhadai.		*Aghani.*		*Rabi.*		Twice cropped.		Net cropped area.	Irrigated percentage.
Area.	Percentage of net cropped area.	Area.	Percentage of net cropped area.	Area.	Percentage of net cropped area.	Area.	Percentage of net cropped area.		
1	2	3	4	5	6	7	8	9	10
Acres.		Acres.		Acres.		Acres.		Acres.	
6,64,437	46	5,56,279	38	7,99,622	55	5,72,670	39	14,47,668	2

The most noticeable points with regard to these figures is the very large area under *bhadai* (46 per cent), the somewhat small area under *aghani* (38 per cent), the large area under *rabi*, and the large area twice cropped. These percentages, at first sight, might encourage the supposition that Champaran is a great *rabi* producing area like the south part of Tirhut bordering on the Ganges. But this is far from the truth. Much of the *rabi* area is covered with grass, *khesari* and other cheap crops, such as only the poorest will eat. It will, therefore, be necessary to examine the figures in further detail in order to arrive at a just idea of the district agricultural resources; but before doing so, a comparison of the figures already furnished with those returned by some neighbouring districts may not be without interest :—

Serial no.	Name of district.	Total area in acres for which statistics were prepared.	Net cropped area.		*Bhadai.*	
			Area in acres.	Percentage of total area.	Area in acres.	Percentage of net cropped area.
1	2	3	4	5	6	7
1	Champaran ..	20,79,815	14,47,668	70	6,64,437	46
2	Muzaffarpur ..	19,41,254	15,55,291	80	5,94,668	38
3	Gaya ..	3,72,508	2,46,734	66	15,288	6
4	North Monghyr..	30,359	24,410	80	8,938	37

Aghani.		*Rabi.*		Twice cropped.		*Irrigated.*	
Area in acres.	Precentage of net cropped area.	Area in acres.	Percentage of net cropped area.	Area in acres.	Percentage of net cropped area.	Area in acres.	Percentage of net cropped area.
8	9	10	11	12	13	14	15
5,56,279	38	7,99,622	55	5,72,670	39	27,829	2
7,47,606	48	9,36,039	60	7,23,022	46	29,828	2
1,34,252	54	1,50,320	61	53,126	21	1,37,934	56
8,031	33	12,354	51	4,913	20	87	3

Gaya is largely a one cropped district, and for its one crop depends mainly on artificial irrigation. The conditions of North Monghyr and Muzaffarpur are probably more similar than these figures would show. The North Monghyr statistics are for the Narhan estate only. The *bhadai* area in Champaran is very much greater than in Muzaffarpur, while the *aghani* area is smaller. Yet a local observer

would say, without hesitation, that Champaran is more distinctively a rice-growing district than Muzaffarpur. The explanation is that Champaran, being much exposed to inundation, grows much of its paddy as an autumn crop, and this accounts for the large area devoted to this harvest. The area under *rabi* and twice cropped is considerably less in Champaran than in Muzaffarpur, and at the same time it is less remunerative.

For the Champaran district taken alone the statistics of the relative importance of the different harvests and of irrigation are, thana by thana as follows :—

Serial no.	Name of thana.	Total area in acres.	Net cropped area.		*Bhadai.*	
			Acres.	Percentage to total area.	Area.	Percentage to net cropped.
1	2	3	4	5	6	7
1	Bagaha ..	3,96,272	1,98,823	50	86,010	43
2	Shikarpur ..	3,54,558	2,44,781	69	84,461	34
3	Bettiah ..	3,50,139	2,43,139	69	1,20,621	50
Total Bettiah Subdivision ..		11,00,969	6,86,743	62	2,91,092	42
4	Adapur ..	1,43,401	1,22,193	85	65,387	54
5	Dhaka ..	2,14,528	1,77,846	83	86,269	49
6	Motihari ..	1,85,180	1,31,337	71	62,716	48
7	Gobindganj ..	1,82,689	1,27,963	70	67,136	52
8	Kesaria ..	1,74,842	1,38,468	79	66,410	48
9	Madhubani ..	78,206	63,118	81	25,427	40
Total Sadar Subdivision ..		9,78,846	7,60,925	78	3,73,345	49
GRAND TOTAL ..		20,79,815	14,47,668	70	6,64,437	46

Aghani.		*Rabi.*		Twice cropped.		Irrigated area.	
Area.	Percentage to net cropped.	Area.	Percentage to net cropped.	Area.	Percentage to net cropped.	Area.	Percentage to net cropped.
8	9	10	11	12	13	14	15
76,192	38	1,06,529	54	69,908	35	7,002	4
1,23,593	50	1,31,498	54	94,771	39	11,204	5
93,072	38	1,24,748	51	95,302	39	622	..
2,92,857	43	3,62,775	53	2,59,981	38	18,828	3
48,423	40	78,624	64	70,241	57	4,976	4
64,072	36	1,13,420	64	85,915	48	2,942	2
33,317	25	82,966	63	47,662	36	1,044	1
43,871	34	63,080	49	46,124	36	37	..
50,453	36	60,813	44	39,208	28	..	..
23,286	37	37,944	60	23,539	37	2	..
2,63,422	35	4,36,847	57	3,12,689	41	9,001	1
5,56,279	38	7,99,622	55	5,72,670	40	27,829	2

feels at once the least failure of rainfall, and has no *rabi* crops of any value to look forward to help it to tide through the year following a short *aghani* harvest; whereas, in Adapur, the rich *bhadai* crop is reaped at the beginning of September, so that, even if the *hathiya* rains fail, it is no great matter while there is always the prospect of a good *rabi* crop on the high *bhadai* land later on. In the recent famine, Shikarpur was the thana first and most severely affected, and relief had to be continued there long after it had been closed in other parts. Adapur, on the other hand, was only comparatively slightly affected, so far as the cultivators were concerned, and in many parts of it very little relief had to be given. After Adapur, Bettiah and Bagaha return the largest percentage. The Bettiah subdivision is considerably larger than the Sadar subdivision, and its three thanas, if we ignore Adapur, contain the highest percentage under *aghani*, indicating the extent to which the northern half of this district is dependent on its rice crop. Adapur, too, belongs to the same physical division. In Dhaka Kesa[illegible]

The differences in the percentages of the two subdivisions are noticeable. Bettiah has 42 per cent under *bhadai*, the Sadar 49 per cent under winter crops, Bettiah has 43 per cent, while the Sadar has only 35 per cent but under *rabi*, on the other hand, the Sadar has 57 per cent, against Bettiah's 53 per cent, and the twice-cropped area in the Sadar is consequently greater than in Bettiah. The irrigated area in Bettiah subdivision is nearly 3 per cent as against only 1 per cent in the Sadar. The *aghani* harvest consists mainly, of course, of winter rice. It follows, then, that winter rice is a more predominating crop in the Bettiah than in the Sadr subdivision. A similar distinction has been noticed between the northern half and the southern half of Muzaffarpur; but there is this difference, that while in South Muzaffarpur, the large *bhadai* area is occupied largely by maize, etc., valuable crops themselves, which form the first crops to the better class of *rabi* crops, in South Champaran, the predominating *bhadai* area is largely covered with autumn rice, the second crop to which is often of an inferior class. Thus, to gain a clear idea of their respective resourcefulness in the face of adverse seasons, it will be necessary to compare the relative rice areas of the two districts irrespective of harvests.

A glance at the detailed thana statement will show that Adapur, with 54 per cent, and Govindganj, with 52 per cent of net cropped area under *bhadai*, show a very marked predominance of autumn crops. Adapur's chief autumn crop is early rice. Gobindganj has considerable upland, and at the same time subject to inundation early in the season. Bettiah, which also contains considerable upland comes next, then Dhaka, with 49 per cent, under *bhadai*, consisting mainly of early rice on the portion of it bordering on Adapur. It is noticeable that the *bhadai* area is only 40 per cent of the net cropped area in Madhuban, whereas it is 43 per cent in Bagaha. Madhuban, bordering on Tirhut, has little land exposed to early inundation, while the southern portion of Bagaha contains much *diara* where *bhadai* crops are grown. In the northern half of Bagaha, there are practically no autumn crops, and its condition approximate to those of Shikarpur, which returns only 35 per cent under this head.

Turning to the proportion of net cropped area under *aghani*, we find the above position largely reversed. Shikarpur heads the list with 50 per cent, and that Adapur does not end it, shows how remarkably fertile that thana is. On the contrary, we find Adapur in spite of its large *bhadai* area follows Shikarpur with 40 per cent or 2 per cent above the district average, under *aghani*. With reference to the contrast between the agricultural conditions in Shikarpur and Adapur, Mr. Kerr writes: "The importance of this contrast lies in the fact that it is well known that Shikarpur is the area in the district most liable to famine, while Adapur is always the least affected. Shikarpur, with its dependence on the *aghani* harvest,

1922, has dealt with the agricultural pattern in the following paragraphs :—

"*District area.*—It is unnecessary to enter again into the question of the district area which was dealt with at length in Mr. Stevenson-Moore's report. The area for which the statistics have been compiled in the present operations is precisely the same, though the figures obtained by summation of fields are, as might be expected, somewhat different from the figures of 1898.

The statement below compares the figures in acres for the two settlements :—

Thana.	Area, last settlement.	Area, present settlement.
Shikarpur	3,54,558	3,58,492

the officers of the next revision may expect again an increase of 20 per cent in the fields, and a corresponding fall in their average size. The areas of holdings are much more important, but unfortunately the present system of statistics does not give an accurate account of the facts. What we really require to know is the average size of a raiyat's holding. Under the present system figures are compiled for *khatians,* which do not necessarily, or in fact, represent complete holdings. In the first place a raiyat may have produce-rented land in addition to his cash-rented holding. He will therefore get two *khatians.* Again he may hold land in two villages and for each village he will get a separate *khatian,* or set of *khatians.* Finally the raiyat may have several "*jamabandis*" or the same joint family may have several *jamabandis* in different names, for all of which separate *khatians* are prepared. The statements based on *khatians,* therefore, do not enable us to measure the property of the raiyat, and I think it would be well in future operations, especially in view of the need for a reliable franchise roll, to prepare in addition to the *khatian terij,* a *raiyatwar terij* bringing together for each raiyat, or joint family, the whole of the land held by him or it. It may be urged, and it is conceded, that there are serious difficulties in the carrying out of this project. The facts remain, however, that our present statistics are defective in a most important particular, and that the compilation of such a *terij,* if difficult, is possible.

The cultivated area—Out of the total area, 20,77,735 acres of the district, 14,29,859 acres or 69 per cent are cultivated, while 6,47,875 acres or 31 per cent are uncultivated. These figures, of course, exclude the 290 square miles of hill and jungle in the north of the district that have not been cadastrally surveyed.

The following statement compares the results of the last and the present settlements :—

	Last. settlement.	Present settlement.
	Acres.	Acres.
Cultivated area	14,47,668	14,29,859
Percentage	70	69
Uncultivated area ..	6,32,147	6,47,875
Percentage	30	31
Total	20,79,815	20,77,735

While, for reasons already described, it is not practicable to adopt the nominal difference in cultivated area, i.e., 17,809 acres, as the real decrease in cultivation, the comparison of percentages shows beyond doubt that there has been a real decrease, though it is not

considerable. The explanation is simple enough. On the one hand, something over 8,000 acres of cultivated land has been acquired since the last settlement for railways and canals, and has thus become waste, and on the other hand, natural development has been arrested at first by the depression following the famine of 1897 and the set-back in population that it caused, and later by a long period of agrarian trouble which, it is hoped, has now ended. There have been additional causes in the disappointing immigration due to the threatening agrarian outlook, the evil repute of the climate in the thanas where there is most room for expansion, and the lightness of the soil in some of the central thanas.

The figures below compare the percentage of cultivated and uncultivated land in the several thanas in the two settlements :—

Thana.	Cultivated.		Uncultivated.	
	Last settlement.	Present settlement.	Last settlement.	Present settlement.
Shikarpur	69.04	67	30.96	33
Bagaha	50.17	49.50	49.83	50.50
Bettiah	69.44	71	30.56	29
Bettiah subdivision ..	62.38	62.33	37.62	37.67
Madhuban	80.70	77.50	19.30	22.50
Adapur	85.21	85.14	14.79	14.86
Dhaka	82.90	83.90	17.10	16.10
Kesaria	79.20	76.30	20.30	23.70
Gobindganj	70.04	65	29.96	35
Motihari	70.92	69.50	29.08	30.50
Sadar subdivision	77.74	76	22.26	24

The Bettiah subdivision, which furnished nearly all the land acquired for railways and canals, has maintained its percentage of cultivation, and in fact, there has been a decided advance in Bettiah thana. The Sadar subdivision, with the exception of the Adapur and Dhaka thanas, shows a decided decline.

The uncultivated area.—It has been seen already that 6,47,875 acres or 31 per cent of the district area is uncultivated.

Out of this 43,685 acres are current fallow, while 3,84,753 acres or 18 per cent, are cultivable. The area of current fallow has declined since the last settlement, while the area available for the

expansion of cultivation remains practically the same. Turning to the thanas we find that Bagaha has the enormous proportion of 34 per cent of its total area available for cultivation. There is similarly room for great expansion in Shikarpur and Bettiah, the available land being mainly either old fallow or cultivable jungle.

The question of grazing grounds.—There is one important consideration, however, that affects the expansion of cultivation. In parts of the district there is too little waste land left to furnish grazing grounds for village cattle, and the want is now evidenced by disputes between landlord and tenant on this subject. The Champaran Agrarian Committee noticed the want and recommended that reasonable areas of waste land should be set aside for cattle. The Bettiah estate has already taken steps on this recommendation, but it is practically certain that other landlords will not see their way to take similar action. In a well regulated agricultural community, it is reasonable to suppose that 10 per cent of the land would be set aside a grazing ground for cattle. Land suitable for grazing is ordinarily culturable, and the cultivable area is as we have seen 18 per cent. On this reasoning, it would appear that the area available for agricultural expansion, assuming that proper regard is paid to grazing facilities, is not considerable. The facts are however that, except in the Bettiah Estate *kham* and *thikadari* villages, the district will tend towards the system prevailing in most parts of North Bihar, by which all cultivable lands are gradually taken up, and cattle are mainly trough-fed. In any case the areas available for cultivation in the northern thanas are still very considerable, and it is to be hoped that the climate will improve with the advance of the plough.

Harvests and irrigation.—The following statement shows the distribution of area under the three harvests and the proportion irrigated according to the present and last settlements :—

Bhadai.		*Aghani.*		*Rabi.*		Twice cropped.				
Area in acres.	Percentage of net cropped area.	Area in acres.	Percentage of net cropped area.	Area in acres.	Percentage of net cropped area.	Area in acres.	Percentage of net cropped area.	Net cropped area.	Irrigated percentage.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
6,62,727	46	5,89,088	41	7,96,922	55	6,61,337	47	14,29,859	8	Present settlement.
664,437	46	5,56,279	38	7,99,622	55	5,72,670	39	14,47,668	2	Last settlement

The increased area under *aghani* crops and twice cropped is due to a large extent to the increased facilities for irrigation. The large figure for *rabi* requires a word of explanation, as it is deceptive. The *rabi* cultivation in Shikarpur and Bagaha, and to a less extent in Bettiah, is very careless and unproductive, as seeds are cast in the growing *dhan* and left without any further care to grow up a sparse crop when the *dhan* is removed. The crop experiments may illustrate this, as the *rabi* results in those thanas were almost negligible. The irrigated area has increased by about 300 per cent since the last settlement, the present area being 1,16,117 acres as against 27,829 acres. The figure 1,16,117 acres, however, does not give a complete idea of the irrigation system, as it covers only the area found irrigated by artificial means during the survey, which took place in a year of exceptionally favourable rainfall. I have already shown in paragraph 9 that the canal system now commands, and can irrigate, 3,06,800 acres, so that in reality 21 per cent of the net cropped area is entirely protected, or 52 per cent of the area under *aghani,* which is the main crop to be protected.

Wells—The fewness of wells in Champaran is striking. There are only 16,426 in the district, the Bettiah subdivision having only 5,537. The reason, of course, is the abundance of water available from other sources, lakes, rivers and *jhils.*

The Crops.

Rice—The officially recognized staple food crops of the district are rice and maize, the fluctuating values of which have been considered in a previous chapter. The area under rice has increased since 1898, the figures being last settlement 7,82,661 acres or 54 per cent of net cropped area, and present settlement 8,58,631 acres or 60 per cent.

The increase is due to the extension of irrigation. Rice is the chief crop of the district, and it is now so protected that a serious famine is impossible.

Bhadai crops.—After rice the chief crops of the autumn harvest are maize, which covers 1,59,984 acres or 11 per cent of the net cropped area, and *kodo,* which accounts for 1,19,681 acres or 8 per cent. The corresponding percentages at the last settlement were 8.28 and 7.75, so that there has been an increase here also. Indigo has practically disappeared, for causes that have been described already.

Aghani crops.—In the winter harvest again rice is the chief crop, accounting for 5,14,995 out of 5,89,088 acres. The only others that need mention are miscellaneous food crops (mainly *alua* and *suthni*) 23,638 acres, oil-seeds 17,103 acres, and sugarcane 19,688 acres of which the growing importance has been noticed in the first part of this report.

Rabi crops—The total area under the spring harvest is 7,96,922 acres, a figure which, for reasons already stated, is somewhat misleading. In this harvest there is much more even distribution among the crops. The most important figures are :—

	Acres.
Barley	1,67,335
Haldi	1,13,780
Wheat	1,07,182
Linseed	95,576
Arhar	66,457
Gram	61,934

The chief food crops of this harvest are barley and wheat. The percentages of the net cropped area under those in the two settlements are compared below :—

	Last settlement.	Present settlement.
Barley	14.79	11.70
Wheat	7.27	7.40

The differences do not call for any detailed investigation. Both crops are grown under precisely the same conditions, and are often mixed in the same field. The importance of the *arhar* crop is that it grows and thrives on very little cultivation, and under adverse conditions. It must be said, however, that in general the Champaran cultivator puts very little effort into his *rabi* cultivation, and gets a correspondingly small outturn, except in the manured *goenra* lands surrounding the homestead. This inferior cultivation was especially marked in comparison with the very careful and productive tillage of the Saran District. Excluding the cultivation of the Factories, the rabi outturn of the former district does not average much more than half the yield of the latter.

Production and export—The railway system has opened out the export trade of the district, and as might be expected, the chief articles of export correspond to the crops under expanding cultivation. At the last settlement rice occupied 54 per cent of the net cropped area. It now occupies 60 per cent and constitutes 37 per cent of the exports from the district according to the figures for 1900 to 1910. Oil-seeds in 1898 occupied 6.50 per cent of the net cropped area. They now occupy 14 per cent and account for 34 per cent of exports.

Regarding irrigation in his time Mr. Sweeney had come to certain definite conclusions as will be seen in the following paragraph :—

Protection of cultivation.—Although it cannat be said that Champaran is immune from damage by floods, a successful attempt

has been made to confine the Gandak by an embankment some 62 miles long extending down the western border of the district. This work is maintained on the contract system at an expenditure of approximately Rs. 20,000 per annum, and protects an area of 267 square miles. On the other hand, strides have been made in the extension of irrigation facilities. The north and east of the district contain a large proportion of *bangar* soil, which grows winter rice, and is peculiarly suited to irrigation. It is in this area that the canals operate, the south and west of the district, on the other hand, having a preponderance of upland with a light soil, which the people consider unsuited to artificial irrigation. The district is ordinarily blessed with abundant rainfall, but when it is either below the requisite quantity, or badly distributed, the winter rice crop is endangered. It may be said that with the irrigation facilities now existing the district is practically immune from famine on an extensive scale. There are now three main canals :—

(1) The Tribeni Canal, which traverses in the whole north of the district from Tribeni Ghat to Mainatand.

(2) The Tiur Canal, which runs almost due south towards Lakhaura from Chauradano.

(3) The Dhaka Canal, which runs south and west from the vicinity of Bairagnia Station.

The Tribeni Canal was designed to irrigate that portion of the district to the west of Motihari which is bounded by the Nepal frontier and the Sikrahana river as far east as the boundary between Bihar and Nepal runs north and south. It was partly constructed in the year 1897 as a famine relief work, and was again taken up in 1901. The first portion was opened on the 7th June 1909, and the extension of the irrigation has gone on continuously since in a series of lengthy distributaries running south. Nearly 62 miles of the main canal have now been constructed, and there is a suggestion of a further extension from Mainatand south towards Sathi in order to cover the area previously served by the Sathi *pains,* the history of which will be found in the chapter on Attestation.

The Tiur Canal, which takes off from the river of the same name was originally made mainly at the expense of the Madhuban Babu and other zamindars. It was completed in 1879 at a cost of Rs. 72,926 of which Government paid Rs. 6,881. It was taken over by Government in 1886, and has been maintained since that time from provincial revenues. The construction of distributaries was taken up after the famine of 1897, and completed in 1905-06. There is now a project for the construction of an extra distributary towards Lakhaura, for which 49 acres of land have been acquired. This canal traverses what is perhaps the most fertile tract in the District.

The construction of the Dhaka Canal was commenced in 1896-97 as a famine relief work, because the rice crop had failed almost

entirely in thana Dhaka in the famines of 1873 and 1896, and much expenditure had been incurred on relief. The canal and its distributaries were completed in March 1908.

One further irrigation work, which has a chequered history and is longer in operation, remains to be described. The Masan *pain* in the Ramnagar Raj was constructed at the expense of Government as a famine relief work in 1897-98. The Collector found that the demand was greater than the supply of water, and that there was consequently much jealousy and bickering about it, and that the interests of the Ramnagar raiyats were being neglected. A meeting was held in the Collector's house in June 1899 which was attended by the Collector, the Inspector of Works, and some European zamindars whose interests were concerned. It was agreed that the management of the work should be vested in the District Engineer, and that the sum of Rs. 800 annually required for the maintenance of the *pain* should be paid by the Raja Ramnagar and Messrs. Bion, Marsham and Coffin in proportion to the benefit derived from irrigation by their respective villages. Again in May, 1900, the Collector and the District Engineer met the parties requiring water for irrigation at Bettiah, and an arrangement was made whereby the *pain* was divided into five sections, and the parties agreed to contribute the costs according to the area irrigated. The subscriptions for maintenance amounted in 1901-02 to Rs. 1,786, in 1902-03 to Rs. 1,409, in 1903-04 to Rs. 1,886, in 1904-05 to Rs. 803. In this year the dissolution of the arrangement began. The decrease of income was due to conflicting claims for water, which the Collector fruitlessly endeavoured to settle by compromise. In 1905-06 only Rs. 228 was contributed out of a total assessment of Rs. 2,853, and the Collector proposed to give up the management. From this year the *pain* was practically closed. As no subscriptions were paid the Collector gave up the management, and the head villages seized all the water. This work was extremely useful during the short period when it was in operation, and it is to be regretted that the suggestion that it should be taken over by the Public Works Department has not materialized.

The areas commanded by the the three working canals are as follows :—

	Acres.
Tribeni Canal	2,84,800
Tiur Canal	6,000
Dhaka Canal	16,000
Total	3,06,800

The great importance of this protection will be realized from the fact that, assuming an average outturn of 15 standard maunds per

acre, it ensures an annual yield of 46,02,000 maunds of paddy, or roughly two maunds per head of the total population of the district.

Besides irrigation from canals mentioned, there were also irrigation from private canals, tanks and *ahars* and other sources. The following statement of the irrigated area and how irrigated appears in Appendix I of Mr. Sweeney's Settlement Report :—

Name of thana.	Irrigated area.	Irrigated area and how irrigated.				
		Irrigated from wells.	Irrigated from Government canals.	Irrigated from private canals.	Irrigated from tanks and *ahars*.	Irrigated from other sources.
1	2	3	4	5	6	7
	A. D.	A. D.	A. D.	A. D.	A. D.	A. D.
Shikarpur ..	43,481 41	313 30	5,561 08	33,643 54	441 48	3,522 01
Bagaha ..	49,936 33	9 10	29,035 42	15,368 44	303 61	5,219 76
Bettiah ..	600 56	14 96	..	258 16	65 00	262 44
Total ..	94,018 30	337 36	34,596 50	49,270 14	810 09	9,004 21
Madhuban ..	53 60	9 34	..	..	31 26	13 00
Adapur ..	8,976 01	175 54	1,209 37	1,330 72	1,160 70	5,039 68
Dhaka ..	10,298 96	67 32	6,507 99	1,280 81	1,629 43	813 41
Kesaria ..	12 89	12 89	..	..	..	..
Gobindganj ..	811 71	720 20	..	2 48	88 55	0 48
Motihari ..	1,945 78	291 09	..	826 78	571 64	256 27
Total ..	22,098 95	1,276 38	7,777 36	3,440 79	3,481 58	6,122 84
Grand Total	1,16,117 25	1,613 74	42,373 86	52,710 93	4,291 67	15,127 05

After Mr. Sweeney's Report in 1922, there had not been any other similar intensive survey of agricultural condition in the district. Yet, gleaning stray figures from here and there one can easily visualise that there has not been any fundamental changes in agricultural pattern. The district as in the past continues to remain primarily agricultural with its age old pattern, of course, with a few

modifications at places. If the present figures of cultivation are examined, it will be found that the average net area sown in 1951, viz., 14,77,094 acres is slightly higher than in 1921 when the average net area sown was 14,29,360 acres. The intervening two decades suffered on eclipse and the figures for 1931 and 1941 show marked fall than in 1951 and 1921. In 1931, the average net area sown was 13,63,220 acres and in 1941 was 13,97,660 acres. It shows that cultivation in the district has recouped its position somewhat, which it suffered during the post-depression and World War period.

The case with the average area sown more than once during the same period is just the opposite. In 1921, 5,23,140 acres were the area sown more than once, as against 6,00,940 acres in 1931, 6,01,720 in 1941 and 4,21,009 acres in 1951. This is a disturbing trend because the fall in figure is markedly lower than not only 1941 and 1931 figures but also from that of 1921. Excepting in 1931 when the average net area irrigated was 1,25,496 acres the irrigated acreage showed a regular increase from 1921 onwards where only 95,758 acres were under irrigation, as against 1,31,553 acres in 1931 and 1,67,781 acres in 1951. It is apparent from this that the cultivator is more and more becoming irrigation-minded. But the most disturbing feature is the rapid and steady fall in the area of cultivation per capita since 1921. In 1921 the area of cultivation per capita was 74 per cent whereas in 1931, it was 64 per cent, in 1941, 58 per cent and in 1951, 59 per cent. The growth of human population has been the main factor responsible for this trend. And it is bound to be lesser and lesser in the near future if the growth of population remains unchecked.

In 1951 there were 22,74,112 (including unsurveyed areas) acres, the total geographical area of the district, out of which net area sown comes to 14,77,094 acres, area sown more than once to 4,21,009 acres, current fallows 1,81,923 acres, area under orchard 39,972 acres, culturable waste 1,12,811 acres and area not available for cultivation 4,62,312 acres, respectively. In 1956-57 the figures returned 14,42,000 acres as net area sown, for area sown more than once 4,27,000 acres, current fallows 1,60,000 acres, culturable waste 1,04,000 acres and area not available for cultivation 2,96,000 acres, respectively. The changes are, therefore, very nominal, fluctuating only to the extent of a few thousands either way. More area was brought under cultivation in 1956-57 than in 1951. But the net area sown in 1956-57 is lesser than in 1951 by more than 30,000 acres. This is certainly disturbing but it is not a regularly downgrading trend, since in 1953-54 more area was sown, i.e., 15,43,000 acres, 1954-55 15,29,000 acres and in 1955-56 only 12,13,000 acres, respectively. The low figure sown in 1955-56 has been recouped as is evident from the figure quoted for the year 1956-57 shows an upward trend. It is a fact that in spite of increased irrigational facilities that were available 30 or 40 years back, agriculture in Champaran alike rest of Bihar is subject to the vagaries of monsoon.

Among the different crop seasons, *aghani* generally occupies greater acreage than *bhadai* or *rabi*. But there are years when *aghani* is closely followed by *rabi* and *bhadai*. In 1953-54 *aghani* occupied as much as 7,94,000 acres as against 4,44,000 acres by *bhadai* and 6,90,000 acres by *rabi*, respectively. This is the general trend of the different crop seasons now. In 1954-55, *bhadai* covered 4,63,000 acres and *aghani* and *rabi*, 7,72,000 acres and 4,91,000 acres, respectively. It will be marked here that the drop in *rabi* acreage is very great, in *aghani* it is little, whereas *bhadai* shows an increase over the previous year. In 1955-56, *bhadai* covered 5,59,000 acres as against 6,96,000 acres covered by *aghani* and 6,15,000 covered by *rabi*, respectively. Though there is an up and down process in the respective acreage, the fact is that *aghani* generally occupies the longer acreage.

The break up figure cropwise of 1951 when compared to the acreage under different crops it will be found that in 1956-57 rice, wheat, *khesari*, tobacco, potatoes and *marua*, though show a variation but that is not so marked as those in gram, barley, maize, *masoor*, peas, sugarcane and jute. The cash crops are being cultivated more widely in recent years than in the past. Indigo and opium are, of course, completely out of the picture now. But the cultivation of sugarcane and jute especially the former has increased enormously and bringing hard cash to the reach of the cane-growers. Jute cultivation is rather a late introduction but now sufficient attention is being paid to widen the scope of further cultivation of this crop, especially since India lost the jute growing areas of East Bengal to Pakistan.

The discussion of these figures in such detail is necessary to indicate the relative importance of different crops. It has also to be noted that the cultivators nowadays enjoy better and more improved facilities of irrigation than their predecessors. The canals, both Government and private, are still the main sources of irrigation, other sources which include modern improvements like tube-wells come next in importance, tanks and wells come third, far behind them. On an average 2,00,000 acres are annually irrigated. The yearly acreage under irrigation differs on the success or failure of monsoon, as in the past.

The regions which used to grow different crops in different seasons during the two settlement operations are still cultivating in the same manner. Only, as a change there are now more pockets of intensive cultivation of sugarcane nearabout the nine sugar factories in the district. Wherever there is a sugar factory, the immediate neighbourhood is found cultivating more sugarcane than anything else. But other crops like rice, wheat, barley, etc., are still the main items of cultivation where they used to be cultivated in the past.

LAND RECLAMATION.

Earlier Champaran was very sparsely populated and it had vast stretches of uninhabited waste land. We find description of such uninhabited strips of land in the old English Correspondence Volumes preserved in the Record Room of Motihari till as late as sixties of the last century. Letter no. 97, dated the 21st May 1860, from the officiating Joint Magistrate, Champaran, to the Commissioner of Circuit, Patna, mentions: "..... between the forests and sugarcane of Lawrea and Rutwal and Bagaha is a space of country, some 40 to 50 miles long by 10 to 15 miles broad, comparatively speaking, waste and uninhabited....." But since then the district has had a very heavy influx of immigrants, specially in the late seventies and eighties of the last century. Most of the immigrants came to have their permanent abode in the district. Now there is no such vast strip of land lying waste and uninhabited in the district and whatever waste lands there are, they are gradually being brought under the plough under the pressure of food deficit in the country. The figures quoted previously from the Statistical Hand Book of Bihar, 1953, indicate that there were only 148 thousand acres of land under the head "Other uncultivated land excluding current fallow".

A separate section, known as Waste Land Reclamation under an officer is functioning in the district since 1951. In order to facilitate reclamation of land the Government has made a provision to advance Land Improvement Loan to the cultivators at the rate of Rs. 50 per acre of the land proposed to be reclaimed. Whatever lands have been reclaimed in the district, have been reclaimed by manual labour.

Statement showing the amount of Land Improvement Loans and Agriculturists' Loans distributed on reclamation of waste land and area of waste land reclaimed in Champaran during 1951—1956.

Year.	Amount of land improvement loans distributed.	Amount of agriculture loans distributed for purchase of tractors and other implements.	Area of waste land reclaimed (by manual labour in acres).			Total.	By State tractors with assistance of land improvement loans (in acres).	GRAND TOTAL.
			With assistance of land improvement loans.	With assistance of agriculture loans and official initiative.	By application of Bihar Waste Land (Reclamation, Cultivation and Improvement) Act, 1946.			
1	2	3	4	5	6	7	8	9
	Rs.	Rs.						
1951-52	1,08,159	Nil	4,179	Nil	Nil	4,179	Nil	4,179
1952-53	17,270	Nil	862.00	Nil	Nil	862.00	Nil	862.00
1953-54	90,000	62,166	32,06.48	Nil	Nil	32,06.48	Nil	32,06.48
1954-55	1,00,582	17,000	11.00	Nil	Nil	11.00	Nil	11.00
1955-56	1,05,675	1,49,000	31,93.12	Nil	Nil	31,93.12	Nil	31,93.12

Agricultural Seasons.

The main agricultural seasons are three, *aghani, bhadai* and *rabi*. *Aghani* season starts by the end of June or in the beginning of July when *aghani* rice is sown broadcast on the selected piece of land meant for seed nurseries. Seed sowing is followed by transplantation. Then the plant is left to mature with the help of water till the end of September when the water is drained off and the field is allowed to dry for about 15 days. The late rains of *hathiya* again fill the paddy fields which help the paddy attain maturity. The paddy is the main crop grown in this season. The paddy comes to maturity in November or December when the harvesting begins. Other crops grown during *aghani* season are *alua, janera* (*aghauwa*) and sugarcane. *Bhadai* season starts from the beginning of June and lasts till the 15th of October. The main crop grown during this season is *bhadai* paddy.

Other Crops.

Other crops grown during this season are *makai, marua, sama, kodo, janera* (*masuria*), *urid, china,* hemp flax, etc. The *rabi* season starts just after the *hathiya* rains and lasts till the middle of April. As a matter of fact preparation of land for *rabi* begins from the time of early rains and sowing starts just after the rainy season. Generally *rabi* crops are sown from the beginning of *Chitra nakshtra* (8th to 20th October) to the end of *Siwati nakshatra* (21st October to 3rd November). Harvesting season begins by the last week of February and lasts till the middle of April. Crops grown during this season are wheat, barley, oats, *arhar, khesari,* gram, peas, potatoes, *masuri, kerao,* linseed, cotton, mustard, tobacco, etc.

Soils.

For the purpose of soil study the district can be divided into two parts, i.e., the area falling to the north of river Sikrana and the area falling to the south of it. The Sikrana is an important river in the district flowing to the south-easterly direction. This river passes through the centre of the district. Gandak is another important river which forms the western border of the district and the soil of great natural fertility in the vicinity of its course is alluvial and very fertile.

North of Sikrana three types of soils are found, namely, *bangar, babhani* and *baldhus*. *Bangar* is a hard clay soil which predominates this area. This is particularly good for winter paddy and is suited to irrigation. *Babhani* is a thin reddish loam which bears crops of maize, barley, gram, other pulses and oil seeds. Paddy does not grow on this soil. *Baldhus* is a light loose sandy soil, fit for only maize and inferior millets. This is the least fertile soil.

South of Sikrana, broadly speaking two types of soils are found, that is *bhith* and *dhanhar*. *Bhith* is the upland soils and predominates the locality. *Dhanhar* is the large marshes (chaurs) where

paddy is gown. This is confined to a comparatively small area. The upland or *uparwar* as it is also called by the inhabitants, is further divided into the following classes :—

(*a*) *Dhobini,* (*b*) *Goenra,* (*c*) *Bhath,* (*d*) *Baldhus,* (*e*) *Dub.*

Dhobini, meaning bleached, corresponds to *babhani* in the northern tract. *Goenra* is the upland soil close to village and is specially manured by cow-dung and is consequently very fertile. This is also known by the name *chaumas.* This is usually parcelled out into small plots, and almost every holding will be found to contain a portion of it. *Bhath* is a land periodically visited by flood and enriched by silt deposits. *Baldhus* is a light loose soil, in which sand predominates as its name denotes. *Dub* is low sandy lands on the riverside, which stagnant flood-water converts into marsh and on which a coarse paddy called *boro dhan* is grown.

Principal Crops.

As stated earlier the total cropped area of the district in the year 1952-53 was 1,944 thousand acres as against 19,30,000 acres in 1955-56 out of which 445 thousand acres were cultivated more than once as against 7,69,000 acres in 1955-56 and hence the net cropped area of the district was 1,499 thousand acres or 80 per cent of the total area of the district in 1952-53 as against 12,13,000 acres or 62.9 per cent in 1955-56 excluding the hills and forest areas. The following table mentions the acreage under principal crops in the district from the years 1952-53 to 1955-56 :—

Table V.

(*In thousands of tons.*)

	Paddy—autumn and winter.	Wheat.	Gram.	Barley.	Maize.	Masoor.	Arhar.	Khesari.	Peas.	Sugarcane.	Tobacco.	Potatoes.	Jute.	Chillies.	Marua.	Year.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1,026	85	36	144	118	77	46	58	13	92	1	3	21	*	20	1952-53
2	966	102	35	264	105	78	45	57	14	84	1	5	10	*	6	1953-54
	960	84	32	143	107	56	35	44	12	94	1	5	11	*	6	1954-55
	905	122	39	202	117	64	35	69	16	143	1	8	20	Nil	Not given.	1955-56

*Negligible.

1. *Vide Bihar Statistical Hand-Book,* 1953.

2. *Vide Bihar Statistical Hand-Book,* 1955, pp. 34—36.

Among food-crops paddy occupies the most important place. Next comes barley and then maize. Among the non-food-crops sugarcane occupies the first place and then jute.

A table is given below which shows the output of principal crops in the district from 1952-53 to 1955-56 :—

TABLE VI.

(In thousands of tons.)

Rice autumn and winter.	Wheat.	Gram.	Barley.	Maize.	Masoor.	Arhar.	Khesari.	Peas.	Sugarcane.	Potato.	Tobacco.	Jute.	Chillies.	Year.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
2,85	19	10	20	28	12	12	10	3	77	5	*	27	*	1952-53	1
2,53	22	5	40	13	9	10	10	2	7,56	7	Negli-gible.	13	Negli-gible.	1953-54	2
2,23	16	7	21	19	5	8	8	3	6,82	8	Negli-gible.	19	Negli-gible.	1954-55	
2,06	33	8	45	15	7	9	5	3	7,62	11	Nil	41	Nil	1955-56	

On the face of them some of the figures in Table V and Table VI from Bihar Statistical Hand-Books lead to some confusion. It is true that with our undeveloped technique and personnel for Statistical Survey we cannot expect very accurate figures. But the acreage under jute and sugarcane would not bear any comparison with the output figures in thousands of tons. It is possible that there might have been a shortfall in the output of a particular crop for some reason or other. But even with this margin it is not understood why there should be a very small increase in the output when there has been a considerable increase in the acreage. It has been difficult to strike any workable ratio between the two tables and at least the figures can only give us a picture of the maize crops and some idea of their acreages. In spite of the somewhat vagueness of the figures it would be worthwhile to go into the matter deeper.

Paddy.

Paddy occupying 1,026 thousand acres or nearly 69 per cent of the net cropped area in 1952-53 as against 905 thousand acres or 74.6 per cent of the net cropped area in 1955-56 is all-important crop of Champaran. This consists of *aghani* paddy and *bhadai* paddy both. Aghani rice is grown on the greater part of land. The largest paddy-growing tract is comprised within the Adapur, Shikarpur, Dhaka,

*Less than 500 tons.

1. *Vide Bihar Statistical Hand-Book* 1953, page 30.
2. *Vide Bihar Statistical Hand-Book* 1955, pages, 38—40.

Bagaha and Bettiah thanas. In the Tarai tract to the north of the district paddy is almost the only crop grown by the Tharus.

In June or July after the commencement of the rains rice is sown broadcast on lands ploughed previously for three or four times. This is called seed nurseries. When the young plants are about a foot high they are generally transplanted in rains in another field, in which the soil has been puddled. Till towards the end of September the plant is allowed to grow with the aid of water. Then the practice known as *nigar* is resorted to and the water from the fields is drained off and the field is allowed to dry for 15 days. The late rains of *hathiya* is awaited eagerly, for its failure is bound to bring a calamity unless irrigational facilities are available. The rice comes to maturity in November or December when harvesting begins.

Sometimes paddy is sown broadcast in *chaurs*. This sort of paddy is generally very long and does not sink in water even in heavy inundations as the plant grows with water. It is sown in the month of February as soon as the low land dries up. It is commonly reaped from beats.

A noticeable feature of paddy cultivation is the arrangement of *nakshatra* according to which the different phases of paddy cultivation is conducted. These *nakshatras* are calculated according to phases of the moon and vary slightly from Gregorian calendar dates—the greatest variation is only for five days. Seeds are sown in the seed beds in *Adra nakshatra* (20th June to 5th July), transplantation is done during *Punarbas, Pukh* and *Asres nakshatras* (18th July to 15th August), *nigar* or draining of water from the field is done during *Utra nakshatra* (12th to 25th September), after which the heavy rains of *Hathiya nakshatra* (26th September to 7th October) is awaited. During *Chitra nakshatra* (8th to 20th October) it is customary to keep the fields wet; again to drain off the water at the commencement of *Siwati nakshatra* (21st October to 3rd November) and to leave the paddy on itself till the *Bisakha nakshatra* (4th to 15th November) after which harvesting begins. This schedule is religiously followed with slight variation according to the early or late commencement of monsoon.

Barley.

Barley is a *rabi* crop and is harvested in March or early April. It is grown on uplands. It is the single crop most extensively grown in the district after paddy. It occupied 144 thousand acres or 9.60 per cent of the net cropped area in 1952-53 as against 2,02,000 acres or 16.6 per cent of the net cropped area in 1955-56. It is a common edible food-crop. It is taken in the form of bread or *sattu* (flour). Its *sattu* is consumed with pleasure even by those who can afford better food. The output is poor in respect of quantity and quality both. The reason is poor cultivation for *rabi* done by the cultivators of this district in general.

under this crop was estimated to be only 11,000 acres. However, this did not last long and sugarcane began to replace indigo as early as in the beginning of the current century. The area increased to 13,000 acres in 1906 and in 1930 the approximate area under this crop was estimated to be 21,000 acres. Now, as stated above, the area under this has increased to 92,000 acres and cultivation of indigo has completely died out from the district. Several Cane-growers' Co-operative Societies have been established in this district which look after the grievances of cultivators. Through this agency extension of area under this crop is also affected.

Other Non-food-crops.

Among other non-food-crops jute and tobacco are important. Both these are cash crops and are grown only to be sold out. Climatically this district is not suited for jute cultivation. It is grown only because it fetches good price to the cultivators, although after the close of the Korean War price of jute suffered a severe slump.

Maize.

Maize is the third important in the district from the acreage point of view. This occupied an area of 118 thousand acres or 7.87 per cent of the net cropped area in 1952-53 as against 1,17,000 acres or 9.6 per cent of the net cropped area in 1955-56. It is a *bhadai* crop and is harvested in September. It is suited to the upland soil and hence, extensively grown in the south of the district. It keeps the *ryot* going for about four months in the year. It is eaten, when fried, for breakfast, when boiled as *bhat* for dinner and when made into bread for supper. It is also taken in the form of *sattu*. However, there is no hard and fast rule as to in what shape it is to be taken at which period of the day. When still only ripe, it is slightly fried and is rubbed with oil and lemon, sprinkled with salt and pepper and is eaten even by the well-to-do with much relish.

Wheat.

The area under wheat was 85 thousand acres or 5.67 per cent of the net area sown in 1952-53 as against 1,22,000 acres or 10 per cent of the net cropped area in 1955-56. It is most valuable of all the *rabi* crops. In the old District Gazetteer of Mr. O'Malley (1907) it was mentioned as *Devanna* or the food for the gods. It is a crop which requires good attention. It is usually grown on the lands in the vicinity of rivers or in the paddy fields from which paddy is washed away in floods. Poorer class of people generally grow it for sale.

OTHER FOOD-CROPS.

Among other food crops *masoor, khesari, arhar,* gram, *marua,* peas and potato are important. All these excepting *marua* are pulses and are generally consumed as a supplement to the principal food-corn of the people. However, some of these pulses, like gram, *arhar,* etc., are also consumed by the poorer class of people as their principal food. Gram is generally consumed by them in the form of *sattu*. *Marua* is consumed by the poorest class of the people. Potato solves the problem of vegetables to a great extent.

NON-FOOD-CROPS.

Sugarcane.

Among the non-food-crops sugarcane is the most important. This occupied 92 thousand acres of land or 6.67 per cent of the net cropped area in 1952-53 as against 1,43,000 acres or 11.7 per cent of the net cropped area in 1955-56. It is a crop which keeps the field engaged for the whole year. Most of the cane-growers supply it to big factories, while a few crush the cane at their own instance and sell out the product in the shape of *gur* and allied bye-products. Much earlier the cultivation of sugarcane was quite considerable, but later on it gave way to indigo cultivation and many of the concerns that were started as sugar factories gave up manufacture of sugar when indigo proved to be more profitable. This went so far that at the time of survey and settlement during 1892—1899 the area

Name of fruits.	Varieties.	Area covered (in acres.)	Yield per acre.
2. Lichi ..	*Purbi, deshi, bedana* and *china* ..	6,000	150 to 200 Mds.
3. Lime and Lemon.	(*i*) Malta—*Mosambi* ..	..	..
	(*ii*) Orange—*Nagpuri* ..	..	..
	(*iii*) Lemon—*Kagzi, bedana* and *banarsi.*	6,000	150 to 200
	(*iv*) Sweetlime—*Nepali* ..	..	..
4. Guava ..	*Allahabadi, banarsi* and *deshi* ..	6,000	50 to 150
5. Banana ..	*Malbhog, martaman, china* and *batisa*	700	400
6. Plum ..	*Banarsi, nagpuri* and *deshi* ..	2,000	150 to 200
7. Pears ..	..	100	50

MARKETING OF FRUITS AND VEGETABLES.

Most of the surplus fruits and vegetables are sold in the *hats* and markets of the locality, where they are grown. This district does not generally export outside the district any fruits or vegetables excepting mango and *lichi* fruits. As a matter of fact, this district is deficient in respect of vegetables and it imports vegetables like onion, potato, etc. Such fruits which are exported outside the district are generally sold on contract basis in the very garden where they grow. The greatest defect in the marketing system of surplus fruits is that they are not properly graded before they are sold. They fetch very little price due to their perishability.

Approximately 26,000 maunds of mango and 2,000 maunds of *lichi* are annually exported outside the district.

HOLDINGS.

In his Final Report on Survey and Settlement Operations (1892 to 1899) Mr. C. J. Stevenson-Moore has observed that the average size of a holding in this district was 5.19 acres or more than double of that in Muzaffarpur. This was not equal between the two subdivisions of Bettiah and Sadar in the district as the average size of a holding in Bettiah subdivision was of 6.11 acres while in Sadar it consisted of only 4.44 acres. The average size of a holding is connected with the density of population—the more dense the population the lesser is the average size of a holding and *vice versa*—and hence the average size of a holding in the district differed from one subdivision to another subdivision and also that the average size of a holding in this district was found to be greater than that of its adjoining districts of Muzaffarpur and Saran. In the Final Report on the Survey and Settlement (Revisional) of 1913—1919 Mr. Sweeney has given some statistics concerning the records of rights and from those statistics it appears that the average area of a holding in the district was 3.57 acres. This average area of a holding considerably differed from one subdivision to another subdivision. The average area of a holding in Sadar and Bettiah subdivisions was of 2.90 and 4.36 acres, respectively, as against 4.44 acres and 6.11 acres, respectively, calculated during the Survey and Settlement Operations of 1892—1899. This may suggest a rapid fall in the average area of a holding within a period of somewhat two decades. But here it may be mentioned that in his Final Report on the Revisional Survey and Settlement Operations (1913—1919) Mr. Sweeney has observed, "The areas of holdings are much more important, but unfortunately the present system of statistics does not give an accurate account of the facts. What we really require to know is the average size of a *raiyat's* holding..... The statements based on *khatians* therefore do not enable us to measure the property of the *raiyat*..... The facts remain, however, that our present statistics are defective in a most important particular,

.....". Here again we find that the average area of a holding in this district was even at the Revisional Survey and Settlement bigger than the average area of a holding in the districts of Saran and Muzaffarpur.

Since 1919 there has not been any survey and settlement in the district and it is difficult to have an accurate account of the holding. With the census of 1951 a separate *District Census Hand-Book* was prepared for every district of Bihar which gives some information with regard to holdings. A table is given below from the District *Census Hand-Book of Champaran* which gives an idea of the size of holdings in the district :—

TABLE VII.

Distribution of 1,000 *agricultural holdings by size of holdings (based on sample survey of size holdings,* 1952).

Up to 0.50 acre	281
Exceeding 0.50 acre and up to 1 acre	172
Exceeding 1 acre and up to 2 acres	216
Exceeding 2 acres and up to 3 acres	103
Exceeding 3 acres and up to 4 acres	59
Exceeding 4 acres and up to 5 acres	49
Exceeding 5 acres and up to 10 acres	78
Exceeding 10 acres and up to 15 acres	22
Exceeding 15 acres and up to 30 acres	16
Exceeding 30 acres and up to 50 acres	4
Exceeding 50 acres	Nil.

On the basis of the abovementioned Table VII it is difficult to find out the exact average area of a holding in the district or in the subdivisions. Nevertheless, it gives an idea of the size of holdings in the district. The greatest number of holdings are of the size of up to .50 acre and next comes the position of the holdings of the size of 1 acre to 2 acres and then comes that of .50 acre to 1 acre. It will be seen that the size of more than 77 per cent holdings are of below 3 acres. As a holding may consist of several plots of land scattered over the whole village or even in several villages, the size of plots of land must be of a smaller size than of a holding. This presents a somewhat distressing feature of agricultural economy and suggests the holding to be uneconomic. The size of an average holding will go on reducing because of the present laws of succession will continue.

AGRICULTURAL OPERATIONS.

Agricultural operations generally vary according to the type of crop to be sown. It also depends on the type of soil and the rainfall. Agricultural operations consist of hoeing, ploughing, pulverising, manuring, seed sowing, transplantation, weeding, interculturing,

irrigation water draining, earthing up, insecticide spraying, watching the crops, harvesting, threshing and storing. Besides, permanent improvements made in the fields like bunding, levelling, trenching, reclaiming lands for cultivation, etc., may also be taken as agricultural operations.

Hoeing.

Fields generally to be sown with paddy are hoed with the help of a spade, locally known as *kudal.* Such sugarcane fields are also hoed in which the cultivator does not want to remove the roots and replant sugarcane in it but to allow the sugarcane to grow from the roots. It is also resorted to in such fields the soil of which may be so stiff as not to be easily ploughed. Hoeing is generally done in a double cropped field after the *rabi* of small importance, such as *khesari, masoor,* gram, etc., is harvested and in a single cropped fields of paddy after the harvesting of paddy. On the average one labourer can hoe an area of 2 *kathas* to 3 *kathas* per day. But as hoeing is preferred to be done in the forenoon, the area hoed by an average labourer does not exceed 1 to 1½ *kathas.* When the soil is upturned by hoeing, the remains of the preceding crop goes under the soil and acts as a kind of manure. Hoed fields of paddy are only harrowed after heavy rains to make the field fit for transplanting paddy.

Ploughing.

In order to open the land, to dig out deep-rooted weeds or stubles, to irrigate the soil and to trap and store water for crops a field is ploughed every year. Generally a field is ploughed twice but when valuable crops like wheat, sugarcane, tobacco, etc., are to be sown in the fields, it is ploughed several times and ploughing continues till the soil becomes so loose as to allow a bamboo stick to go in it about half a foot without being hardly pressed. Seed nurseries are also ploughed with meticulous care and every clod is reduced to almost dust. Ordinarily, one plough opens up about 15 to 16 *kathas* of land in a day. However, the area varies according to soil, season, cattle used and the depth to which land is to be opened.

Pulverisation.

After ploughing, the soil of a field is generally allowed to dry, specially in the case of a field which contains more moisture than is considered necessary for a particular crop. Ploughing is followed by pulverisation. It is done with the help of harrow, locally known a *chauki* or *henga,* made of either wood or a pair of bamboo pieces clogged together. In case of hoed fields or the fields containing hard soil, wooden harrow is used as it is generally heavy enough to crush the clods. In respect of light soils, harrow made of bamboo is used. The harrow is pulled by one pair to several pairs of bullocks, the number of bullocks varying with the size of the harrow. A few persons sit on the harrow and bullocks pull it. In case of hoed field

sometimes pulverisation is done also with the help of wooden hammers or something else, such as with the reverse side of a spade. Harrowing is also necessary at the time of puddling a field and making it ready for paddy transplantation.

Manuring.

Manuring is done at any time before or after ploughing or hoeing. But generally it is done after the field has been opened up so that the soil could easily absorb it. Manures like cowdung, compost, ash, etc., are carried to the field either on a bullock-cart or as head load. The manure is sometimes spread evenly in the field and sometimes small heaps of it are allowed to remain in the field at a distance of a few yards from each other which at the time of pulverisation spread automatically all over the field. Sometimes ash is spread on the small plants of *rabi*, like gram and *khesari*, etc. It is done with two motives, to manure the field and to provide a protection against stray cattle.

Seed-sowing.

In respect of some of the crops, seeds are separately grown in small nurseries and then transplanted, while in respect of others no such process is adopted. Crops for which seeds are usually separately grown, are *aghani* and *bhadai* paddies and *marua*. The nursery field is thoroughly cultivated before the seed is actually spread. In respect of crops, like wheat, barley, gram, *khesari*, also sometimes in case of paddy, etc., seeds are not sown separately. Quantity of seeds necessary for an acre of land varies from crop to crop. Seeds often need be irrigated, specially when the monsoon breaks a little lately. *Marua* seeds require more watering than any other seeds.

Transplantation.

Transplantation is necessary only in case of those crops for which seeds are grown separately, viz., *aghani* and *bhadai* paddies and *marua*. As Champaran is predominantly a *aghani* paddy growing area, transplantation is chiefly important here in respect of *aghani* paddy only. For *aghani* paddy as well as for *bhadai* paddy the field is first puddled well and harrowed and the soil is made muddy. The seeds are taken out from the seed nurseries where they are earlier sown and are more or less planted in line at a distance of generally one foot. A number of seed plants, varying from 3 to 5, are thrust at a single place in the muddy soil. Transplantation in respect of paddy is done only when there is sufficient rain. But in respect of *marua*, transplantation is done even at a time when it has rained scantily.

Weeding.

Along with the small plants of crops many unnecessary grasses grow in the field and sometimes these grasses are so thick that they

deter the growth of the main plants. It is considered necessary by the cultivators to weed out the useless plants from the field. This is done with the help of an instrument, called *khurpi*. In case of paddy crops specially in the field where there is some water, weeding is done by hands without the help of any instrument. All the useless plants are pulled out of the soil. This process is repeated twice or thrice where necessary.

Interculturing.

Interculturing means culturing or stirring the soil in between the crop plants. It is also done with the help of *khurpi*. In respect of some of the crops, it is simultaneously done at the time of weeding. This is done to aerate the soil, to prepare a milch (a loose layer of dry soil as covering), to kill the harmful insects and to make the soil congenial for the rapid growth of crop plants.

Irrigation.

With the growth of the crop and longer intervals of rains the soil of a field looses moisture. But as moisture in the soil is very essential for the growth of plant, the cultivators resort to irrigation. In respect of certain crops scanty watering is needed every morning and evening or once a day. In such cases water is taken in a pitcher or bucket and is spread over the field. But there are certain crops which need heavy watering, varying from two inches to half a foot or so. Such plants are irrigated with the canal water and where canal water is not available with the water taken out from wells, tanks, tube-wells, etc. Water from wells and tanks is taken out with the help of bucket, *karin* or some other water-lifting devices. At places electric pumps are also used. Deep watering to a crop is sometimes needed twice or thrice according to the changes in the rainfall conditions. (Details of irrigation are discussed later.)

Water Draining.

Draining the stagnant water from the field becomes sometimes necessary, specially in case of paddy. This is done at the commencement of *Siwati nakshatra,* that is in the last week of October. It is done with pleasure where the cultivators can have water easily from canals or any other source if rains during *Hathiya nakshatra* fail. However, in the *Bisakha nakshatra,* that is, in the first fortnight of November the water from the field is again drained off never to be filled in again until the crop is harvested.

Water draining in Champaran is a big problem specially in respect of *chaurs* (low paddy fields). There are many *chaurs* in this district where water accumulates during rainy season and does not dry up at times even at the time of sowing. Recently some steps have been taken by the Government to provide a planned drainage system at least in respect of a few *chaurs.*

Earthing Up.

Earthing up is done chiefly in respect of some of the root crops, such as potatoes. Earthing up is done also in respect of sugarcane and maize. Soil from near about the plant is dug up and heaped at the base of the plant. This is done to give support to the plant and to keep the tubers and roots under the soil. This is done with the help of *kudali* (spade) and *khurpi.*

Insecticide Spraying.

Certain kinds of pests and diseases at times attack the plant and kill its growth. When such pests and diseases appear, farmers spray some indigenous medicines or the ones suggested by the Agriculture Department. However, insecticides recommended by the Agriculture Department have not yet become very popular. They are chiefly used in big farms only. For this the ignorance of the cultivators is responsible.

Watching the Crop.

Watching the crop against being destroyed by animals, birds and stray cattle always remains a great problem for the cultivators. Sometimes, protection against thieves also becomes necessary. A farmer has to keep a permanent watchman to guard against such evils. Sometimes co-operative efforts are also made to guard against such destructions. Co-operative efforts in this respect are always beneficial to farmers, for each of them is not required to keep a watchman separately. However, such efforts only succeed when a number of farmers sow their field with one type of crop and in one locality only.

Harvesting.

Harvesting is one of the most important agricultural operations. This is commonly known as *katani,* chiefly in respect of crops having big stems or straws, such as paddy, wheat, barley, etc. So far *rabi* crops like gram, *khesari, masuri,* etc., are concerned the harvesting is called *ukharni* or uprooting the crop as such crops are not cut but are up-rooted.

Crops having big stems or stalks are cut with the help of an instrument known as *hasua* (sickle). Sugarcane is cut with the help of an instrument known as *dabila* which is just like sickle with plain edge but many times heavier than it. Pulse crops are uprooted as stated above. Root-crops like potatoes are harvested with the help of *kudal* (spade).

Harvested food crops like paddy, wheat, barley, gram, etc., are arranged into bundles and brought to the threshing floor either on the head of labourers or on bullock-carts. Here the bundles are first stocked.

Threshing.

Harvesting is followed by threshing. Bundles of crops are opened and spread round a pole and a number of bullocks are run over them round the pole. This process continues till the grain is separated from the straw. Later the grain is collected and winnowed against the breeze to separate it from chaff.

Storing.

The method of storing varies from crop to crop. Grains are stored either for consumption or for seed or for sale at a later date. Grain kept either for consumption or for sale is stored in either mud-built *kothis* or granaries made of bamboo. Grain for seeds are either stored in small baskets plastered with mud and cowdung or in a kind of bag made of straws which is also plastered with mud and cow-dung. This plastering provides protection against insects.

It is a problem to store root-crops like potatoes as it can be preserved well only in cold storage which is very rarely available in the remote villages. Sometimes a kind of powder is used to protect potatoes, but this spoils their very taste. There is no cold storage in the district for preserving potatoes, mangoes, etc. Warehouse facilities at State level are not available.

On the whole, it may be said that the methods of storing are not satisfactory.

AGRICULTURAL IMPLEMENTS.

Among the argicultural implements mention may be made of tractor, plough, harrow, pick-axe, weeding-hook, sickle, water-lifts, etc. The most important of these are tractor and plough. In the live-stock census of 1945 the number of agricultural implements were also accounted for. According to this census there were 1,16,505 wooden ploughs, 11,231 iron ploughs, 37,579 carts and 101 tractors. Since then no census of agricultural implements has taken place and it is difficult to ascertain the number of agricultural implements in the district. However according to *Bihar Statistical Hand-Book of* 1953 the number of tractors in the district in 1951 was 111.

Plough.

Plough is the age old implement. The plough generally used in this district is either of wood or iron, but wooden plough is very commonly used as the above mentioned figures of these two ploughs would suggest.

A wooden plough consists of several pieces. The principal parts are *hal* (main body), *lagan* (the portion caught by the ploughman at the time of ploughing), *palo* (yoke), *haris* (the wooden pole connecting the main body of the plough and the yoke) and *phal* (spear). All the wooden parts are made by the village carpenter and *phal* is made by the village blacksmith and is even sometimes

imported from outside. It is the *phal* which actually pierces the ground. The tilth attained by wooden ploughs is generally 3 inches to 4 inches. A wooden plough with good bullock ploughs an area of one bigha in a day. The area ploughed by a simple plough varies with the nature of the soil and the type of bullocks employed. An improvised plough known as Bihar Plough has been introduced. It ensures a deeper plough and breaking of clods.

The iron plough is rather a new introduction in the field of agriculture. As a matter of fact it is generally favoured in the cane growing belt of the district. Ordinary bullocks are not capable of pulling it. In the cane growing belt of the district bullocks of better breed have to play duel role, viz., to pull iron ploughs and to pull carts heavily loaded with sugarcane. This plough is being gradually popularised by the Agriculture Department and cultivators are also taking to it.

Tractors.

Tractors are quite recent to make a headway in the field of agriculture in the district. The number of tractors in this district in 1951 was more than any other district of Bihar. There has been a vast tract of land in this district awaiting reclamation and as a measure to reclaim waste lands, tractors were imported in the district on a big scale on Government initiative. However, this does not find favour with the ordinary cultivators due to several reasons such as heavy capital investment, paucity of large farms, etc. Operating cost of tractors is also considered to be high because of the cultivators being quite ignorant of the mechanical complexities and also due to paucity of technical personnel, etc.

Harrow.

The harrow, locally known as *chauki* or *henga,* is used after ploughing. The upturned soil after ploughing is still full of clods and to crush the clods harrowing is necessary. Harrow is either made of wood or bamboos. Wooden harrow is generally several times heavier than a harrow made of bamboo and is used generally in a field having considerably big clods. It is square like a wooden beam varying in weight from a maund to 3 or 4 maunds. The length of a harrow varies from 6 feet to 12 feet. Bullocks are tied with a yoke and the harrow is attached with the yoke with the help of rope. One or several men stand on the harrow, bullocks are made to run and the clods falling under the harrow naturally go to pieces. So far a bamboo made harrow is concerned, it is made by putting together two pieces of bamboo. These two pieces of bamboo are clogged together at either ends with the help of a nail either made of wood or bamboo or iron. A bamboo harrow is generally used in a field having comparatively less tenacious soil or in which clods are considerably small. It is generally kept by small cultivators. An area of about 3 to 4 acres is harrowed in a day with the help of a pair of bullocks.

Water-lifts.

The water lifts used on wells for irrigating fields are locally known as either *latha* or *koor*. The bucket used for lifting water is generally made of iron with a pointed bottom. It is imported in this district from the nearby urban markets. The bucket is tied with a big bamboo piece with a rope and the bamboo piece in its turn hangs like a balance with two poles which are erected nearby the well for this purpose. It helps cultivators pulling water from wells with great ease. At places electric pumps are also seen but they are not popular in the district. Water obtained from the electric pumps is expensive.

Pick-axe.

Pick-axe is locally known as *kudal* and is used in, generally up-turning the soil of such fields in which plough cannot easily move due to stiffness of the soil. This is also used to attain greater tilth and to culture that part of the field where plough cannot easily go, such as near the angles and near the raised boundary lines. This is of use to the cultivators in various other work. It is made of iron and is generally fitted in a thin bamboo piece of $2\frac{1}{2}$ feet to 3 feet. The pick-axe is generally imported from outside, but locally made ones are also not unknown.

Miscellaneous.

There are several other implements which a cultivator uses in the ordinary course of his agricultural operations. Among such implements mention may be made of cart, axe, locally known as *kulhari*, weeding hook, locally known as *khurpi*, sickle, locally known as *hasua*, etc.

LIVESTOCK.

The importance of cattle to the cultivators can hardly be exaggerated. Like the other districts of North Bihar, cultivation in this district also almost entirely depends on bullocks. The plough cattle are generally of the local breed. However, many fine and well conditioned bullocks are also seen in the district. Such bullocks are generally to be found in the cane growing region of the district and are chiefly kept for the purpose of pulling the cart loaded with sugarcane. The deplorable condition of bullocks in general has attracted the attention of the Government in recent years and some efforts have been made to improve the breed. An Artificial Insemination Centre has been opened at Motihari with three sub-centres at Jiudhara, Turkaulia and Sugauli to improve the breed of the cattle. Although artificial insemination method has been introduced in the district very recently (1957) and the people are very conservative, but it has been reported that the method is gaining popularity among the livestock owners. Some bulls of high pedigree have been distributed in the district to up-grade the local breed. Sheep and

goats are also found in the district. Sheep are more numerous in the north but goats are fairly distributed over the whole of the district.

Much information is available in the *Final Report of Survey and Settlement Operations in* 1892 *to* 1899, by C. J. Stevenson-Moore, Esq., I.C.S., in 1900—wherein he has supplied the number of livestock, ploughs and carts, thana by thana to provide a tentative index of agricultural prosperity along with the livestock situation in the district.

Serial no.	Name of thana.	Total area in sq. miles.	Cows.	Bulls and bullocks.	Male buffaloes.	Cow buffaloes.
1	2	3	4	5	6	7
1	Bagaha	619	70,636	46,107	3,686	10,870
2	Shikarpur	554	77,158	58,929	3,522	14,439
3	Bettiah	547	59,587	59,058	4,742	18,315
Subdivisional Total ..		1,720	2,07,381	1,64,094	11,950	43,624
4	Adapur	224	16,505	26,329	1,064	8,333
5	Dhaka	335	18,462	29,304	1,321	9,437
6	Motihari	290	12,708	16,411	819	5,321
7	Gobindganj ..	286	16,207	16,371	1,034	5,922
8	Kesaria	273	15,968	20,279	931	7,514
9	Madhuban ..	122	8,441	9,548	473	3,606
Sadar Subdivisional Total ..		1,530	88,291	1,18,242	5,642	40,133
District Total		3,250	2,95,672	2,82,336	17,592	83,757

Horses and ponies.	Calves including buffalo calves.	Sheep.	Goats.	Mules and donkeys.	Total no. of cattle of all sorts.	Ploughs.	Carts.	Remarks.
8	9	10	11	12	13	14	15	16
2,880	20,156	4,151	11,853	1,437	1,71,776	16,850	3,051	
2,612	25,636	3,503	18,318	1,299	2,05,416	21,994	4,115	
3,732	5,103	7,458	33,695	1,088	1,92,778	23,742	1,100	
9,224	50,895	15,112	63,866	3,824	5,69,970	62,586	8,266	
1,864	5,804	941	17,539	710	79,089	10,515	1,508	
2,094	6,941	1,772	24,450	937	94,718	10,054	2,162	
1,364	811	2,061	11,864	305	51,664	4,924	435	
1,374	2,966	3,158	14,605	421	62,058	5,358	4,356	
1,754	5,708	2,661	17,526	718	73,059	6,562	1,911	
797	3,154	969	8,294	296	35,578	3,413	630	
9,247	25,384	11,562	94,278	3,387	3,96,166	40,826	11,002	
18,471	76,279	26,674	1,58,144	7,211	9,66,136	1,03,412	19,268	

He worked out a ratio between cattle and population as three heads of cattle per family, or more than one per two persons, against 1.75 and one head to three persons respectively of Muzaffarpur. Bettiah subdivision had 6 lakhs of cattle against 4 lakhs in the Sadar subdivision. Bullock carts were 19,268 in all or nearly four times the number for Muzaffarpur. The obvious reason was that there were only 15 miles of the Tirhut State Railway in the district. The trade to and from Nepal mainly depended upon the bullock carts. Indigo also used to be carried by the same. Furnishing a thanawise detailed statement of number of cattle per 100 heads of the population he gives us the following figures from which we pick up only the subdivisional figures :—

Name of subdivision.	Area in square miles.	Population.		Number of cattle per 100 heads of population.							
		Total.	Number per square miles.	Cows.	Cow-buffaloes.	Sheep.	Goats.	Bulls and bullocks.	Horses and ponies.	Cattle of all sorts, including male buffaloes, mules and donkeys.	No. of calves per 100 cows and cow-buffaloes.
1	2	3	4	5	6	7	8	9	10	11	12
Bettiah	1,720	7,59,865	442	29	6	1.9	8	22	1.2	75	20
Sadar	1,530	10,99,660	719	8	4	1.1	7	11	0.8	36	20
District Total	3,250	18,59,465	572	16	5	1.5	9	15	1.0	52	20

Mr. C. J. Stevenson-Moore writes further: "The proportion of milch-kine (cows and cow-buffaloes) per 100 souls is only 11 in the Sadar against 33 in the Bettiah subdivision. In the Bettiah thana the number is lowest for the northern subdivision, but even so is nearly double that for any thana in the southern subdivision. Milch-kine are particularly numerous in Bagaha and Shikarpur, where grazing has to be provided not only for the local cattle but also for large heads driven over from Gorakhpur and Saran. In the Sadar thanas there are 12 milch-kine per 100 persons, that is to say, more than one to supply milk and *ghee* to ten persons. This is little better than in Muzaffarpur. But if the Bettiah subdivision is included, then there is one cow or cow-buffalo to every five persons.

Sheep, too, are more numerous in the north, while goats, on the other hand, are very fairly distributed over the whole district, the only kind of livestock of numerical importance of which this can be said.

Passing on to draught-cattle, here against $10\frac{1}{2}$ heads per 100 persons in the Sadar, $21\frac{1}{2}$ heads, i.e., about double is returned for Bettiah. The cause, as I have said is the plentiful grazing and large cart traffic in the north. Bettiah is the thana returning the lowest number of the three northern thanas, viz., 18, but the only Sadar thana approaching this is Adapur with 16. Adapur is the most cultivated thana in the district, and this high figure, therefore, is in this instance an undoubted indication of agricultural prosperity. Dhaka, also another rich area, returns nearly 11 draught-cattle per 100 persons, Motihari and Madhuban come last with 9.

"The statistics of agricultural stock in the strictest sense will now be considered, and information of the number of bullocks, ploughs and carts returned by Muzaffarpur, Gorakhpur, and Gaya are compared with the Champaran figures :—

Name of district.	Total.	Area in square miles.			
		Cultivated.		Uncultivated.	
		Total in sq. miles.	Percentage of total area.	Total in sq. miles.	Percentage of total area.
1	2	3	4	5	6
1. Champaran ..	3,250	2,263	69.63	987	30.37
2. Muzaffarpur ..	3,035	2,430	80.11	605	19.89
3. Gorakhpur ..	4,581	3,907	67.82	674	32.18
4. Gaya ..	389	271	69.66	118	30.34

Population.	Bulls and bullocks.		Ploughs.		Carts.		Livestock of all sorts.	
	Total number.	No. per sq. mile of cultivated area.	Total number.	No. per sq. mile of cultivated area.	Total number.	No. per sq. mile of cultivated area.	Total number.	No. per 100 persons of population.
7	8	9	10	11	12	13	14	15
18,59,464	2,82,336	125	1,03,412	46	19,268	8	9,66,136	52
27,12,857	2,42,703	99	85,147	35	5,043	2	8,10,950	30
29,94,057	5,86,468	118	2,70,378	87	24,390	7	1,71,894	56
..	40,494	149	12,969	48	62	0.02	*	*

*Figures not available.

"The figures of Champaran and Gorakhpur are approximate. The number of cattle of all sorts per 100 persons is 52 in Champaran, against 56 in Gorakhpur, Muzaffarpur coming to a bad third with only 30. The same conditions are noticeable in respect of draught-cattle; Champaran has 125 per cultivated square mile and Gorakhpur 118, against 99 only in Muzaffarpur, but here Gaya heads the list with 149. In the matter of carts per square mile Gorakhpur and Champaran are again very similarly circumstanced, but with four times the number found in Muzaffarpur, where the average is only 2. In the number of ploughs per square mile while Muzaffarpur returns 35 and Champaran 46, Gorakhpur returns so high a figure, viz., 87, that I doubt its accuracy. Gaya returns 48 only, and both in this district and Champaran draught-cattle are more numerous than in Gorakhpur. Gaya has the largest number of bullocks per plough, viz., three. Then comes Muzaffarpur with 2.8, closely followed by Champaran with 2.7; Gorakhpur returns only 2.1 per plough, an exceedingly low and abnormal number.

"Confining our attention to the Champaran district we find the largest number of draught-cattle per cultivated square mile in all the thanas of the Bettiah subdivision, but it is curious to note that Bettiah equals Shikarpur, and Bagaha stands third. But without doubt, both the Bagaha and Shikarpur figures would have been very much higher had the statistics for agriculturists living in the hills outside the surveyed area been included. Among the Sadar thanas, Adapur has the largest number of bullocks, viz., 138 per square mile of cultivation, followed by Dhaka with 105: next come the two adjacent thanas of Kesaria and Madhuban, with 96 and 94, respectively; and last of all are Motihari and Gobindganj, the former with 80 heads and the latter with only two more. The same order is remarkably preserved, too, in the statistics for ploughs. But Bettiah heads the list alone with 62 ploughs, or 10 acres per plough. In Bagaha and Shikarpur the area per plough is over 11 acres. Adapur, with 55 ploughs per square mile, is one better than Bagaha. The next thana is Dhaka, with 36 only. In Motihari there is the extraordinarily large area of 26 acres of cultivated land per plough, and in Gobindganj there are nearly 24 acres. These two thanas would appear to be under-stocked, though, owing to the soil being light, it is probably ploughed with ease and rapidity."

Regarding the availability and the condition of livestock, Mr. L. S. S. O'Malley, I.C.S., writes in his *District Gazetteer of Champaran* in 1907 that "there is abundant pasture in Bagaha and Shikarpur, which attracts great herds of cattle from the southern thanas and also from the adjoining districts of Saran, Muzaffarpur, and to a great extent, Gorakhpur. Cattle are consequently numerous, and every family in the district owns three heads of cattle on the average. Milch-kine are particularly numerous in the north and even in the headquarters subdivision there are 12 milch-kine for every 100 persons, i.e., more than one to supply milk and *ghee* to 10 persons.

Draught cattle are also numerous owing to the deficiency of railway communications, the large demand for carts by the indigo factories, and the trade to and from Nepal, which is carried on by bullock carts. Buffaloes are less common than in the districts south of the Ganges, and the soil being generally light, they are not required to draw the plough. Sheep are more numerous in the north, but goats are fairly distributed over the whole of the district. Donkeys are kept by dhobis, and pigs are to be seen in many villages. Veterinary relief is afforded at a veterinary dispensary at Motihari, and large cattle fairs are held annually at Madhuban and Bettiah".

In comparison to the above conditions, it was found by J. A. Sweeney, I.C.S., during the Revisional Survey and Settlement Operations in 1913–1919 that there had been a change in the agricultural prosperity for the better. In the earlier Report (1900) the total number of cattle enumerated was 966, 136 as against the figure of 11,39,039, i.e., an increase of 18 per cent during the Revisional Survey (1922). Mr. J. A. Sweeney was of the opinion that either of the figures could not pretend to be complete, "as considerable numbers of cattle graze in the jungle and hill areas of thanas Shikarpur and Bagaha which were outside the scope of the enquiry".

The following comparative statement for the two settlement operations reveal interesting figures :—

	Number of draught cattle.		Number of ploughs.		Livestock ratio to population.	
	Total.	Per cultivated sq. mile.	Total.	Per cultivated sq. mile.	Total cattle.	Cattle per 100 population.
1	2	3	4	5	6	7
Last settlement ..	2,82,836	125	1,03,412	46	9,66,136	52
Present settlement	2,97,130	133	1,17,418	52	11,39,039	59

In the latest settlement operations, draught cattle numbered 2,97,130 as against 2,82,336 enumerated in the earlier settlement, giving an average of 91 to the square mile and 133 to the cultivated square mile. Ploughs numbered 1,17,418 or 52 per square mile of cultivated area. The comparative figures thus show a distinct advance.

R. E. Swanzy, I.C.S., mentions in his Revised District Gazetteer of Champaran in 1932 about the practice of cattle-breeding in Champaran. The plough-cattle were locally used and a large number of bullocks used to be exported to different parts of India specially

Bengal. In 1930 the cattle census recorded 808 bulls, 3,82,614 bullocks, 3,70,581 cows and 2,26,417 young stock, 11,826 buffalo-bulls, 1,24,280 cow-buffaloes and 88,983 young stock—the total being 12,05,509. The increase was steady, maintaining its earlier trend. About the conditions of the livestock R. E. Swanzy, I.C.S., mentions in the District Gazetteer of Champaran of 1932 :—

"There are many fine and well-conditioned bullocks to be seen about the district chiefly cart-bullocks, but the large herds of cows and calves are generally in extremely bad condition—undersized and half-starved. This is due to indiscriminate over-breeding and also the fact that insufficient ground is kept for grazing and there are very few fodder crops grown. There is no reason or excuse for this state of affairs as fodder crops such as guinea-grass can be grown in mango and other groves at an almost negligible cost. *Janera* is the only real fodder crop grown, but rice, wheat and barley straw are also used for fodder. In most villages buffalo-cows are used for milking more than cows. Buffaloes are not used as draught animals. Goats are numerous everywhere in the district, 5,77,618 being recorded in 1930. They are a small type but are generally in fairly good condition. They are not generally milked."

A table is given below to show the livestock population (Bovine) in the district since 1920 :—

Year.	Total cattle.	Male cattle.	Female cattle.	Young stock or calves.	Total buffaloes.
1	2	3	4	5	6
1920	8,42,986	3,25,451	3,32,665	1,84,870	1,86,997
1925	8,96,025	3,71,440	3,39,087	1,85,498	2,00,081
1930	9,80,420	3,83,422	3,70,581	2,26,417	2,25,089
1940	8,22,504	2,64,582	2,56,350	1,71,981	1,73,786
1945	6,65,465	3,08,841	2,07,928	1,48,696	1,84,819
1951	6,90,751	4,12,491	2,90,931	1,87,329	1,91,933
1956	8,52,415	4,17,188	2,53,065	1,82,162	2,00,754

Year.	Male buffaloes.	Cow buffaloes.	Young stock buffalo calves.	Sheep.	Goats.
1	7	8	9	10	11
1920	10,036	1,04,682	72,297	25,498	2,88,507
1925	8,135	1,18,923	73,023	28,897	4,05,627
1930	11,826	1,24,280	88,983	31,486	5,17,618
1940	5,961	1,03,509	64,316	20,312	3,40,804
1945	29,394	87,233	68,192	15,752	2,45,916
1951	10,504	1,10,720	70,709	14,501	4,14,636
1956	6,475	1,13,333	80,946	14,551	4,73,682

The table shows the figures of the main species of livestock in the district since 1920 onwards to 1956. The overall trend is more or less stationary so far as the total cattle strength is concerned. Occasional variations are also there, e.g., in 1930 the figure goes up as high as 9,80,420 recording a substantial rise over the previous census figures. But again a downward movement is visible which goes down steep in 1945, i.e., 6,65,465 possibly due to excess consumption of cattle flesh and hide during the war emergencies. Fortunately, the position is again recouped and in 1951, it is recorded as 8,90,751, i.e., more than what has been shown in 1956 census. This upward and downward movement in the census figures for cattle wealth are shared proportionately by all the male, female and young stock groups. The figures for buffaloes show a disturbing trend of going too far from the normal figures on either side. In 1920, total strength has been recorded as 1,86,997 which showed a perceptibly increasing trend through the next two census but goes down steeply, even below the 1920 figures, in 1940 when it has been recorded as 1,73,786. But fortunately, the position improves thereafter and showing a consistent upward trend, the figure again touches 2,00,754 in 1956 census. The most disturbing spectacle is presented by the figures relating to sheep strength in the district. The figures show a definite and drastic continuity in fall in the number of sheep from 25,498 in 1920 to 20,312 in 1940, 14,551 in 1956. Only in 1925 and 1930 censuses, do the figures show any upward trend. Goats, however, show both upward and downward and finally again upward trend. In 1920, there were 2,88,507 goats in Champaran who numbered 4,05,627 in 1925 and 5,17,618 in 1930. Then again the figures fall in 1940 and 1945 when it has been recorded that 3,40,804 and 2,45,916 goats were in the district, respectively. But the position seems to be improving from that time for the 1951 and 1956 census figures mention 4,14,636 and 4,73,682 goats, respectively, in the district of Champaran.

When the 1956 Livestock Census figures are compared with the figures of 1951 human census in the district the distribution of the livestock population throughout the district works out at one head per 2.35 square miles, while the distribution on human population comes to one head per 1.6 persons. The ratio of cattle to human population is one cattle per 2.9 persons whereas buffaloes make out a ratio of one per 12.5 persons. On the subdivisional level, the Sadar subdivision has got one bovine head per 3.2 square miles while one bovine head per 3.1 persons. In Bettiah subdivision the position is not very different from that of the Sadar subdivision so far the ratio to land area is concerned, in this subdivision there is one bovine head per 3.45 square miles of area while the ratio to population is much better than what is there in the Sadar subdivision. There is roughly one head of bovine per individual in this subdivision. Cattle population in the Sadar subdivision is one per 3.75 persons and one per four square miles of area whereas there is one buffallo per

14.98 square miles of area and one per 14 persons in Bettiah subdivision, respectively. In Bettiah subdivision there is one cattle per 4.24 square miles and one cattle per 2.3 persons whereas there is one buffalo in every 20 square miles of area and one per 10.2 persons in Sadar subdivision.

A classified list of livestock (bovine only) for 1951 and 1956 is given below to show their utility :—

	1951.	1956.
Cattle—		
(*i*) Breeding bulls, i.e., entire males, over three years kept or used for breeding only.	1859	816
(*ii*) Working bullocks and uncastrated males over three years kept for work only.	3,93,816	4,08,342
(*iii*) Bulls and bullocks over three years not in use for breeding or work.	16,836	8,030
(*iv*) Breeding cows, i.e., cows over three years kept for breeding or milk production—		
(*a*) In milk	82,593	98,261
(*b*) Dry	1,31,054	1,06,807
(*c*) Not calved	56,051	37,232
(*v*) Cows over three years used for work only.	14,215	4,467
(*vi*) Cows over three years not in use for work or breeding purposes.	7,018	6,298
(*vii*) Young stock—		
(*a*) Under one year	97,452	98,115
(*b*) One to three years	89,877	80,047
Buffaloes—		
(*viii*) Breeding bulls, i.e., entire males over three years kept or used for breeding only.	1,701	679
(*ix*) Working bullocks, i.e., bullocks and uncastrated males over three years kept for work only.	7,259	5,209
(*x*) Bulls and bullocks over three years not in use for breeding or work.	1,544	587
(*xi*) Breeding cows, i.e., cows over three years kept for breeding or milk production—		
(*a*) In milk	41,112	62,430
(*b*) Dry	41,441	32,750
(*c*) Not calved	22,241	14,971

	1951.	1956.
(*xii*) Cows over three years used for work	3,017	1,606
(*xiii*) Cows over three years not in use for work or breeding purposes.	2,909	1,576
Young stock—		
(*i*) Under one year	40,347	51,880
(*ii*) One to three years	30,362	29,066
	10,82,684	10,53,169

A classification of livestock (bovine only) in 1951 and 1956 censuses reveals a comparative picture showing increase or decrease in numbers under different heads, as the case may be. In 1951 there were 1,839 breeding bulls (cattle) as against 816 in 1956 which is after all not a good trend. But the number of working bullocks rises from 3,93,816 in 1951 to 4,08,342 in 1956. For buffaloes also the number of breeding bulls were much bigger in 1951, i.e., 1,701 as against their number in 1956—679 only—thus showing a big fall from the previous census. Working bullocks also register a fall in 1956 in comparison to 1951 figures. In 1951 there were 7,259 working bullocks as against 5,209 in 1956. Bulls and bullocks not used for breeding or work numbered 16,836 in cattle and 1,544 in buffaloes in 1951 as against 8,030 in cattle and 587 in buffaloes in 1956. Cows over three years used for work only numbered 14,215 in cattle and 3,017 in buffaloes in 1951 as against 4,467 in cattle and 1,606 in buffaloes in 1956. This shows that the use of cattle in 1956 fell perceptively over the 1951 figure while in buffaloes the same trend is apparent. Milch cows numbered 82,593 in cattle and 41,112 in buffaloes in 1951 as against 98,261 in cattle and 62,430 in buffaloes in 1956. That means that more buffaloes have been milched in the later years than in the early fifties. Another fact is also apparent that while though increasing over the 1951 figure the increased proportion of the milched cows in cattle is less than the increased proportion of milched buffaloes. Draught cows numbered 1,31,054 in cattle and 41,441 in buffaloes in 1951 as against 1,06,807 in cattle and 32,750 in buffaloes in 1956. Cows not calved numbered 56,051 in cattle and 22,241 in buffaloes in 1951 as against 37,232 in cattle and 14,971 in buffaloes in 1956. Cows neither for use for work for in breeding numbered 7,018 in cattle and 2,909 in buffaloes in 1951 as against 6,298 in cattle and 1,576 in buffaloes in 1956. The 1956 thus registers a fall in comparison to the position in 1951. Youngstock under one year numbered 97,452 in cattle and 40,347 in buffaloes in 1951 as against 98,115 in cattle and 51,880 in buffaloes in 1956. Youngstock grouped under one to three years numbered 89,877 in cattle and 30,362 in buffaloes in 1951 as against 80,047 in cattle and 29,066 in buffaloes in 1956. The total bovine numbered 10,82,684 in 1951 as against 10,53,169 in 1956, thus showing an overall shortfall in the latter census.

Livestock Mortality.

Livestock like their human counterpart do suffer from diseases, some of them take epidemic form, others endemic. The main diseases from which the bovine population generally suffer are Rinderpest, Foot and Mouth diseases, Hæmorrhagic Septicæmia and other contagious diseases like Black Quarter, Anthrax and Sorah. About the prevalence of cattle-diseases in earlier days, we have come to know about two types of cattle-diseases which have particularly been mentioned in some of the old correspondence. Letter no. 22, dated Camp Sugauli, the 10th February 1864, from F. M. Halliday, Officiating Magistrate, to the Commissioner of Circuit, Patna Division, mentioned two kinds of contagious diseases, viz., *gotee* and *coraveab*. *Gotee* usually spread from the end of February to the end of April but it also broke out earlier at times. The other disease generally occurred only in hot season. The affected animals had fever followed by sore between the hoofs and the mouth swelled slightly. The tongue would come out and the teeth became loose and then worms appeared at the gum, tongue and feet of the animals. Death came to the animals within ten to twenty days. It also attacked goats, sheep and buffaloes.

A table is given below to show the livestock mortality (bovine population) due to contagious diseases in the district since 1945-46 :—

Years.	Causes of death.				
	Rinder-pest.	Foot and Mouth diseases.	Haemor-rahagic septicaemia.	Other contagious diseases.	Total.
1	2	3	4	5	6
1945-46 ..	544	3	94	13	654
1946-47 ..	123	..	117	6	246
1947-48 ..	..	2	102	..	104
1948-49 ..	..	1	42	2	45
1949-50 ..	6	6	387	104	503
1950-51 ..	2	..	73	1	76
1951-52 ..	..	2	63	50	115
1952-53 ..	93	..	55	61	209
1953-54 ..	55	1	126	108	290
1954-55 ..	33	..	99	39	171
1955-56 ..	5	4	126	87	222
1956-57 ..	337	6	99	63	505
1957-58 ..	196	3	69	18	286

It will be seen from the above statement that Rinderpest and Hæmorrhagic Septicæmia have been a drain on the cattle wealth of the district. Both these diseases account for the highest number of deaths than rest of the diseases put together. Foot and Mouth diseases account for only a few lives a year. There are years when no cattle died of foot and mouth diseases. The year 1945-46 seemed to be a crisis year for the livestock for in that year the largest number of death occurred in the district, i.e., 654 cattle died from this fell disease. Rinderpest often breaks out in an epidemic form. Giving a respite for a few years in between this disease again began to cause large scale death from 1952-53 and reached the figure of 337 in 1956-57. Though going down the year 1957-58 by no means can be said to be a relieving year. Hæmorrhagic Septicæmia appears to be more consistent in its heavy toll year after year than any other diseases. The least number of death occurred due to this disease was 42 in 1948-49 and the victims numbered 387 in the very next year, i.e., in 1949-50. Other contagious diseases took a toll of 108 in 1953-54. The statement above gives only the picture of fatality among the bovine population of the district. The real picture becomes apparent when one checks up the figures of actual number of attacks from the various diseases.

Sources of Veterinary Aid.

In the second decade of the present century one veterinary hospital at Motihari and another veterinary dispensary at Ramnagar were opened by the Government. One hospital at Bettiah was also opened by the Bettiah Raj which was then under Court of Wards. This hospital was also taken over by the Government in 1952. These three veterinary institutions only functioned in the whole of the district of Champaran for a considerable period. However, in 1951-52 there were several hospitals and dispensaries functioning in the district. A list is given below to show the number of hospitals and dispensaries with their jurisdiction :—

Veterinary Hospitals	Jurisdiction.
(1) Motihari (Provincialised in 1957).	Municipal area.
(2) Bettiah	Municipal area.
(3) Bagaha	Bagaha police-station.

Veterinary Dispensaries.	Jurisdiction.
(1) Chakia	Pipra, Madhuban, Kesaria police-stations.
(2) Areraj	Gobindganj, Hansidih and Sugauli police-stations.
(3) Dhaka	Dhaka, Patahi and Motihari Muffasil police-stations.

Veterinary Dispensaries.	Jurisdiction.
(4) Raxaul	Raxaul, Adapur and Ghorasahan police-stations.
(5) Bettiah	Bettiah, Nautan, Chainpatia, Lauria, Jogapatty and Majhowalia police-stations.
(6) Narkatiaganj ..	Shikarpur, Sikta, Ramnagar and Mainatanr police-stations.

Besides there was one more dispensary in Madhubani under Dhanha police-station run by the local bodies.

In all the hospitals there are arrangements for indoor and out-door patients whereas in the dispensaries, there are arrangements for out-door patients only.

A district branch of the Society for Prevention of Cruelty to Animals was formed in the district in the late thirties of the present century. This was constituted for detection and prevention of cruelty to animals. This society prevents mainly, using of lame, diseased, etc., animals, *phooka* (blowing of air through the animal's genitals before milking), flaying goats, etc., alive.

Cattle Fairs.

Several cattle fairs are held annually in the district, but three are important, namely, Bettiah, Madhuban and Rajpur cattle fairs. The Bettiah cattle fair is the biggest in the district. These cattle fairs are held during Durga Puja and generally last for 10 to 15 days. Domesticated animals are brought for sale in these fairs. At these fairs sometimes exhibition is also organised by the Agriculture and Veterinary Departments. In the Bettiah cattle fair in 1955-56, 30,000 cattle were brought, out of which 28,020 were sold out during the period of that fair. In 1956-57, at the same fair 20,540 cattle were brought out of which 4,011 heads were sold. In 1957-58, 38,313 heads of cattle were present in the fair held at Bettiah and out of which 16,309 heads were sold. These figures suggest that the fair is very important as a cattle fair. The other important cattle fair which is held regularly at Rajpur (Chakia) where in 1953-54, 15,000 bovine stock were present, out of which 3,167 were sold. In 1955-56, at the Rajpur fair 15,832 cattle heads were brought, out of which 10,150 heads were sold. In Madhuban cattle fair held in 1953-54, 4,200 cattle were brought, out of which 3,150 were sold. The cattle fair held in 1953-54 at Kesariya assembled 6,050 cattle heads out of which 3,500 were sold. From these comparative figures Bettiah fair appears to be the biggest of all.

Pasturage.

Pasturage now in this district is about 500 square miles. This being considered inadequate, herds of cattle are taken for grazing to Jitpur in Nepal territory. Animals are taken to this place for grazing

in the spring season and are brought back as soon as monsoon breaks out. For this the land owner charges some fee. There are no particular big areas exclusively meant for fodder crops, such as *berseem,* etc. Small plots are utilised by big farmers for growing *janera* and other kinds of fodder for their cattle.

Bone, Horn and Hide Business.

Business in these articles is exclusively carried by the Muslim community. Hides are processed in the godown with salt, *khari,* etc., and are exported to Calcutta. Besides, bones and horns are also collected by the local merchants through Chamars and are exported outside. It is said that on the average a business of about Rs. 2,00,000 is annually done in these articles in the district. Champaran district is famous for kid hide which is very popular abroad.

Milk and Milk Produce.

It has already been mentioned that according to the livestock census of 1951 there were 30,792 cows and 20,955 she-buffaloes in milk. These figures were 98,261 and 62,430, respectively, in 1956. According to the livestock census of 1951 the total cow's milk produced in the district in 1951 was 6,630.9 maunds and that of she-buffaloes 11,252 maunds while in 1955-56, according to the 1956 Census of Livestock, cow's milk totalled 23,27,448 maunds and she-buffaloes, 18,92,960 maunds.

The 1958 Report on the livestock census, however, mentions about dairy farms at Bettiah Estate Dairy Farm, Bettiah, and Motihari Jail Dairy Farm, Champaran, where we can expect that some amount of milk products are manufactured. There is no dairy farm worth mentioning in the district. However, there are several *goshalas* according to the Livestock Census Report published in 1958, in the following places, viz., (1) Adarshah Hindu Gomandir, Bagaha, (2) Shri Pinjrapole Goshala, Bettiah, (3) Chanpatia, (4) Motihari, (5) Narkatiaganj, (6) Ramgarhwa, (7) Mehsi, (8) Madhuban, (9) Chakia, (10) Sugauli and (11) Raxaul, P. O. Raxaul Bazar, in the district but in none of these *goshalas* any kind of milk product is manufactured. As a matter of fact all the milk produced in the district is consumed in its original shape or turned into curd and consumed. In some of the villages small machines, kept by the private individuals for extracting cream from milk are seen and cream is one of the two milk products of some importance in the district, *ghee* being the other important milk product. *Ghee* is prepared from either milk or cheese by the house-wives. There is no data to show the actual quantity of cheese and *ghee* produced in the district.

Poultry Farming.

The district has a good population of Mohammadans, Tharus and persons of scheduled castes. All these sections of people are fond of

poultry farming. But the birds kept by them are mostly of local breed and smaller in size, although they lay bigger eggs than their counterpart in South Bihar owing to the dampness of the climate.

The Report on the Livestock Census in Bihar in 1956, published in 1958, gives a comparative figure of the number of poultry available in the district in 1951 and the number of poultry available just before and after the reorganisation of the State of Bihar in 1956. In 1951 Champaran had a poultry population of 1,45,139 which swelled to 2,72,262 during 1956, thus showing a variation of 87.6 per cent between the two figures. In 1951 there were 1,35,547 fowls and 9,592 ducks in Champaran as against 1,99,462 fowls and 9,199 ducks in 1956. While the number of fowls increased distinctly in the case of fowls, ducks showed a slight fall.

With the opening of National Extension Service Blocks in the district, an attempt has been made to improve the breed of birds in the district. In four such centres, namely, Motihari, Gaunaha, Turkaulia and Ramnagar, Poultry Extension Centre has been started since 1957 with some birds of Rohde Island Red variety to upgrade the local variety which lays lesser number of eggs of comparatively smaller size. The poultry extension centre was started at Turkaulia on the 20th August with 90 hens and 10 cocks. In addition to this, 98 birds have been distributed to the farmers at Chand Saraya and Baltharwa. The total production of the farm up to the month of November, 1958, is 3,618 eggs in which 1,658 eggs have been for table and 1,246 for hatching purposes. The farmers produced only 168 eggs in which 59 were used in hatching and the rest for table. At the present, the strength of the poultry extension centre, Turkaulia is only 68 and that of the farmers is 89. Thirty-two birds at poultry extension centre at Turkaulia and 9 birds at Chand Saraya died from general diseases and from other accidents.

After the Community Development Block was located at Bagaha, one poultry centre was started on the 16th August 1957, with a capacity of 100 birds of New Hempshire breed. Since the start of the centre, hatching eggs have been supplied to Tharus and Dhangars. Another such centre was started at a village Domwalia. The breeders of this village have been supplied with birds on subsidised rates. The breeders as well as the general people are always given technical and monetary help, e.g., training of breeders or free supply of wire netting. To make the industry more popular four persons have been sanctioned loan under the State Aid to Industries Act and five persons by the Welfare Department for the benefit of the backward people. Only from the review of the working of the poultry centres at these two blocks out of several others it appears that a serious effort is being made to train the people in having better qualities of birds.

Apart from the local demand of eggs and chickens for consumption they have a heavy demand in South Bihar, specially in Patna.

FISHERY.

This district has quite a large number of rivers, lakes, marshes, ponds and tanks. But the fish produced in these water reservoirs is not a major item of trade. There is practically no export of fish from any of the markets beyond the district. Even the daily market for Bettiah, which is considered to be the biggest market within the district, does not attract more than 11 maunds of fish a day. Whatever fish is produced is locally consumed through the nearest market.

In this district there are two main markets for fish supply, viz., one at Bettiah and the other at Motihari. For Bettiah market the sources of supply are Halsarai lake, Majharia lake and Majhaulia lake, Nawtan *chaur* and local ponds. These sources are located within an area ranging between 1½ and 13 miles of distance from Bettiah.

The supply for the market at Motihari comes from the rivers Dhanawati and Sikrahana and local tank and lake. They all come from within the radius of 3 miles from the town of Motihari. This market receives a daily average of 9 maunds of fish from these sources.

The common species found in the district are carps : (1) Rohu, (2) Catla, (3) Naini and (4) Calvasu; Cate fish : (1) Boari, (2) Tengra, (3) Silonal, (4) Bangas and (5) Bachwa; Murels : (1) Garai, (2) Sawra and (3) Chenga; Feather back : (1) Moi and (2) Chitla; Seasonal fish : (1) Hilsa and (2) Gorarah—these two varieties are not available in this district since last few seasons. There are other miscellaneous fish which are available in the district, viz., (1) Pothia, (2) Chelwa, (3) Bami, (4) Gaineha and (5) Chingri. Muhseer which is mentioned in the Old Gazetteer of this district seems to have become extinct.

The main reason for this low output of fish is that the lakes, marshes, ponds and tanks do not get any fry through inundation. They are usually low but with high embankments and the flood water of the river does not reach them. The marshes and ponds are shallow lagoons with deep pits which render fishing difficult. The Earthquake of 1934 has raised the level of the lakes and marshes. The natural productivity of the fish population is definitely low and in order to increase the output of fish there must be induction of fry.

The fishermen as a class have a very poor level of living and it is only recently that some co-operative unions of fishermen have been set up.

The Fishery Section of the State has started functioning in Champaran since 1945 only. The lot of the fishermen, who are scattered all over the district cannot be said to have improved much and their capital still consists of the traditional net, often knit by themselves.

This Section has not yet been able to touch the core of the problem. The Section, however, distributes fish fry and gives subsidy

to tank owners and takes other ameliorative measures to improve the condition of the fishermen.

From the 31st March, 1952 to the 31st March, 1956 the fisheries section was under the Agricultural Department. From the 1st April 1956 the fisheries section has completely been integrated with the general administrative and extension organisation of the Agricultural Department. The two Five-Year Plans envisaged something for the development of fisheries also. These plans aimed at developing the fisheries resources of the district through intensive collection and distribution of fishery, by giving subsidy to tank owners for the improvement of their tanks for pisciculture, by participating in exhibition and fairs for making propaganda for the development of fisheries, by supplying country and motor boats to fishermen, organising night school for fishermen and surveying their colonies. They also aimed at the development of exploitation of Government reservoir, tanks and ponds and the improvement of storage and transport of fish to markets. Since 1945-46 this section has been distributing many maunds of fisheries and fish seeds through the agencies every year. In 1946-47, 18,500 fisheries were distributed as against 4,15,000 in 1947-48, 5,30,000 in 1948-49, 97,500 in 1949-50, 5,78,000 in 1950-51, 2,84,000 in 1951-52, 2,80,000 in 1952-53, 3,51,000 in 1953-54, 1,51,500 in 1954-55 and 1,67,000 in 1955-56, respectively. In 1956-57 some 1,76,333 fish seeds were distributed as against 5,59,666 in 1957-58. Subsidy has been given so far in 1949-50—Rs. 250. This scheme was dropped in 1951-52. In the field of research, as directed by the Research Committee 12 manurial and 2 paddy-*cum*-fish culture experiments were conducted in the year 1955-56. Several demonstrations have been held in different blocks since the beginning of the Second Five-Year Plan.

IRRIGATION.

In the northern and eastern part of the district *bangar* soil predominates. In these tracts of the district winter paddy is chiefly grown. This region is particularly suited to irrigation. The canal system that operates in the district fall in this area. About two and a half decades back Mr. Swanzy in his revised District Gazetteer (1932), published in 1938, observed " it may be said that with the irrigation facilities now existing the district is practically immune from famine on an extensive scale ". Since then, chiefly during recent years, the district has also been provided with some other kinds of irrigational facilities. In spite of cultivators' indifference towards irrigational facilities many irrigation schemes have been executed in the district either totally at the Government's instance or with the joint efforts of the cultivators and the State. A brief account of the different kinds of irrigational facilities obtaining in the district is given below.

Canals.—There are three big canals in the district, viz., Dhaka canal, Tiur canal and Tribeni canal. Besides there is another canal

system to be established in the district which is in project stage and is known as Gandak project. These canals, electric tube-wells and any other irrigational schemes which cost more than Rs. 30,000 come under the major irrigation system.

Dhaka Canal.—In the revised District Gazetteer of 1932 it has been mentioned : "The Dhaka canal runs south and west from the vicinity of Bairgania station and was designed to carry off the water of the Lal Bakaya river to the south of Dhaka thana. The construction of the canal was begun in 1896-97 as a famine relief work and was completed in March, 1908. The area irrigated by the canal is approximately 16,000 acres. It works extremely well and ensures good crops".

For long-term lease for *khariff* crops only a cultivator is charged rupees six per acre annually, whereas the charge for short-term lease is rupees eight. The average revenue (on the basis of the figures for 1952-53 to 1956-57) derived from this canal is Rs. 90,896 per annum in the form of water rent receipt. A table is given below to show the area irrigated by this canal from 1952-53 to 1956-57 :—

(*In acres.*)

Crop season.	Lease.	1952-53.	1953-54.	1954-55.	1955-56.	1956-57.
Khariff ..	Long-term lease	12,071	13,128	12,971	12,140	13,168
Ditto ..	Short-term lease	2,682	1,250	1,863	1,984	1,421
	Total ..	14,753	14,378	14,834	14,124	14,589

From the abovementioned figures the average area irrigated annually from this canal comes to 14,536 acres.

Tiur Canal.—The Tiur canal is smaller than the Dhaka canal. In the revised District Gazetteer published in 1938 (written in 1932) it has been mentioned : "The Tiur canal takes off from the Tiur river and runs almost due south from Chauradano to Lakhaura. This canal, which was completed in 1879, was constructed mainly at the expense of Rai Bahadur Durga Prasad Singh, the Madhuban Babu and of other zamindars. The total cost was Rs. 72,926 of which Governmcnt paid Rs. 6,881. It was taken over by Government in 1886 and has been maintained since that time from provincial revenue. It traverses what is perhaps the most fertile tract in the district and is a great success. The area irrigated is approximately 6,000 acres".

The charge of irrigating an acre of *khariff* crop to the cultivator is the same as in the case of Dhaka canal. However, in this canal lease is given out for hot weather crops also and its cost to the cultivator comes to Rs. 10 per acre. The average revenue (on the basis of figures for 1952-53 to 1956-57) derived from it is Rs. 28,666

per annum in the shape of water rent receipt. A table is given below to show the area irrigated by this canal from 1952-53 to 1956-57 :—

Crop season.	Lease.	1952-53.	1953-54.	1954-55.	1955-56.	1956-57.
Khariff ..	Long-term lease	2,350	2,358	2,541	2,614	2,627
	Short-term lease	504	320	559	459	340
Hot weather	.. ..	1,692	967	850	753	835
	Total ..	4,546	3,645	3,950	3,826	3,802

From the abovementioned figures the average area annually irrigated from this canal comes to 3,953 acres.

Tribeni Canal.—The Tribeni canal flows along the northern boundary of the district for a total length of 93 miles. It takes off from the Gandak through its head-sluice at Bhainsalotan near the village Tribeni from which it derives its name. The canal was first opened for irrigation at a cost of Rs. 75 lakhs on the 7th June 1909 as a famine relief measure after the Great Bengal Famine of 1896. Accordingly the canal was classified as an unproductive scheme. Originally it was only 61 miles and 1,650 feet long with a capacity to carry a maximum discharge of 1,708 cusecs to irrigate 85,400 acres of irrigable land out of its total gross command area of 427 square miles or 2.73 lakh acres. But the masonry structures over it were designed for a maximum capacity of 2,720 cusecs of head discharge. This was done with a view to bring under irrigation more areas with the extension of the canal in future and when the demand for irrigation would increase.

With the passage of time, the demand for irrigation increased and subsequently extension and expansion programme of the canal had to be taken up. The first phase of the expansion of the Tribeni canal costing about Rs. 29 lakhs was done in 1950. This consisted of extension of distributaries and desilting of main canal with a view to provide better distribution of the available discharge water of the canal and to irrigate more areas within its existing command. Under phase two of the expansion scheme some more extension of distributaries and their branches, namely, Belwa-Sathi and Shikarpur distributaries, are to be done for the same purpose as under phase one. Extension of Belwa-Sathi distributaries is under execution (1958) at an estimated cost of Rs. 2,71,018. The Shikarpur distributary is also to be taken up.

Under the Tribeni Canal Extension Scheme amounting to Rs. 1.13 crores the main canal has been extended to a length of 32 miles with a number of distributaries and a further area of 211 square miles have been brought under the command of the canal. An irrigable area of 54,000 acres is expected to get water under the scheme which is expected to be completed by the end of 1958.

The entire Tribeni canal runs across the natural drainage of the country which is from north to south, and necessitate the execution of a number of cross drainage works. This has increased the maintenance cost of land. The left bank of the canal is often breached during high floods and irrigation stops until the breached bank is restored at a considerable cost. In some years accumulation of boulders and silt in the leading channel, connecting the river with the head-sluice of the canal, has rendered it difficult to obtain sufficient water when irrigation is most needed, while in other years irrigation has been made difficult owing to siltation of the main canal and the distributaries. Apart from these the masonry structures in the upper reaches are damaged badly every year and cost much in the annual repair and maintenance. They are made of lime and mortar and are now 50 years old. Due to all this the annual cost of maintenance of the canal is increasing gradually. In 1957-58 about Rs. 3.5 lakhs had to be spent for the maintenance and repair of the old 61 miles length of canal.

At times some unauthorised irrigation is done by putting bunds across some of the natural drainage channel and this leads to administrative complications. This continues to be so since a pretty long time.

Inspite of the above-noted difficulties, the Tribeni canal has proved to be of great value to the area concerned, specially during the years of drought. The extension of the canal has increased the total area under its command to 638 square miles or 4.08 lakh acres. With the completion of all extension and expansion schemes the canal is expected to irrigate an area of about 2 lakh acres.

The rates of irrigation per acre now are : seasonal—Rs. 8; long lease—Rs. 6; and hot weather—Rs. 4. There is also a penal rate for unauthorised irrigation at the rate of Rs. 15 per acre.

A table is given below showing the area irrigated for long lease and short lease during 1953-54 to 1957-58 under *khariff* season and hot weather season :—

Khariff.

(In acres.)

	1953-54.	1954-55.	1955-56.	1956-57.	1957-58.
Ramnagar S. I. ..	56,471	58,146	58,217	59,535	62,573
Subdivision L. I. ..	5,830	4,365	3,765	2,615	
Maniari S. I. ..	40,780	37,631	43,427	44,336	74,284
Subdivision L. I. ..	17,035	20,568	13,772	20,000	
Total ..	1,20,116	1,20,710	1,19,181	1,26,486	1,36,857

Hot weather.

(In acres.)

	1953-54.	1954-55.	1955-56.	1956-57.	1957-58.
Ramnagar subdivision.	7,037	5,701	2,341	3,300	6,091
Maniari subdivision	5,743	5,404	3,844	6,805	10,186
Total ..	12,780	11,105	6,185	10,105	16,277

Electric Tube-well.

In the year 1952-53 a power station was constructed at Chakia to supply power for land irrigation and other purposes. Since then 83 electric pumps have been sunk in the district up to 1955-56 at the cost of about Rs. 70,000 each. Each pump is to discharge a maximum of 1.5 cusecs or 33,000 gallons per hour. The gross area commanded by these pumps comes to about 33,200 acres at the rate of 400 acres per tube-well site and the culturable area comes to 20,750 acres at the rate of 280 acres per tube-well site. The total area proposed to be irrigated by these tube-wells comes to 3,370.27 acres. These tube-wells have not yet (1956-57) gone into operation. This scheme is expected to increase agricultural produce considerably in the district. The cost of water from the tube-wells will be much higher than canal water.

Medium Irrigation Schemes.

The irrigation schemes which cost above Rs. 5,000 and below Rs. 30,000 come under the definition of medium irrigation schemes. These schemes consist of construction of sluice gates over rivers, repair to bunds and pynes, etc. The progress made under this scheme from 1950-51 to March, 1957, in the district may be mentioned as under :—

Number of schemes completed	14
Area benefited (acres)	25,522
Cost involved (rupees)	3,50,041
Population covered	26,000

Minor Irrigation Schemes.

All the construction and repairs of pynes, *ahars*, bunds, excavation or repairs of tanks, etc., costing below Rs. 5,000 comes under the definition of minor irrigation schemes. The construction of wells, installation of tube-wells, open borings with or without strainers are also included under this category. Execution of such schemes under the joint cost contribution by the State and the cultivators, the

share being 50 per cent to either party, is becoming very popular in the district. The progress made under this scheme from 1950-51 up to March, 1957, may be summarised as follows :—

Kinds of scheme.	No. of schemes completed.	Approximate cost involved (in rupees).	Approximate area covered (in acres).	Approximate population covered.
1. Repairs of *pynes, ahars* and bunds.	202	3,66,485	14,500	15,000
2. Surface percolation wells	549	1,93,427	3,294	2,745
3. Open boring	58	40,954	584	600
4. Tube-wells	28	Not available	2,800	Not available.
5. Pumping sets ..	161	94,000	16,100	8,000
6. Rahats	20	5,000	120	100

It is estimated that the execution of these schemes has increased the yield at the rate of 2 maunds per acre in an area of approximately 30,600 acres and at the rate of 5 maunds per acre in an area of 6,798 acres.

Statement showing the area irrigated by different sources in Champaran from 1952-53 *to* 1955-56 *(in thousands of acres).*

Year.	Government Canals.	Private Canals.	Tanks.	Wells.	Other sources.	Total area irrigated.
(A) 1952-53 ..	151	150	Negligible	Negligible	4	306
(B) 1953-54 ..	148	94	2	2	19	265
1954-55 ..	205	35	2	2	11	255
1955-56 ..	82	63	Nil	Nil	6	153
(C) 1956-57 ..	131	Negligible	Negligible	Negligible	29	160

The most disturbing fact that becomes apparent after a look at the statement is that the area under irrigation has been showing a consistently downward trend so much so that while 3,06,000 acres were irrigated in 1952-53 as against 1,53,000 acres in 1955-56 thus reducing exactly by 50 per cent from the previous figure. There is forwarded one reason that an even and sufficiently distributed rainfall neutralises the necessity of more and more of artificial irrigational facilities. But, taking even that as valid it is difficult to accept the premise that in all these years there have been a consistently even and well distributed rainfall every year in the district. On the contrary, there have been constant droughts since 1953-54 and reached

(A) Vide *Bihar Statistical Hand-Book*, p. 22,1953.

(B) Vide *Bihar Statistical Hand-Book*, pp. 28-29, 1955.

(C) Vid *Hand-Book of Reorganised Bihar*, p. 18,1956.

an acute stage in 1955-56. However, it will be seen that Government canals supply the largest area with water while private canals occupy next position. Both tanks and wells irrigated 4,000 acres each during the year 1953—55. Other sources irrigated more area than either tanks or wells do. In 1954-55, 2,05,000 acres of area were irrigated by Government canals as against 82,000 acres in the next year. Private canals irrigated 1,50,000 acres of area in 1952-53 as against only 35,000 acres in 1954-55. Though, fluctuating a bit on either side the acreage under different sources shows the disturbing trend of going down fast as the years advance. With our knowledge of intensive activities undertaken by the Government under the two plans to offer better and wider facilities of irrigation to protect from the vagaries of monsoon the above figures appear confusing and, therefore, unacceptable without a proper investigation.*

SEEDS.

The quality of seeds also counts considerably in stepping up yield. In respect of some of the crops, it has been estimated better varieties of seeds can enhance the output to the extent of 15 to 20 per cent.

It is comparatively a recent innovation to step up production by using better seeds. The cultivators use the same type of seeds which they have been growing for decades. They generally reserve certain portion of their field produce and use that as seed. But as they are technically not considered cent per cent pure and are understood to be of inferior quality, they do not give as much yield as is expected from a better variety of seeds. During recent times several improved varieties of seeds have been obtained either by selection on hybridisation by the Department of Agriculture, Bihar on its research stations in the State or imported from outside research stations in India. Several imported seeds have been given trial under local conditions and have been recommended to replace local seeds. An account of local as well as imported seeds is given below in a tabular form :—

Name of the crop.	Name of the local varieties of seeds.	Name of the imported varieties of seeds.	Remarks.
Paddy ..	*Sathi, Boro, Katika, Bansmati, Deosar, Kalamdan, Baharani, Badsah bhog, Sengara, Jessariya, Barhmabhoshi, Saro, Manasara, Bhanisalote, Sona and Sathika.*	B. R. 1 (Bihar Kolaba), B. R. 3 (115 B.K.), B. R. 4 (141 B.K.), B. R. 6 (88 B.K.), B. R. 7 (36 B.K.), B. R. 8 (198-2A), B. R. 9 (818-3A), B. R. (B. R.-13), B. R. 14, N. P. 24 and N. P. 31.	Out of the seeds mentioned in the previous two cols. B. R. 3 (B. K. 115), B. R. 8 (498-2A), B. R. 9 (818-3A), B. R. 14, *Sona* and *Sathika* are popularly grown in the district.

* Such confusing figures for irrigated areas will be found for other districts as well. The matter was reported to and is under investigation of the Directorate of Economics and Statistics. (P. C. R. C.)

Name of the crop.	Name of the local varieties of seeds.	Name of the imported varieties of seeds.	Remarks.
Wheat ..	*Dawadia* (white grained), *Dudhia* (soft white grained) and *Lalka* (red grained).	N. P. 755, N. P. 758, N. P. 761, N. P. 798, N. P. 799, N. P. 52 and B. R. 319.	N. P. 761 is the most popular variety since it is early maturing and can be grown after early paddy. N. P. 755 and N. P. 758 come next due to their high yield, drought and rust resistance. These come amongst the mid-season wheat.
Barley ..	*Desi* barley ..	B. R. 21, B. R. 22, B. R. 24 and N. P. 21, N. P. 13 and N. P. 24.	
Maize ..	*Baraki Makai*, *Tinpakhia*.	*Jaunpur*, *Kalimpong* and *Tinpakhia*.	*Jaunpur* is most popularly grown in the district.
Rahar ..	Red and black according to colour and *Aghani*, *Maghi*, *Chaiti* according to season.	S. T. 7 and B. R. 65.	B. R. 65 is most popularly grown.
Sugarcane ..	*Rewara*, *Lalgainra*, *Bhuaria* and *Pansahi*.	C. O. 419, C. O. 513, C. O. 453, C. O. 313, B. O. 10, B. O. 3, B. O. 14, B. O. 19, B. O. 21, B. O. 22, B. O. 28, B. O. 29, B. O. 31 and B. O. 35.	B. O. 10, B. O. 3, B. O. 21, C. O. 419, C. O. 313 and C. O. 513 are the most popular cane grown in the district. Local varieties have practically gone out of cultivation in this district.
Gram ..	..	N. P. 58 and N. P. 53.	N. P. 58 is most popularly grown in the district.
Peas ..	..	*Sepaya* A and N. P. 29.	*Sepaya* A is grown popularly in the district.
Moong ..	..	Type 1 ..	There is only one variety and it is grown exclusively in the district.
Jute ..	..	Corchorus capsularies and C. Olitorius.	Corchorus capsularis is most popularly grown in the district.

It is said that the introduction of improved varieties on a wider scale has been rather slow in the district due to inadequacy of seed supply. Seed Multiplication Farms have been set up at district, subdivision and anchal-*cum*-block levels to supply improved seeds to the entire district in order to step up production during the Second Five-Year Plan. These farms are to be the "foundation seed farms" of 100, 50 and 25 acres, respectively. Block farms have a programme to spread pure and improved seeds of most of the crops within its area within a period of three to four years by flowing the "foundation" seeds produced in its farm in three stages through registered growers. It is calculated to increase the production of the important crops like wheat, paddy, sugarcane, pulses, etc.

Manures and Fertilisers.

Compared to the last 30 years the consumption of manures and fertilisers has increased considerably. Not only cowdung and compost are used but farmers have been taking more to the use of oilcakes and chemical fertilisers to increase the crop production. Nightsoil or ponderatte which was unheard of thirty years ago or people did not use it due to their prejudices are now being used in greater quantities. It is so much in demand that municipalities are not able to cope with it. Green manuring, which was formerly done with *sanai* (Crotolaria juncea), is now supplemented by *moong* (Phaseolus radiatus), *urid* (Phaseolus mungo) and *meth* (Phaseolus aconitifolius) in about 15 thousand acres in the district. Among all kinds of manuring practices green manuring has been found to be the cheapest. Even the chemical fertilisers show better results only in those fields where organic matter is sufficiently high due to green manuring.

At present among the nitrogenous fertilisers ammonium sulphate is used in the district on an average to the tune of 1,378 tons (on the basis of consumption from 1953 to 1956) and single superphosphate to the tune of 2,042 tons. Bonemeal is also used but to a very limited extent. A table is given below showing the consumption of fertilisers from 1953 to 1956 :—

Name of fertilisers.	Consumption in tons yearwise.			
	1953.	1954.	1955.	1956.
Ammonium sulphate ..	979	1,250	1,824	1,460
Superphosphate	613	1,423	3,679	2,453.65
Bonemeal	31	21	16	..

(Figures for this table have been supplied by Bihar State Co-operative Bank, Credit Agricole Section.)

Besides the abovementioned figures, certain special fertiliser mixtures are directly imported by the sugar factories and distributed amongst the cane-growers through the Cane-growers' Co-operative Societies on credit. The quantity so distributed is understood to be considerably large, although no figures for them are obtainable. This understanding is based on a spot enquiry in which it was found that all the cane-growers had received on credit some fertiliser mixture from the respective cane factories to which they regularly supplied their cane.

The manurial schedule commonly recommended to the cultivators in this district prescribes the use of 2½ maunds of ammonium sulphate, 3 maunds and 5 seers of single superphosphate for cereal crops in the irrigated area and the dose of ammonium sulphate is reduced by 50 per cent in an unirrigated area. One maund and 22½ seers of single superphosphate is recommended for use in leguminous crops.

Most of the farmers do not know how to use fertilisers. Earlier they were completely ignorant of it. But now they are being educated in the technique of using fertilisers by various agencies, Governmental and non-Governmental.

Diseases and Pests.

Various kinds of diseases and pests have been found to be prevalent in the district for different crops. A brief description of some of them is given below :—

(*i*) *Rice hispa* (Hispa armigera).—This is a kind of pest which affects paddy plants. The beetle feeds on the leaves. The immature stages also feed on the plant leaves making blisters or blotches and giving to the crop a scorched appearance. Dusting 5 per cent B. H. C. is generally recommended as a remedy.

(*ii*) *Gundhi bug* (Leptocorisa varicornis F.).—This is an elongated bug commonly found on grasses and cereals. This feeds by sucking sap but in particular milk juice of the developing grain of paddy. This makes the ears fail and turn white. Dusting with gammexane 0.025 at the rate of 20 to 25 lbs. per acre is recommended.

(*iii*) *Grasshoppers* (Hieroglyphus spp.).—This is also a kind of pest found in the cereals. This feeds on foliage and cuts ears' heads. The period between September and November is the main time for its attack. Dusting B. H. C. for early stages of the pest and 10 per cent for more advanced stages are recommended.

(*iv*) *Blast* (Piricularia Oryzæ).—This is a disease which attacks rice plants in all the stages of growth. It manifests itself in the form of spindle shaped brown spots with grey centre. These spots increase in dimension gradually and in cases of severe attacks the plant withers away and present blasted appearance. In the stem nodes are blockened and break at the joint. The grains remain unfilled and become

chaffy. It is controlled by spraying with bordeaux mixture, disease resisting paddy varieties and balanced used of nitrogenous fertilisers.

(*v*) *Leaf spot* (Helminthosporium Oryzæ).—In this disease spots on leaves first appear as minute brown specks and later develop up to ½ cm. long. They are elliptical and are darker in the centre than in case of blast. In severe cases ears fail to emerge, seeds become shrivelled and discoloured. The primary infection of the disease can be controlled by treating with agrosan GN or ceresan at the rate of 1 part of the disinfectant for 400 to 500 parts of seed.

(*vi*) *False smut* (Ustilaginoidea virens).—In this disease individual grain grows abnormally large at times, may be surrounded at first by a bright orange or alive green skin and then become balls several times more in diameter of the normal length of the grain, covered with green black coating of powder.

(*vii*) *Red rot* (Coltetrichum felcatum).—This is a disease which affects sugarcane. In the affected plants leaves droop and dry up along the margin. The badly affected canes shrink and black specks appear on its rind which are conspicuous near the nodes. On splitting a cane broad red blotches with transversely elongated white centres are noticed. A sour smell is also noticed. In the middle of leaves, characteristic lesions occur. Rooting out the affected plants, selection of setts from diseased free clumps and growing of resistant varieties are recommended to get rid of the disease. In the past this disease invaded this district in an epidemic form.

(*viii*) *Mango hopper* (Idiocerus spp.).—This affects mango fruit only. When the trees bear flower spikes thousands of hoppers appear and suck up the juce from the shoots and flower stalks. This drainage of sap causes flowers and buds to dry up and wither away. The hoppers exude a sweet fluid which makes the appearance of the affected tree black. Spraying of D. D. T. and guesard 550 during the flowering time, before the buds open, is recommended.

Some other kinds of diseases like stem rust or black rust (Puecinia graministritici), loose smut (Ustilago tritici), stem borer (Argyria sticticraspis), etc., have also been found prevalent in the district.

Besides pests and diseases, wild animals like jackals, boars, monkeys, blue cows, etc., domestic animals like cows, buffaloes, goats, etc., and birds like crows, wood-peckers, parrots, etc., also cause damage to the crop. Although the extent of damage caused to the crop due to combined effects of various pests and diseases and animals and birds' depredations has not been ascertained but it is estimated that a total prevention of all these would add no less than 10 to 15 per cent to the total output in the district.

It appears necessary to mention here that there has not been any widespread outbreak of pests and diseases in this district in the

recent past. There is a plant protection unit under the Agriculture Department in the district. Some of the effective demonstrations conducted in the district have convinced a good section of the cultivators about the effectiveness of pesticides like gammexane (BHC), guessarol, geigy 33A (D. D. T. product), etc., and they are gradually taking to these things to protect their plants against pests and diseases.

Crop Rotation.

The sequence of growing crops in succession is called crop rotation and a scientific rotation of crops is essential to maintain the fertility of the soil. Crop rotation may be affected by growing one crop after the other or by growing two or more crops at a time in the same field. In rotation principles growing of legume crops and green manuring through legume crops are considered desirable. The rotations may be of one year, two years and three years. Some important crop rotations and mixtures observed in this district are given below in a tabular form :—

(1) One year's rotation—

Kharif.	*Rabi.*
(*i*) Paddy ..	Paira.
(*ii*) Paddy ..	Peas or gram or oats.
(*iii*) Jute and paddy ..	Wheat or barley.
(*iv*) *Bhadai* paddy followed by early *aman* paddy.	Onion.
(*v*) Paddy ..	Onion or potato.
(*vi*) Maize and turmeric.	Wheat.
(*vii*) *Moong* for seed followed by *moong* for green manuring and this followed by paddy.	Wheat or onion.
(*viii*) Maize and *arhar* ..	*Arhar.*

(2) Two years' rotation—

Kharif.	*Rabi.*
First Year.	
(*i*) Paddy ..	Sugarcane.
(*ii*) Maize ..	Sugarcane.
(*iii*) Green manure ..	Sugarcane.
(*iv*) Green manure ..	Wheat.
Second Year.	
(*i*) Sugarcane ..	Sugarcane.
(*ii*) Sugarcane ..	Sugarcane.
(*iii*) Sugarcane	Sugarcane.
(*iv*) Maize and *arhar* ..	Maize and *arhar*.

(3) Three years' rotation—

Kharif.		*Rabi.*
	First Year.	
Green manure	..	Sugarcane.
	Second Year.	
Sugarcane	..	Sugarcane.
	Third Year.	
Paddy	..	Wheat.

Rotation is followed on all types of soil excepting *chaur* lands where a single crop of paddy is grown as they normally remain submerged under water throughout the year excepting for a few weeks. Sometimes *rabi* crops are also grown in *chaurs,* especially in such *chaurs* which remain out of water for a pretty long time.

Marketing of Agricultural Produce.

The bulk of the agricultural produce, chiefly food-crops are consumed by the producers and only a small percentage comes to the market for sale. However, the bulk of the non-food-crops like jute, sugarcane, tobacco, etc., is sold out.

The food-crops are commonly brought by the producers themselves to the primary market. Some village *banias* also do this kind of business. From the primary markets the produce are brought to the secondary market through the agency of grain traders and made over to big *arhatias* who sell them out to retailers and the final consumers purchase them from the retail traders.

The producers are generally weak and they cannot retain their produce to be sold out at a favourable time to fetch a better price. They generally sell out their produce at harvesting time when the price is comparatively low. The middle men or *banias* make huge profits at the cost of producers. There is no warehouse and credit facilities available to the producers. Such facilities would help them a lot in improving their lot.

There are still other difficulties which stand to the way of producers. These difficulties may be said to be the complete absence of the provision for a scientific grading of produce and a standard weight for all the markets. The provisions would mean fair dealing and fair price to the producer. Sometimes even the producers themselves do not care to separate waste materials like stonechips, dust, etc., from their produce.

So far non-food-crops are concerned, sugarcane is generally supplied to sugar factories, jute and tobacco up to the secondary market are dealt with like foodgrains, but from there they are exported outside the district to manufacturing centres.

The important centres of marketing in the district are Narkatiaganj, Chanpatia, Ramnagar, Bagaha, Bettiah, Motihari, Chiraiya,

Pakari Sikta, Bhelwa, Raxaul, Adapur, Siswa Basantpur, Sariswan, Chakia and Ghorasahan.

Communication and modes of conveyance are the two props for a quick and easy trade and commerce. The chief difficulty in Champaran district for marketing has been a certain amount of inaccessibility of some of the areas that grow good crops or are rich in forests. The proximity of Nepal *tarai* has been another difficulty. It has already been mentioned elsewhere that the Public Works Department did not have much to do with the roads in this district till 1946-47. It was difficult to reach by road the subdivisional town of Bettiah a few decades back. The District Board did not have proper finance to put up strong culverts and heavy vehicles could only move at considerable damage to the vehicles as well as to the roads.

A certain amount of transport was done through the rivers. Bamboos and timbers used to be floated down from Bagaha right up to Mahendrughat whenever there would be enough water in the rivers. Cargo boat used to ply also. The canal, however, did not offer much facilities for navigation. The Second War brought about a certain change in improving the communications. The soft wood that is plentifully available in this district was fully utilised for making bobbins and put to other uses and a factory was set up at Motihari for manufacturing bobbins which could not be imported from abroad during the Second World War. There was also an enormous drain on *semal* trees for match wood and packing boxes. The jungles were fully tapped and heavy trucks started moving about even with the bad culverts on the roads. The North Bihar Regional Transport Authority was set up in the forties for regulating motor vehicles traffic and started granting permits to the public and private carriers at the teeth of opposition of the District Board. Ultimately the District Board had to yield and started improving their culverts and providing crossing wherever required. The Pubic Works Department took up roads from 1946-47 and a large number of District Board roads were taken over by the Public Works Department. We have now a fair mileage of tarred and macadamised roads in this district, details of which could be found in another chapter.

But this network of roads connects only the main townships and markets but leaves out the primary markets. The primary markets are still suffering from the handicap of bad roads and bullock-carts are the only mode of conveyance for such areas. It will probably take another two or three decades before every village has a road connecting the village up to a main artery and till that is achieved the primary markets are bound to have a certain amount of difficulties in reaching their goods to the wholesale markets. This transport is still done by the bullock-carts or by pack ponies.

The existence of the indigo *kothis* helped the road economy of the interior. The indigo planters were anxious to get the indigo

Serial no.	Name of thana.	Area in sq. mile.	Density per square mile.			Percentage of the total area.			Rate of rent per acre for occupancy *raiyats*.	Remarks.
			1872.	1881.	1891.	Net cropped area.	Culturable area.	Area not available for cultivation.		
1	2	3	4	5	6	7	8	9	10	11
									Rs. a. p.	
1	Bagaha	619	161	278	304	50	36	14	1 9 2	
2	Shikarpur	554	223	238	274	69	23	8	1 10 4	
3	Bettiah	547	539	607	622	69	21	10	1 10 8	
	Bettiah Total	1,720	279	350	377	62	27	11	1 10 2	
4	Adapur	224	511	618	747	85	8	7	2 1 2	
5	Dhaka	335	686	756	803	83	10	7	2 8 1	
6	Motihari	290	496	620	660	71	20	9	1 11 4	
7	Gobindganj	286	522	607	658	70	19	11	1 14 3	
8	Kessaria	273	561	661	683	79	12	9	1 13 3	
9	Madhuban	122	658	815	849	81	10	9	2 11 3	
	Sadar Total	1,530	589	670	724	78	13	9	2 0 6	
	District Total	3,250	408	488	527	70	20	10	1 14 1	

Vide, *Final Report on Survey and Settlement Operations* (1900), page 15.

The difference in the average rent rates between Motihari, Gobindganj and Kessaria thanas on one hand and Adapur, Dhaka and Madhuban thanas on the other, has been attributed by Mr. Stevenson-Moore due to the difference in soil. He remarks: "In the first three thanas, which are mainly west of the small Gandak, the prevailing soil is a light sand. In Adapur and Dhaka it is a thick clay, which grows very luxurious paddy crops. In Madhuban conditions are approximate to those in Tirhut. The density of population in Madhuban is 849, in Dhaka 803, and in Adapur 747. The density even in Adapur exceeds the North Bihar average by 134. But I do not think the high rent rates, except perhaps in Madhuban, are mainly and directly due to the high density of population. A wave of agricultural enterprise starting from the southerly thanas, has flowed northwards through the thanas of Dhaka and Adapur within recent years, drawn by the extraordinary fertility of the soil. Having covered most of this tract, it is now spreading to Shikarpur thana. Another flowing eastward from the congested parts of Saran and Gorakhpur is similarly making its way over thana Bagaha".

He faced difficulties in getting an approximate accuracy regarding the percentages of the population, as cultivators and as labourers, were mainly dependent on the produce of the soil for their livelihood. This came up when he tried to discuss the material conditions of the people. One major obstructing factor, according to him, was the caste consciousness of the people. The Brahmins in fact who were cultivators had stated their occupation as priest and conversely a Koiri, who lived by serving others asserted that he was a cultivator. The confusion as regards the actual dependence on agriculture was justified. On the basis of the 1891 census 13,23,125 persons showed their occupation as agriculture thus accounting for 72 per cent of the population. This figure he denied to accept as he found it underestimated and gave his own figure as 85 per cent. He divided the agricultural class into three groups of pure cultivators, cultivators with other professions, if any, and cultivating labourers, but for convenience's sake, he put the cultivating labourer in the same column with the landless labourers, a column he set apart for 'others', and produced the relative percentages of the three groups out of the total population—

Pure cultivators	61
Labourers	33
Others	6
	100

This throws some light on the relative importance of particular castes from the agricultural point of view, and the percentage of the area occupied by each afforded additional corroboration. The following eight castes, viz., Goala, Rajput, Brahman, Koiri, Babhan,

Kayasth, Kurmi and Sheikh, totalling a little over 36 per cent of the total population according to the census of 1891, covered 60 per cent of the area.

Among the different religious communities, excepting Christians, both Hindus and Mohammedans depended largely on the soil for their subsistence. The tendency per female to increase relatively to males, was another interesting and important economic feature and this indicated more civilized and settled social and, therefore, agricultural conditions. There were immigrants, mainly from the three districts of Gorakhpur, Saran and Muzaffarpur. From Nepal also many came and settled down in Champaran.

Mr. Stevenson-Moore has concluded his analysis in the following two paragraphs :—

" In this section I have tried to trace the expansion of population in Champaran—Round Bettiah the headquarters of a powerful Raj and the southernmost thanas the country was cleared and peopled in very old times, while the rest of this large district was little better than a vast expanse of grass and forest, unbroken save by a hermit's abode, or by an isolated patch of cultivation sufficient to show the great possibilities that lay beyond it. The congested areas in this and the surrounding districts found an outlet to the east, in Dhaka and Adapur thanas; and the expansion was encouraged by the extraordinary fertility of the tract exploited, which now supports a density of population equal to most thanas in Tirhut. The onward movement still continues, checked only by the evil reputation that the northern portion of thanas Bagaha and Shikarpur have earned for a virulent type of malarial fever. But as the country is opened out it grows much healthier and this deterrent ceases to act.

The district, then with which we are dealing is one where rents are low, where population is sparse; where land available for cultivation is plentiful and of good quality yet this is the district in which the famine of 1896, not only was probably most severe, but also was soonest felt. Here is a fact which western methods of economic investigation entirely fail to explain. If there was one district in Bihar that should have been able to make a good fight on its own resources against famine, it was Champaran. But this was the district which was the first to succumb, and within certain restricted areas the most severely affected. Such is the problem that a consideration of census statistics has suggested. In treating the material condition of the people an attempt will be made to solve it."

Mr. O'Malley writes in the Census Report for 1911 regarding the population in relation to agriculture :—

" Compared with the other districts of the Tirhut Division, Champaran has but a thin population. Not only is the proportion of unculturable land (17 per cent) higher than elsewhere, but a large part of culturable area still awaits development. Pasturage rather

than agriculture has engaged the energies of its inhabitants until fairly recent times. Partly for this reason and partly because of the prevalence of malaria, which saps their energies, the people are but indifferent cultivators, and only two-thirds of the culturable area have been brought under the plough".

Mr. J. A. Sweeney, I.C.S., in his *Final Report on the Revised Survey and Settlement Operations,* published in 1922, has shown by a comparative statement that the mean density per square mile had increased in Champaran consistently since 1872, when the density per square mile was 408, in 1881— 488, in 1891— 527, in 1901— 507 and in 1911— 540. This the net variation of population in this district had been 32.5 per cent during the span of 1872 to 1911. Though the overall picture appeared to be satisfactory, there was a considerable set-back in the period 1891—1901 (— 3.7 per cent), a set-back from which the district did not appear to have quickly recovered. The famine of 1897 was accepted generally as the cause of this temporary decline but the 1901 census report attributed the cause to malarial affections and epidemics of cholera and plague. The population of the district nevertheless, made a remarkable recovery between 1901 and 1911 in which period it showed the largest proportional increase of the North Bihar districts, just as in 1901 it showed the greatest proportional decrease. It did not appear that there had been any very conspicuous improvement in public health in the decade 1901—1911 though the general impression was that climate had generally improved. Another significant fact was that there had been a decrease in the cultivated area since the first settlement. This could not be attributed to climate or public health, as the decrease had been most marked in thanas Motihari, Kessaria and Gobindganj which were not particularly conspicuous for bad climate and epidemics. The population of thanas Motihari and Gobindganj was still in 1921 than in 1891, while that of thana Kessaria had scarcely increased. In these three thanas the arrested development must have been due to something more than climate and health. To some extent the comparative lightness of the soil, and the opening up in the last two decades of the more fertile northern areas by numerous new communications and irrigation systems might have been the reasons. The following is a statement showing for 1891, 1901 and 1911 the density of population in the thanas and subdivisions :—

	1911.	1901	1891.
Sadar subdivision	726	686	724
Motihari	643	602	660
Adapur	784	749	747
Dhaka	854	771	803
Kessaria	689	661	683

	1911.	1901	1891.
Madhuban	806	810	849
Gobindganj	605	581	..
Bettiah subdivision	460	373	377
Bettiah	656	623	607
Bagaha	302	285	304
Shikarpur	307	272	..

The density was greatest in thanas Dhaka, Madhuban and Adapur where the land is very fertile and is now largely protected by irrigation. The development of Madhuban had been arrested by plough. The failure of Bagaha to recover the density of 1891 was due to the malarious climate of the northern tract and the transfer of 48 southern villages to thanas Bettiah and Shikarpur. In 1911, out of the total population of 19,08,385, 90 per cent or 17,28,902 persons were engaged in agriculture. And in agriculture 15,300 were receivers of income from agricultural land, 12,97,498 ordinary cultivators, 4,638 agents, managers of landed estates (not planters), clerks, rent collectors, etc., 4,10,862 farm servants and field labourers and 595 were growers of special products and market gardening. 13,943 persons were raising farm stock. Champaran was more dependent on agriculture than any district in the province of Bihar and Orissa, as 906 persons out of every 1,000 were supported. It had also the largest rural proportion of population. The rapid development of the district should have depended largely on immigration but peculiarly enough there had been a falling off since 1901 and that at the same time emigration had increaed. In 1901 the figures for Immigrants and Emigrants were 1,06,781 and 36,077 as against 95,518 and 47,832 in 1911, respectively. The population variation between 1931 and 1941 was 11.7 per cent as against 4.9 per cent between 1941 and 1951, the net variation being 7,24,880 between the 1951 and 1901 censuses. This increase in population has put much pressure on agricultural conditions because the district still continues to be predominantly agricultural. In the period of 1913—1919 an average net area of 13,86,851 was sown in Champaran as against 14,29,360 acres on average for the quinquennium ending 1921 and 14,77,094 acres on average for the quinquennium ending 1951. The population of Champaran is distributed very unevenly. And this is due to the fact that in the eastern revenue thanas of the Sadar subdivision which adjoin the Muzaffarpur district, the density of population exceeds 1,000; in the central portions of the district, the density varies from 800 to 950; while in the sub-montane area in the north-west, it is only 300 to 450 persons per square mile, the average density being 713 per square mile in 1951. Motihari subdivision has gained in 1951 more than Bettiah subdivision. In 1931—1941 Motihari subdivision had

a gain of 12.1 per cent as against 11.2 per cent for Bettiah subdivision. In 1941–1951 Motihari subdivision had a variation of 4.0 per cent as against 6.2 per cent of Bettiah subdivision.

CHANGING PATTERN.

Taking all facts together we come to the conclusion that the traditional agriculturist is having a change in his status and fortune and that the change generally may be regarded for the better. The changes that are taking place in the agricultural system, land tenures, abolition of zamindari, caste structure, etc., are going to affect the agriculturist profoundly. There is no longer the system of 'tied labour'. The owner of land however big he may be, has been denied of the privilege. The agriculturist is now free from the oppressions of the erstwhile zamindars but he is neither having happy dealings at the hands of the State *Karmacharis* in charge of the collection of rents. This relationship is however going to improve as the new set-up will be more and more closely supervised by the authorities. Men belonging to higher castes have lost the automatic elation to the position of village leadership by means of caste consideration alone.

The agriculturist is now enjoying more option in selecting the kind of crop he is to cultivate than his predecessors. The modern agriculturist, however, is more inclined towards the cultivation of cash crops like sugarcane, chillies and tobacco. Indigo and opium once cultivated in this district under compulsion imposed by the vested interests have totally ceased to the great relief to both the agriculturist and the society at large. Though there are fluctuations in the earnings from the cash crops, still the attraction is there. The cultivation of cash crops has been instrumental in bringing up some so to say agricultural industries, small and large, e.g., oil pressing, *gur* making and sugar mills or one may say *vice versa.*

Wages paid in kind are rather becoming unpopular and there is the increasing demand for being paid in cash. Labourers are now enjoying more freedom and are much more mobile than their predecessors. Tied labour in any form whatsoever has been abolished altogether. Credit facilities have been forthcoming in the mofussil areas more and more. The age-old process of fragmentation of holding has been sought to be checked. The index of urbanisation is going up and this affects agriculture indirectly.

Large money had been accumulated in the hands of the lower caste people during Second World War. Many prudent villagers bought up lands with the help of this money. This caused the price of land go up considerably. The agriculturist's previous social stigma has often been turned to advantage. Today the landless labourer is not so helpless as he was in the past. He is now in a position to dictate the term of wages. There has been an increasing

tendency on the part of the farmers' sons to go after already overcrowded white-collared jobs though they may have little qualifications to satisfy the needs of their service conditions. This may be due to the fact that in spite of its uneconomic nature the Government servant enjoys immense awe and prestige among the villagers.

Accumulation of money is now more evenly shared than before. The citadel of casteism is slowly being undermined by the amount of wealth in one's hand. The agriculturist is certainly gaining his status as an individual. The changes have weakened the forces among the poorer sections who have not always been able to adjust themselves to the changing pattern and consequently there is often a tension of the nerves and clash of interests. One can still be optimistic about their future as there have been general improvements all around. Economic power is no longer concentrated in the possession of land rights.

An agriculturist is still more interested in meeting primary needs and his daily and family life like food and clothing, rather than spend on tobacco, betel, tea or alcoholic drinks. But it is not rare that he sometimes persuades himself to spend a small portion of his purse over these avoidable items. Fuel and lighting form a very small percentage of his expenditure. The main expenditures are incurred on cultivation, interest on loans, journeys and ceremonies, etc. Medical and educational expenses are almost insignificant in the budget unless the agriculturist's family is of a higher class. However, attention has been drawn towards the education of the children even of the Harijan class. Litigation is still eating into the vitals of the agriculturist, although the number of cases has gone down perceptively since the abolition of the zamindaris. Ceremonies are occasional visitations which take away a considerable part of the budget.

This changed pattern in the agrarian life of the district ensures for the agriculturist of the future a more leisurely and bountiful life. He is going to have in the near future a good cup of tea to relax, better food to eat and more clothing to wear.

Natural Calamity.

Liability to Famine.

In the revised *District Gazetteer* writen in 1932 (published in 1938) Mr. Swanzy has observed: "Champaran was previously particularly liable to the visitations of famine owing to its dependence on the rice crop and the absence of irrigation. A generally deficient monsoon is more disastrous to rice than any other crop for the prospects of the early rice are seriously prejudiced by a scanty rainfall at its beginning, while a premature termination is both fatal to the winter crop. If there is a total failure of both

these crops, the people have nothing to subsist on until the harvesting of the *rabi* crops in the latter part of March, except maize and inferior millet crops, such as *kodo* and *sawan*. In dry years the *rabi* crops largely fail.

"Failure of the rains bears particularly hard on the Champaran *raiyats*, for as they inhabit a district in which copious rain is in normal years a certainty, where land is comparatively plentiful, and rents are low, they have not acquired the resource, energy and adaptability which are the attributes of their fellows in the more thickly-populated areas of Tirhut. Also they suffer more heavily from malaria and kindred diseases."

Since then there has not appeared anything which could be said to have affected the observations of Mr. Swanzy excepting that the malaria and kindred diseases have been partially controlled and the irrigational facilities have been extended considerably in the district.

Famines.

The district of Champaran was made a separate district in the year 1866 and since then up to the closing decade of the nineteenth century it was visited by several famines and scarcity. The most important of them are the famines of 1866, 1874, 1897, and the scarcity of 1889. It appears from a study of the Old English Correspondence Volumes preserved in the Record Room of Champaran that probably in 1842 also the district witnessed somewhat an acute distress, for letter no. 1173, dated the 10th November 1841, from the Commissioner, Patna Division, to the Joint Magistrate of Champaran, mentions "..... it seems highly probable that both the Khureef and Rubbee crops will fail this year from the want of rain". And the Magistrate was asked to furnish a fortnightly return of the price of principal grains on which the majority of the people subsisted with a view to evolve suitable measures to "..... alleviate the distress which must necessarily result from the failure of the harvests.....". However, further details about the distress and the relief measures adopted have not yet been traced out. The following paragraphs in connection with the first four natural calamities are quoted *in extenso* from the old *District Gazetteer* (1938) :—

"*Famine of* 1865.—In 1865 the rainfall was deficient and stopped early, none falling in October, with the result that the winter rice was almost a total failure. The previous autumn crops had been fair; but had been largely exported owing to the prevalence of high prices in the neighbouring districts; and consequently when the rice crop was lost, distress became general. As early as October, 1865, the commonest kind of rice could not be procured at less than 9 seers a rupee—three times the rate at which it was sold at the beginning of the year, and the price of all other foodgrains had risen in a similar proportion. The *rabi* crops were also poor owing to

want of moisture, and *china,* a grain which is largely grown in the early summer, withered completely.

"No relief measures were undertaken till June, when road works were started and relief centres established at Motihari and Bettiah for the distribution of gratuitous relief in the shape of one daily meal of soaked grain. No system seems, however, to have regulated the distribution of food, the quantity which each applicant obtained depending on the numbers present; thus at Motihari the sum allotted for relief was so small that each applicant out of 1,500 received only four chittacks or half a pound of food per diem. To add to the general distress, the main embankment on the Gandak gave way in August, and the flood-water passing over the district till it joined the little Gandak swept away the crops over a large area. The maize harvest, however, was good; prices fell in September and all relief centres were closed by the 1st October. In the meantime, the mortality from actual starvation and disease, accelerated by want of food, was very great; the total number of deaths reported being no less than 56,000 or 6 per cent, on an estimated population of 8,50,000."

"*Famine of* 1874.—In Champaran, as in other Bihar districts, the year 1871 was marked by excessive rainfall, the excess varying from 12 inches in the Bettiah to 18.50 inches in the headquarters subdivision. This surplus rain fell chiefly in September and was followed by inundations, which caused great damage to the bulk of the autumn crops. The alluvial deposits brought down by the floods seem, however, to have benefited both the rice and the spring crops and the outturn of these harvests was satisfactory. The year 1872 was, on the whole, favourable from an agricultural point of view and were it not that in March, 1873, violent hail-storms in the north of the district caused serious injury to the spring in isolated trades of country, the harvests would have been decidedly good. As things happened, it may be said that the year preceding the year of failure was a fairly prosperous year, neither above the average nor below it—and during the latter part of 1872 and in the early part of 1873 the grain market recovered in a great measure its normal tone.

"The rains of 1873 were deficient all over the district, the deficiency being much more marked in the Bettiah subdivision than in Motihari. During June, July and August, i.e., the months in which the autumn crop is sown and matures, the rainfall in the headquarters subdivision was somewhat in excess while in the Bettiah subdivision it fell short of the normal quantity. The *bhadai* crops suffered much from this capriciousness in the rainfall, and in particular maize, which is more largely grown than any other *bhadai* crop except autumn rice, not more than five-eighths of an average crop being harvested. In September the rain practically ceased only a third of an inch falling in the whole month and this entailed the

almost complete destruction of the winter rice crop. By the middle of January rice was quoted in Bagaha at 9 seers a rupee, and as the shopkeepers refused to sell even at that price, sales of Government rice were authorised.

"Rainfall in the beginning of the next month had immensely improved the prospects of the spring crops. In the meantime arrangements had been made for opening relief works and for importing over 10,00,000 maunds of grain. Incendiarism, robberies and other crimes prevalent in times of scarcity were becoming rife along the northern borders. In February Government relief was fairly established, relief works in the shape of tank-digging and road-making were opened, and the extension of the Gandak embankment was taken in hand. Early in June the rivers rose in the north of the district and flooded about 200 square miles, destroying all the Indian corn in the thanas of Motihari and Dhaka. The autumn crops, however, were fair, the outturn in the north-west and the centre of the district being exceptionally large, while in the east the yield was equal to the average. In the beginning of September, favourable accounts were received from all parts of the district except the east of Gobindganj where half of the late rice was said to have been totally lost. Before the end of that month, however, from 12 to 15 inches of rain had fallen, ensuring the winter harvest and spring sowings everywhere; and relief operations were closed at the end of September.

"In the relief of this famine Government distributed 1,190 tons of rice in charitable relief, sold 11,081 tons for cash, paid away 7,294 tons as wages on relief works, and advanced 8,012 on recoverable loans. It also distributed Rs. 36,950 in charity, paid Rs. 6,43,808 as wages on relief works and advanced Rs. 3,00,430 in loans. During January 11,631 persons were daily employed on relief works; in February 25,361; in March 52,758; in April 83,917; in May 1,59,668; in June 79,752; in July 73,007; in August 8,938; and in September 1,849."

"*Scarcity of* 1889.—Owing to the deficiency of the rainfall in 1888 and the consequent injury to the winter rice crop, there was scarcity in 1889 in the north of the district, in a tract of country forming the Dhaka thana and parts of the Motihari thana and Madhuban outpost. Relief operations were commenced in December and distress became acute in March owing to the partial loss of the *rabi* harvest. Relief works were closed at the end of June owing to the fall of abundant rain, which ensured full employment for the people on agricultural labour. The unusually heavy rain which fell in the latter part of July caused floods, and thus added to the sufferings of the poorer classes, about 2,000 of whom were in receipt of gratuitous relief during the months from July to September. The average daily attendance at relief works was greatest in May, when it aggregated 11,000."

"*Famine of* 1897.—The greatest famine of the century occurred eight years later and was caused by deficient and unfavourably distributed rainfall in 1895 and 1896, the effects of which were intensified by extraordinary high prices consequent on famine prevailing over a great part of India. Although the rainfall of 1895-96 was above the normal it was badly distributed. It was, on the whole, favourable for the crops until August, but it ceased prematurely none falling after the 21st September, not even in the *hathiya* asterism, when good rain is considered essential for the *aghani* rice crop and for providing moisture for the *rabi* and indigo crops. There was, moreover, practically no rain at all throughout the cold weather the total fall from October to March inclusive amounting to only half an inch.

"This was unfortunately followed by much more unfavourable conditions during 1896-97. In May 1896 the showers which facilitate the early sowings of the *bhadai* crops were much scantier than usual, and the monsoon rains began late, not breaking till the 25th June and then only feebly, the fall for June being less than half the average. The rainfall was capriciously distributed in different localities and remained in persistent defect throughout the rainy season, being 75 per cent below the normal in September; while not a drop fell after the 18th of that month until Christmas, with the exception of a shower on the 23rd November. There was a prolonged break of four weeks' duration from the 21st July to the 17th August, which did the greatest possible damage to the *aghani* rice and the *bhadai* crops and after the 1st September there was practically no rain at all that could be of any material benefit to the *aghani* rice crop. The total defect from May to October inclusive was 19.2 inches, or 40 per cent. Throughout the cold weather of 1896-97 occasional light showers fell, but in February there was a defect of 66 per cent.

"The result was a very inferior *bhadai* crop and an almost total failure of the winter rice, the outturn being only 8 and $3\frac{1}{2}$ annas, respectively. These two crops account for nearly three-fourths of the harvests of the district; and as the outturn of the *rabi* was only 12 annas, the distress in Champaran was more general and widespread than in any other district of the division except Darbhanga. Moreover, Champaran shared in the general rise of prices, and felt it the more acutely because in ordinary years it produces more than it needs, and exports its produce largely to Saran and elsewhere; consequently its dealers, and its population generally, had to submit to a complete change of normal conditions, from easy prices to famine rates and from large exportations to the importation of food for actual subsistence.

"In these circumstances, during the months of greatest distress the whole district was severely affected, except four tracts, all of which owed their comparative prosperity to irrigation, viz.,

(1) thana Adapur on the northern boundary of the district where the streams issuing from the hills were dammed , (2) a tract round Sathi factory in Bettiah, which was irrigated from a channel from one of these streams, (3) a tract round Bettiah watered from the Sikrahna, and (4) a smaller patch in Dhaka thana protected by the Tiur canal. Two main areas in the district were always worse than the remainder, and in one of them works remained opened when they had been closed in all other parts of the division. The first was a tract corresponding roughly to the Dhaka thana, where the failure of the rains was more complete than elsewhere, and where rice is the principal crop. The second was a large tract to the north-west of Bettiah, of which Ramnagar was the centre, and which included the thanas of Bagaha and Shikarpur. Here many causes combined to render distress severe and the relief of it difficult; the climate is unhealthy, the population scanty, the soil poor; the cultivators are inert, ignorant and unthrifty; there is little *bhadai* and less *rabi,* and the prosperity of the whole tract depends on its rice crop, which in 1896 was an almost total failure. When a plentiful *bhadai* crop restored prosperity to the rest of Champaran in August, 1897, the Ramnagar tract remained unrelieved, first because it has little or no *bhadai,* secondly because up to a very late date the rainfall there was much in deficit, and thirdly, because from its climate and its northerly position the crops in this area are always from a fortnight to three weeks later than they are in the south of the district."

Regarding the course of the famine of 1897 Mr. Swanzy in his revised *District Gazetteer* has also quoted with some slight abbreviation, from the final report of the Collector, Mr. D. J. Macpherson, C.I.E. The quotations are :—

"Although the whole of the Champaran district was at one time affected by famine, the duration and degree of distress varied considerably in different parts of it. The failure of the crops was not very serious in the portion of the district comprising the Dhanaha out-post lying to the west of the Gandak river nor in the vicinity of that river in most of its course where it forms the boundary of the district; nor along the north of the eastern half of the district marching with Nepal, where much was done to save the rice crop and provide moisture for sowing the spring crops by damming the small streams that come down from that country. Serious distress was likewise staved off by similar means in the broken jungle tracts skirting the foot of the hills in the north of Bettiah subdivision; these are inhabited by a race of aborigines of Mongolian type, called Tharus who are good husbandmen. In a limited area in the north-eastern portion of Dhaka thana also a considerable area of winter rice was saved, and of spring crops sown, with the aid of water taken from the Lal Bakaya river to which a temporary dam was thrown by the exertions of the public interested.

"Generally speaking in those portions of the district in which a fair *bhadai* harvest was gathered or irrigation was available, the distress was never acute. But even throughout the more favoured areas all classes of the population, except the more substantial cultivators, who managed to raise sufficient food for their own consumption, suffered, in common with the rest of the district, from the unprecedently high level which prices reached early in the season and maintained almost throughout the whole 12 months. And in the tracts which were saved for the most part by irrigation there were always certain villages and cultivators' holdings which this benefit failed to reach. Every portion of the district had thus to be embraced in the organisation for relief.

"The most severely affected area was the Ramnagar tract in Hardi (now Shikarpur) thana in the north of the Bettiah subdivision, where both the early and late rice, practically the only crop it yields, failed completely. Here relief measures began earlier and ended later than anywhere else lasting altogether for eleven months from the 8th of November, 1896, to the 8th of October, 1897. The tract first affected there covered an area of about 445 square miles with a population of 1,63,000. Almost simultaneously two other rice areas began to suffer severely, one in the south of Gobindganj and the other in the south of Dhaka thana. By the middle of December, as the *bhadai* began to get exhausted, the distress had extended to considerable tracts which were not largely rice-producing; and by the close of that month not only was the greater part of Bagaha and Hardi (now Shikarpur) thanas affected, but also a large tract extending from Bettiah down the southern part of the district in Bettiah and Gobindganj thanas and the northern part of Kessariya; while a great part of the eastern portion of the district was also suffering severely. During January and February the famine-striken area widened somewhat in the neighbourhood of these tracts, and by the middle of March it extended over 1,865 square miles of country with a population of about 11,34,000. At the same time there was much distress occasioned by the general pressure of very high prices and hard times in an area of about 728 square miles, with a population of about 4,20,000 classed as 'slightly affected'.

"The middle of March marked the end of the first stage of the famine, the period during which the necessity for relief gradually extended, in the absence of employment for the people, until the commencement of the spring harvest. After this, the cultivators who had *rabi* crops began to be able for a time to fall back again on their own resources and the attendance at relief works decreased until the middle of April. This period of about six weeks may be regarded as forming the second stage of the famine.

"During May the severity of the distress again deepened, and the area severely affected extended. By the latter part of that month

the whole of the district had become affected, as one stratum of the population after another came to an end of their resources; and the severely affected area extended to 2,100 square miles with a population of 12,75,000 and that slightly affected to 967 square miles with a population of 5,84,465. This the third stage of the famine, ended about the middle of June, when the monsoon rain reached the district, as it did on the 16th.

"The fourth stage of the famine was contemporaneous with the rainy season, and was characterised by a gradual mitigation of distress, as employment became generally available and money-lenders began to open their purse-strings, when a new crop was seen to be coming up well. The *china* millet, which was gathered in June, was also a help. During this period, however, there was on several occasions grave cause for the most gloomy forebodings owing to scanty rainfall and untimely and prolonged breaks, especially in that part of the district which had all along been suffering most acutely. The classes who were being relieved gratuitously continued to suffer as greatly as ever for a good while after those who could work were able to shift for themselves, as private charity could not be relied on to come to their rescue until the *bhadai* harvest was assured, while prices were higher than ever until after the middle of August. About the beginning of September, when a decided fall in prices came about, an area of 1,400 square miles with an estimated population of one million was removed from the category of severe to that of slight distress, but the total affected area remained the same as before. At this time 700 square miles with a population of 2,75,000 was still classed as severely affected, and 2,367 square miles with a population of 15,84,000 as slightly affected. By the 25th of September all relief in the latter was closed, but some works remained open until the 8th of October in the former tract, i.e., the Ramnagar part of the district, which had been the first to suffer nearly a year before".

In connection with this famine Mr. Swanzy further stated: "As regards the number of those relieved, the whole population of the district was affected by the middle of May, relief in some form or other having to be given, and this continued to be the case until the *bhadai* harvest began to come in the middle of September. Taking this, then, as the population affected, and 10 months as the period of famine, the daily average of 59,336 relieved on works and of 44,960 relieved gratuitously represents a percentage of 3.19 and 2.42, respectively, on the population affected. The time when the number in receipt of Government relief of all kinds was largest of all was in the second week of June, when it reached a daily average of 2,19,005 persons or 11.77 per cent of the affected population of whom 1,23,007 or 6.61 per cent were relieved on works and 95,998 or 5.16 gratuitously. The number relieved on works, reckoned in terms of one day, was a little over 18 millions as

compared with 15 millions in 1874, and the aggregate number receiving gratuitous relief was over 31 millions. The total expenditure by Government amounted to nearly Rs. 25 lakhs, of which one-half was spent in wages and a quarter in gratuitous relief, while Rs. 3 lakhs were advanced as loans. Owing to the extent and adequacy of the relief measures, no deaths occurred from starvation".

Scarcity of 1951-52.—There has not been any notable scarcity in the district since the revised *District Gazetteer* was written (1932) excepting the scarcity of 1951-52 and a few minor scarcities which were noticed in the years 1932-33, 1939-40, 1940-41 and 1950-51. These minor scarcities were overcome without much difficulties and as such they do not deserve to be mentioned in detail here. However, the scarcity of 1951-52 was of greater importance and special efforts had to be made to relieve the people from the scarcity condition.

The scarcity of 1951-52 was the cumulative effect of scarcity of 1950-51, flood and scarcity of 1951-52 and the war ridden economy of the Second Great World War. The State Government declared the entire district of Champaran a scarcity area and sanctioned a sum of Rs. 17.70 lakhs to extend relief to the affected people. The total sum of Rs. 17.70 lakhs was to be spent in different manners, the most important of which being hard manual labour for which a sum of Rs. 9.50 lakhs had been sanctioned. Gratuitous relief, construction of roads through local bodies, light manual labour and salaries of establishments accounted for Rs. 3.50 lakhs, Rs. 1 lakh and Rs. 20,000, respectively. Schemes for hard manual labour, light manual labour and construction of roads were extended to provide the opportunity of employment to the people while the provision for gratuitous relief was made for those who were incapable of doing any manual labour. 2,000 *kurtas* and 2,000 *janghias* were also distributed among the indigent children on behalf of Government. Besides, a sum of Rs. 33,054 was received as donation from the Bihar Famine Charitable Relief Fund and some donations in kind were also received from different agencies to be distributed free of cost. The names of the agencies with their respective donations are mentioned below :—

(1) National Christian Council, Bombay—285 maunds of wheat.
(2) Additional Collector, Patna—30 bags of rice and 100 bags of millet flour.
(3) Special Rationing Officer, Patna—45 bags of cereals and 200 tablets of soap.
(4) Australian Red-Cross Society—20 tons of rice.
(5) Merchants of Burma—20 tons of rice.
(6) U. N. I. C. E. F., Burma—20 tons of rice.
(7) Indian Supply Mission, America—1,080 maunds of wheat.

Relief work actually started in May, 1951. To facilitate work and exercise better control the entire district was divided into 17 charges and each was put in charge of a gazetted officer known as Charge Superintendent. Red ration cards were issued to indigent persons with directions to take ration from their neighbouring ration shops. The darkest period of scarcity was June and July, 1951, when the number of indigent persons rose to over 23,000 in the entire district.

Under hard manual labour a number of schemes like re-excavation of tanks, repair of bunds, repair of village roads, desilting of wells, etc., were taken up and a sum of Rs. 6 lakhs and odd was spent. Under light manual labour needle work, cotton spinning, shoe making, basket making, etc., were included and a sum of about Rs. 35,000 was spent over them which were taken advantage of chiefly by *purdahnasin* ladies. A sum of about Rs. 2,27,500 was spent over gratuitous relief and the expenditure over the construction of roads (40 in numbers) through the local agencies accounted for about Rs. 2,73,500.

The scarcity actually started in the month of May, 1951, and continued till the month of September, 1951, in the district as a whole but in Tharuhat and Dhangaran areas the scarcity continued and the relief was given till a later date. There was no starvation death in the district.

Protective Measures.

In his revised *District Gazetteer* Mr. Swanzy mentions : "Since the great famine of 1897 the railway has been extended through the north of the district by lines from Bettiah to Bagaha *via* Narkatiaganj and from Narkatiaganj *via* Raxaul Bairagnia. These extensions insure rapid communication practically throughout the district.

"The northern areas of the district are also now protected largely by irrigation from failure of crops due to shortage of rainfall. The Tribeni canal and the Dhaka canal have been constructed in addition to the Tiur canal. The former is the more ambitious project, running as it does across the waterway of the north of the district. Irrigation from it therefore has often been interrupted by breaches due to sudden floods in the hill-streams. Difficulty has also often been experienced owing to silting of the Gandak at the head sluice of the canal at Bhaisalotan and also silting of the canal itself. The canal, in spite of these difficulties, has been of very great benefit to the district. These difficulties have not been met with, in the district. These difficulties have not been met with, in the case of the Dhaka canal which ensures magnificent rice crops in the area irrigated except in years of very unusual floods."

Now there has been made some improvement in the Tribeni canal, details of which have already been mentiond earlier. As stated

above various other kinds of irrigational facilities have also been provided in the district, although many of them have not come in use at present. There has also been rapid development of road vehicular traffic. All these have rendered the district practically immune from famine.

Liability to Flood.

Writing about the liability to flood Mr. Swanzy mentions, "The configuration of Champaran renders it peculiarly liable to inundation. In the past the Great Gandak, a snow fed river, has caused serious flood. But the embankment maintained by Government along the left bank of the river protects an area of 2,693 square miles. This embankment which is 83 miles long (including 21 miles of retired lines) extends from near Bagaha to the southern extremity of the district but there are four breaches in it. It is kept under a contract with the proprietors of the estates protected from inundation. The first contract was made in 1883, the second in 1903 and the third in 1923 for another term of 20 years, the sum of Rs. 25,600 per annum being fixed for the maintenance of the embankment.

"Floods are frequently caused by heavy rain in the foot-hills of Nepal and the Sumeswar range. The hill-streams fed from these hills rise very rapidly and overflow their banks inundating large areas. These floods in the north of the district are very short in duration as owing to the fall in the general level of the country, the water rapidly drains off. In this area, therefore, little damage is done to the crops. The people are used to these floods and little loss of life is caused, though in more severe floods there is considerable loss of livestock. In the centre and east of the district extensive tracts are liable to be flooded by the overflow of the Sikrahna, Lal Bakaya and Baghmati rivers and their tributaries."

His observations do not appear to have undergone any change excepting that the earthquake of 1934 brought some alteration in the level of the country which has increased the danger of flood at least for a few years immediately following the earthquake of 1934.

As has been mentioned above, floods are generally of very short duration in the district and ordinarily no damage is done to the property nor the loss of life is caused to any considerable extent. Still at times the district has been a victim of severe floods. Such floods, as mentioned by Mr. Swanzy are the floods of 1898, 1906, 1910, 1915, 1923 and 1924. In connection with these floods the following paragraphs *in extenso* are quoted from Mr. Swanzy's revised *District Gazetteer* of 1932 :—

"*Floods of* 1898.—The highest flood on record in Champaran was that which occurred in September, 1898, when over 20 inches of rain fell at Motihari from the 4th to the 10th. The tract most seriously affected extended over 350 square miles or about one-tenth

of the district, lying chiefly in a strip about four miles broad on either bank of the Sikrahna between Sugauli and Mehsi, but the inundations were also of considerable extent in the south, where the floods of the Baghmati met those of the Sikrahna. The loss of life was very slight, only 16 persons being drowned but about 220 cattle and over 1,000 sheep and goats were swept away, and not less than one-third of the house in the badly affected area collapsed. The circuit house at Motihari fell, and the police-stations at Sugauli, Madhuban, Chauradano and Raxaul were destroyed. The Bengal and North-Western Railway was topped for miles and badly breached, with the result that traffic was at a standstill for over a month; while the Sugauli-Raxaul line was most severely damaged, the bank being completely washed away in places. Both these lines run across a strong line of drainage; and the waterways being insufficient the flood was given an accumulated volume and velocity, which greatly increased its power for destruction.

"Most of the *bhadai* crops in the affected area were destroyed, the loss being estimated at about two-thirds of the outturn. On the other hand, the winter rice was not damaged to any considerable extent and in fact was benefited by the heavy rain except in the tract close to the Sikrahna. The cultivators were also compensated by the rich deposit of silt, in some places 3 inches thick, which was left on the land submerged by the flood: and no sooner did the water recede than they began to prepare their fields for the cold weather crops. The labouring classes were not in any distress, as there was employment for all willing to work, houses being rebuilt, lands prepared for the *rabi* crops, and roads repaired on all sides. Agricultural loans were granted on a large scale but no other relief measures were necessary."

"*Flood of* 1906.—The last serious flood occurred in August, 1906, owing to the overflow of the Sikrahna river and its tributaries and also in a less degree to the temporary rise of the Great Gandak, by which some damage was caused in the Bettiah and Gobindganj thanas. The whole of the Motihari and Madhuban thanas, a portion of the Dhaka thana, and small tracts in the east of the Kessariya thana, the north of the Gobindganj thana, and the east of the Bettiah thana were affected, the worst damage being in the area between Siraha and Mehsi in the Madhuban thana. The area affected was roughly 400 square miles and here the maize crop was almost entirely swept away, while the *bhadai* and *aghani* rice crops were seriously damaged. Considerable distress was caused by the flood, and it was found necessary to open kitchens for granting gratuitous relief and to advance a large sum in loans. Test works were opened, but failed to attract labour and soon after the floods evidence of the marvellous recuperative powers of the people was forthcoming, for scarcely had the flood subsided when they began to sow and transplant the paddy seedlings."

"*Floods of* 1910, 1915, 1923 *and* 1924.—In subsequent years flood occurred in the district on a comparatively small scale, especially in the years 1910, 1915 and 1923. In 1915 the flood was high in the Sikrahna and Baghmati in the south-east of the district. *Takavi* loans were given out but no other relief was necessary. Collection of these loans was suspended in some areas in 1916 owing to a further flood in the Sadar subdivision of small dimensions. In 1923 a heavy flood in the Sikrahna occurred which was exceptionally high in the north of the district. The flood was very sudden. There was no warning and the level in the Sikrahna rose as much as 5 feet in four hours. In spite of this there appears to have been little loss of life as the people, well accustomed to similar conditions, retired to high ground without delay. Four corpses were seen in Ramnagar thana but were not identified and no reports were received from the village in the area of any loss of life. The flood backed up against the Tribeni Canal and the railway embankment breaching both. The damage to the Tribeni Canal was estimated at Rs. 75,000. The railway between Bhairogunj and Khairpokhra and between Sikta and Gokhula stations was also seriously damaged and road communications also suffered damage amounting to Rs. 5,000 being done to a pile bridge near Lauriya. A number of cattle were lost, chiefly from among large herds which grazed in the north of the district. Considerable loss was incurred in the Narkatiaganj Bazar owing to storages of grain and salt being damaged by flood. The flood, however, in other respects caused little loss. Water rapidly drained off and the crops were probably all the better afterwards. No distress was caused and no measures of relief were found necessary".

"*Flood of* 1924.—In 1924 there was a slight flood in the Gandak river in September which caused no loss of life or damage to property generally. This flood was important because two iron girders of the Bagaha railway bridge were washed away. The bridge has never been repaired and in consequence direct railway communications have been interrupted between Champaran and Gorakhpur. The direct cause of this disaster was rather a change in the course of the river than excessive flood."

Floods between 1934-35 *to* 1953-54.

As stated above since the earthquake of 1934 there had been some change in the general level of the district making it more vulnerable to floods, especially for few years after the earthquake. The district fell victim of minor floods in the years 1934-35, 1935-36, 1936-37, 1943-44, 1948-49 and 1950-51. All these floods were of very short duration and did not cause any noticeable harm to the people and as such they do not deserve any special mention. However, the district also suffered from flood in the years 1938-39 and 1953-54 which brought a good deal of sufferings in their trail to the people.

In the flood of 1938-39 there had been some breaches in the Gandak embankment in the 39th mile in Bettiah subdivision. The

flood was of such a severe nature that the villagers of the neighbourhood had to abandon their hearths and homes and settle elsewhere. However, there was no loss of human life although some cattle were washed away. Immediate relief measures were adopted to help the flood-striken people.

Between 24th to 27th July in the year 1953-54 all the rivers emanating from Nepal rose in flood simultaneously and the district fell a victim of flood. The flood was more severe in Sadar subdivision than the Bettiah subdivision. Prompt relief measures like provision of boats, distributions of gratuitous relief, supply of cheap foodgrains through fair price shops, distribution of *taccavi* loans, etc., were adopted. The relief officers, after enquiries on the spot distributed *taccavi* loans on the joint and bond system at local camps. The quick distribution of loans went a long way to sustain the flood affected people and at the same time enabled them to purchase paddy seeds for the first transplantation. Loan distribution was resumed in the flood affected areas on a wider scale from the first week of October, 1953, to enable people to cultivate *rabi* crops. Landless labourers were provided with employment as road improvement schemes were extended. Due to these measures and good harvest of *rabi* the material condition of the people returned to normal before the close of the year.

There was an investigation regarding the floods in the rivers by the Irrigation Department. From their elaborate report the following quotations are given :—

" *The River Sikrahna* (*Burhi Gandak*).—The flood during the year under review was abnormal. It rose to its maximum level on the morning of the 30th July, 1953, which was recorded at the Chanpatia Railway Gauge as R. I. 247.75, against R. I. 246.00 of last year.

" All of its tributaries were in heavy flood and consequently the river spilled after Basantpur (in Lauria police-station). In certain localities such as Sugaulighat, Barnawaghat, Lalbagiya and Madhuban in Champaran district, the river spilled over both its banks damaging standing Bhadai and paddy crops in Majhaulia, Motihari, Sugauli and Madhuban police-stations.

" Some special features of the river during the flood in this year are given below :—

(*i*) At Basantpur, the river Sikrahna received a moderate discharge through its distributaries named Masan, etc., which did not spill this year.

(*ii*) Its another tributary, the Balore, was supplemented with the discharge of hilly streams Harbora and others a little above the crossing of a railway bridge of $7 \times 40'\text{-}0''$ on the west of Sikarpur. This was also in H. F. L. at the same time, i.e., on the 30th July, 1953.

(*iii*) Its tributaries, Pandai, Karthaha, Gadh, Telawe, Sariswa, Bongri and Pasadh were also in high flood simultaneously.

" *Telawe Nadi.*—The H. F. L. was recorded by the observation of flood marks as R. I. 253.06 in the month of July, 1953. The river spilled over its bank near Raxaul-Sugauli Railway line crossing at Ramgarhwa and eroding the bank by nearly 100 feet, the spill water damaged standing Bhadai and paddy crops but the latter crops were retransplanted as the flood did not last long. However, the river maintained smooth gradient, did not reach the maximum H. F. L. and had less velocity than the Bongri.

" The villages Bila, Rampurwa, Singhasani, etc., were inundated with flood water with combined spill of the Uria, Sikta and Garh *nadies* with depth of spill varying from 2 feet to 4 feet.

" *Ramgarhwa.*—Sugauli road was overtopped at several places and the depth of water over the road was found to be from 6 inches to 1 foot.

" *The Pasah river.*—This river flowing through Adapur police-station joined the river Bongary near Banjari. The private embankment on the western side of the river breached near Katkanwa and damaged the whole area lying between its own course and that of Bongari, Narkatia, Siswania, and Bhaluahia villages were badly damaged.

" *The river Bongari.*—The river runs with a high velocity and does not maintain a particular course; now-a-days it flows parallel to the railway line (Darbhanga-Narkatiaganj) for a distance of about 1,000 feet in the middle of Raxaul-Adapur railway stations. This has got very swift current and was to form a new course sweeping the railway line about 1,000 feet west of the existing railway culvert this year.

" (*iv*) Near about Barnawaghat in Motihari police-station four main streams of the Nepal hills, namely, the Telawe, Bongari, Pasahand and Tiur *nadies* meet the river Sikrahana as a result of which the river spilled over both its banks and the spill water spread over an area of about 20 to 25 square miles in Motihari police-station, the depth of the spilled water being 2 feet to 6 feet. The spilling of either bank continued in Bhainsra and Ratra series of *chaurs* in Motihari police-station.

" (*v*) In the year 1897, a marginal embankment about three miles in length, was constructed on the left bank of the Sikrahna for checking the left bank spill, but in the year 1906 there was abnormal flood which breached the embankment and established an eastward flow overtopping Motihari-Teteria Road in the 17th and 18th miles. This flow of spill water passed through the Chaknaha *nadi* and spread over Bhunda *chaur*. Since then the regular spill of the Sikrahana passes through these areas. It was also learnt that the river Sikrahana

was flowing through another course which was touching village Jitauraon, the left bank.

The spill of the river Sikrahana also spread over the area between Narpahar Pakri and Pipra on the north of Muzaffarpur-Narkatiaganj railway line. The area near about Mehsi railway station was also under the influence of flooding from the Sikrahana.

Important Places and Communications Affected.

Sikta-Motihari Road.—It was overtopped in the 1st, 11th, 14th, 17th and 19th miles due to the spills of the Sikrahana and its tributary Tilawe. The depth of water on the road was observed from 6 inches to 1 foot 6 inches. One breach of nearly 100 feet in length occurred in the 18th mile near Ramgarhwa railway station.

Sugauli-Raxaul Road.—This road was overtopped in the 1st to 8th miles due to the spill of the Sikrahana river, the depth of water being 6 inches to 1 foot over the road.

Motihari-Tetaria Road.—This road was breached in the 16th, 26th and 28th miles for considerable length. The depth of soundings over the road was found to be 1 foot 6 inches to 2 feet.

Sikarpur-Lauria Road.—This road was overtopped in the 3rd, 4th, 7th and 8th miles with an average depth of flood spill of 6 inches to 1 foot.

Lauria-Ramnagar Road.—This road was overtopped in the 1st, 2nd, 4th to 12th miles. In the 1st and 2nd miles on the either side of Pakri bridge, 3 feet deep water was flowing over the road.

Bettiah-Chainpatia Road.—The road was overtopped in the 7th, 8th, 10th and 11th miles with an average depth of 1 foot spill water. Only one serious breach occurred in the 9th mile.

Bettiah-Jagdishpur Road.—This road was overtopped in the 3rd, 4th, 5th and 8th miles with an average depth of 1 foot of spill water from the Sikrahana river.

Bettiah-Pipraghat Road.—This road was breached in the 5th mile for a length of nearly 900 feet and there was only 6 inches to 1 foot 6 inches depth of water over the road due to spill of the Chandrawati and Konhara, both being the tributaries of the Sakrahna river.

Important Places Affected.

(*i*) No important town was affected, save and except the suburb of Motihari town. The flood water reached so near Motihari town that the drainage system of Motihari Municipality nearly ceased to function.

(*ii*) The water level of the Motihari lake which is fed by this river through the nalla of Bettiah Raj rose up to the bottom of the rails nearly at culvert near Mina Bazar.

(*iii*) The villages Rampura and Katkenwa in Majhaulia and Raxaul police-stations respectively, were also affected.

Causes of Flood.

The abnormal flood in the river Sikrahana were due to the following :—

(*i*) Heavy rainfall in the beginning of the monsoon period in the Champaran hills.

(*ii*) High flood in the tributaries.

(*iii*) Heavy rainfall continuously during the period 21st July to 31st July, 1953.

The rainfall for the period 21st to 31st July, 1953, when the highest level was attached by the river is given below :—

Rainfall stations.	Dates (month July).											
	21st	22nd	23rd	24th	25th	26th	27th	28th	29th	30th	31st	Total.
Motihari ..	7.08	0.96	0.70	1.33	0.20	0.49	1.02	2.85	1.52	0.21	0.20	16.56
Bettiah ..	2.85	1.75	1.60	0.35	0.15	0.28	0.90	0.88	2.90	..	..	9.66
Narkatia-ganj.	1.83	3.88	0.60	2.38	0.17	4.14	2.20	2.48	0.11	..	..	17.25
Kesariya..	0.35	2.25	1.50	0.10	2.72	3.25	0.20	0.10	0.36	..	..	10.83
									Total	..	..	54.30

The average of stations, for which the readings are available = 13.6 inches.

Remedial Measures.

(*i*) The marginal embankments should be provided along the banks of the Sikrahana river with sluices where considered necessary for drainage and also irrigation.

(*ii*) A scheme for the drainage of *chaurs* in Majhaulia police-station should be prepared, sent up for the consideration of the Government.

It is hoped that with the execution of the schemes as proposed above, the flood and drainage system of the adjacent areas which are affected by the spill of the Sikrahana may considerably be controlled and improved.

The River Bagmati.—The flooding of this district during the year due to the right bank spills nearabout villages Gonahi and Tajpur was abnormal and several important villages and roads of Patahi and Madhubani police-stations were inundated; roads were breached and practically there was no land communication during

the flood time. The standing *bhadai* and paddy crops were severely damaged.

The discharge of the Bagmati at Dheng on 2nd October, 1953 was 16,216 cusecs while the discharges through the spill channels were as follows :—

Name.	Discharge on 2nd October 1953.	Width.
	Cusecs.	Feet.
Laulua Nala	447	..
Pardesia Nala no. 1	292	81
Ditto no. 2	206	45
Ditto no. 3	2,206	134
Ditto no. 4	307	42
Ditto no. 5	361	48
Gosaipur Nala	584	..
Main Bagmati downward ..	11,813	..
Total of Bagmati at Dheng ..	16,216	

During the high flood the discharge of these nallas may be assured in the same proportion. 3,372 cusecs, the total of the five Sugia Pardesia channels, was the discharge when the river was at low level. During high flood, the discharge through them might have been passing three times of this amount.

From the local enquiry it is gathered that these channels have become vigorous because of the direction of the Bagmati from its old course, so if the old course be revised, the pressure of the river in these spill channels will be reduced and the vast area affected by the Sugia Pardesia Nalas will be saved from the spill ravages of the river Bagmati.

(*a*) *Important villages affected.*

Villages Barkagao, Gobindbara, Phenhara and Anjhorabara in Patahi police-station were affected.

Villages Gonahi, Suga Pipra, Chainpur, Jihuli and Gujraul were most seriously affected due to the right bank spill of the Bagmati river.

(*b*) *Important communications affected.*

Dhaka.—Padumkar Road was breached in the 2nd mile. Dhaka-Phulwaria Road was breached in the 4th and 7th miles.

Madhuban.—Dihulia Road was overtopped by 6 inches to 4 feet deep water throughout its length. Patahi-Madhuban Road was breached in the 7th and 8th miles and overtopped by 2 feet deep

flood water up to a length of $\frac{3}{4}$ and $\frac{1}{2}$ mile respectively. Motihari-Tetaria Road was breached in the 16th, 26th and 28th miles for considerable length. Flood water overtopped the road for half its length.

Remedial measures.

The main source of flooding of this district, by the river Bagmati, is the Sugia Pardesia spill channels. These have further developed during the last flood probably due to closing of mouth of Hirama spill channel in Muzaffarpur district though the latter gave way after a few days by outflanking. A proposal for providing a marginal embankment with suitable sluices along the river from junction point with the Lalbakia up to Hirama covering the above spill channels is under consideration and investigation.

The River Baya.—The channel below the junction of the Samohti with the Raghua at Bankal is known as the river Baya. Formerly it was a spill channel or *sota* of the river Gandak and is still fed through the Baya *nalla* in Muzaffarpur district.

The abovementioned rivers Samothi and Raghua are fed by the local drainage of the *chaurs* in Kesaria and Govindganj police-stations. The heaviest rainfall occurred in the beginning of the monsoon as mentioned in the rainfall report. The catchment basins of these rivers are mostly *chaurs,* such as Bahadurpur, Bhusaha, Ketra, Sonaula, Kesaria and Sundarpur *chaurs* which were totally submerged due to local rains, continuously from the month of July to September this year. The drainage channel falls in the Baya *nalla* which was also in flood due to local rains and consequently the above-mentioned *chaurs* could not be drained out before the months of October and November. The standing paddy and *bhadai* crops were severely damaged.

Important Communication Affected.

Railway station Pipra-Kalayanpur road was overtopped in the 6th and 7th miles at two places by 1 foot and 2 feet depth of water respectively.

Kalyanpur-Satarghat Road was overtopped in the 1st, 2nd, 5th, and 7th miles by 1 foot 6 inches deep water on average.

Rajpur-Chakia Road was overtopped in the 2nd, 6th and 10th miles by 2 feet 6 inches deep water on average. Boats were plying on the road near Brindaban *chaur* in the 6th mile in a length of one-fourth mile from the 22nd August to 15th September, 1953. The motor traffic was suspended, due to the overtopping of roads, for about two months.

Rajpur-Turkaulia Road was overtopped in the 2nd, 6th, 9th, 10th, 14th, 17th and 18th miles by 6 inches deep water.

Kesaria-Govindganj Road was overtopped in the 1st, 2nd, 8th and 9th miles by 9 inches depth of water.

Rajpur-Karnaul Road was overtopped in the 1st and 2nd miles by 1 foot 6 inches depth of water.

Rajpur-Sahebganj Road was overtopped in the 1st mile only by 6 inches depth of water.

Remedial Measures.

The drainage system of the *chaurs* may be improved by resectioning and regrading of portions of the Raghua *nalla* (not done so far). The survey and investigations for the revival of a dead channel from village Bhathua up to Madhopur Bangra for improving the drainage of the above *chaurs* are in progress and requisite scheme may be evolved in due course.

The River Gandak (Narayani).—General description of flood.— The river runs along the boundary of Champaran and Saran districts. The spill is protected by the Champaran embankment which is 83 miles long as well as by the Saran embankment. There are some gaps in the Champaran embankment, nearly two miles long in Kesaria police-station near village Karhan. As the river was in full spate, Karhan village was badly damaged and all standing crops were washed away by the spill passing through the above mentioned gap. The villages Nawadah, Pachoharia and Dumaria also suffered badly.

Effects of Flood on Champaran Embankment.

(*a*) *52nd mile at Barahwa.*—The river was over-active and had great erosive tendency here. The spurs and bank pilings were badly damaged and a few of them even collapsed. A width of 10 feet to 70 feet of marginal land was eroded. A great part of the village Barharwa was cut away. Due to these protective works, the main current has been diverted to a distance of half mile from the embankment but a live *sota* is still existing which may take an adverse turn in next flood.

Remedial measures.

To protect the embankment it is considered necessary to construct a number of single spurs (double rows) and 300 feet of bank pilings.

(*b*) *53rd mile.*—Due to erosion tendency of the river a width of 100 feet to 150 feet of marginal land was cut away.

Remedial measures.

To protect the embankment from further erosion it is necessary to construct a number of single spurs (double rows) 60 feet long.

(*c*) *54th mile.*—The *sota* was active here but by constructing three numbers of spurs in time, its erosive tendency was checked and the *sota* silted up to the best advantage of the embankment.

(*d*) *55th mile at Nagadaha.*—The *sota* was over-active here and a width of 400 feet to 500 feet of the marshy land was eroded in a length of about one-fourth mile and the main current of the river is diverted through the *sota* itself.

Remedial measures.

As the river has come too close to the embankment (only within 200 feet to 300 feet from the embankment) it is necessary to construct 1 number triangular spur and 6 numbers single spurs (double rows) 60 feet long to save the embankment from its dangers in the next flood.

The River Dhanauti.—General description of flood.—The rain water accumulating in the *chaurs* of Bettiah, Majhaulia and Harshidi police-stations reached into this river and inundated the areas on either bank specially in Motihari police-station.

Important communications affected.

Station-Court Road at Motihari was under water for 1 foot depth nearly, near the Motihari Zila School.

Turkaulia-Kesaria Road was badly damaged at several places between the 10th and 14th miles.

EARTHQUAKE.

The district has recently suffered from shocks of two severe earthquakes. The first earthquake occurred in 1833 and the second after a period of relative quiescence of a century in 1934. Details of damage of the first earthquake are not available. The earthquake of 1934 is comparatively recent and we have ample materials to the effect. In his revised *District Gazetteer of Champaran,* written in 1932 and published in 1938, Mr. Swanzy has given an account of the earthquake of 1934 in a separate chapter, from which we quote portions relevant for showing effects on agriculture in the district, due to this catastrophe.

"The epicentral tract stretching from Dhaka on the west to a point about 10 miles east of Madhuban on the east, included a small area only to the east of Dhaka in Champaran district. The slump area stretching from Purnea in the east to Sugauli on the west included the whole area east of a line drawn through Ghorasahan, Sugauli and Gobindganj.

"In this area sand was forced up through fissures and geysers, levels were changed, and water channels were to some extent blocked with sand. The damage to land was specially severe near the banks of rivers and lakes where the ground was so badly fissured that

rebuilding was a serious problem....." As a result of the sand survey completed after the earthquake in May 1934, Rs. 10,66,153 was distributed in loans and Rs. 44,199 as free grants. The map given in Mr. Brett's report shows that the damage was slight generally in police-stations Adapur, Chouradano, Ghorasahan and Gobindganj, average in the area to the east of Sugauli along the Sikrahna, and in police-stations Motihari, Dhaka, Peepra, Madhubani and Kessariya, and two comparatively small areas, one west of Peepra police-station and one in Dhaka and Madhuban police-stations, suffered severe damage.

This earthquake also did some good to the soil as will be found from another portion of Mr. Swanzy's account of the earthquake of 1934, quoted below :—

"It is interesting to find that the deposits of sand are now in 1937 reported to have benefited land with a clay and loam-soil except where the sand deposit was deep. Land of a sandy nature has certainly been injuriously affected by deep deposits, but the area of such land is small."

Communication was also seriously damaged which necessarily had its ill effects on agriculture but the damages were quickly repaired. The earthquake had effect on the general level of the country for which it was anticipated that floods may play havoc in the district and thus cause serious damages to agriculture. Mr. Swanzy mentions in his note : "After the earthquake it was feared that floods would cause immense damage owing to changes in the general level of the country and specially to waterways being choked. From Ramnagar to Ghorasahan the ground fell in level varying from 3 to 10 inches. At Motihari the drop had been of 18 inches.) This anticipation was to some extent justified. For in the flood of 1934 though the flood readings at Chainpatia were 2 feet less than in the flood of 1915 the levels of Motihari were slightly higher than in 1915. Since the earthquake the rivers and water courses have to a large extent scoured their beds in the three successive years' floods.

"In 1936 the flood at Chainpatia rose 6 inches above the 1915 level and in Motihari 9 inches above the level of that year. The earthquake therefore may be said to have left no permanent effect on the district in this respect." To this we can add the difficulties which had to be faced to dispose of sugarcane. The principal crop standing at the time of the earthquake was sugarcane. Since several of the factories were damaged, steps had to be taken to dispose of cane to the good account of cultivators. Loans by the Government at $2\frac{1}{2}$ per cent were distributed to those who could work power-driven *khandsari* sugar plant. Bullock-driven mills were also obtained from far off places like the Punjab and distributed to turn out sugarcane into *gur*. A good quantity of *gur* could be turned out, which at the end of season sold at Rs. 3-4-0 a maund nearly double its former

figure. Undamaged sugar mills were appealed through the Indian Sugar Mills' Association to increase their crush. But response to the appeal was disappointing. The railway offered the low rate of freight of one-tenth of a pie per maund per mile on cane. A Cane Marketing Board was established and the special freight rate was confined to canes handled by this body. This had to be done as agents of many sugar mills were found purchasing sugarcane from the needy cultivators at a very cheaper rate. But after the constitution of the Board, it became the sole selling agent for such canes for which there existed no agreement with the factories. The cane sold through the Board fetched 4 annas 3 pies per maund to the cultivators, a price not much below they would have obtained in the normal course. As a result of all this Champaran had been entirely cleared of cane, when the season came to an end in early May.

There has not been any other earthquake since 1934. The district is within the risk zone of earthquakes and an earthquake in the future is remote possibility.

HAILSTORM.

Severe hailstorm is not a normal feature but there are usually some hailstorms in the months of March-April.

Writing about the hailstorm in his revised *District Gazetteer* Mr. Swanzy mentions as follows :—

"Early in March 1931 the district suffered from a very severe hailstorm, which caused great damage to the *rabi* crops. The area affected consisted of a strip on the average about 10 miles wide through the centre of the district, viz., south Dhanaha thana, Jogaputti thana, the areas round Sirsia Factory, Bettiah, Lalsaraiya Factory, Sugauli, and along the Sikrahna to Lal Bakiya Ghat on the Motihari-Dhaka road".

"The area most affected was that bordering the Sikrahna from Sugauli to Lal Bakiya Ghat. In this area the *bhadai* crop of 1930 had failed owing to flood and consequently owing to the slump in prices, money was very scarce and *raiyats* were relying on the *rabi* crop for their living. Again in 1931 the *bhadai* crop was largely destroyed by flood and the *mahajans* could not advance money to any large extent.

"The following measures of relief were, therefore, found necessary to remedy or alleviate distress. In the Sadar subdivision the District Distress Relief Committee was started in July, 1931 and gave gratuitous relief to 11,133 persons in 29 badly-affected villages. Subsequently the Marwari Relief Society took up the work about the third week of September and continued it till the middle of October in Sadar subdivision and till the middle of November in Bettiah subdivision. *Takavi* loans amounting to Rs. 21,502 had been advanced in the Sadar subdivision. The Bettiah State in the

Motihari Circle advanced Rs. 43,848 as seed loans in the Sadar subdivision. In addition the Bettiah Estate undertook seven relief works at a cost of Rs. 16,001 in the Sadar subdivision during the months of June and October.

"In the Bettiah subdivision gratuitous relief was given out in some three centres in Jogapatti thana and also in Dhanaha thana and Colonel Lees of Lal Saraiya gave out relief himself in some of the villages of his *elaka* partly from his own funds and partly from the funds of the District Distress Relief Committee. Rs. 4,630 was given out as *takavi* in the Bettiah subdivision and Rs. 33,450 by the Bettiah Estate as seed loan. The estate also undertook five relief works at a cost of Rs. 5,979 in the Bettiah subdivision. In addition to the above the Bettiah Estate has also granted suspension of rent in the areas in which seed loans have been granted."

No serious hailstorm has visited the district since 1931. However, light hailstorm caused some loss to the district in the years 1932-33, 1938-39 and 1939-40. But as none of these hailstorms was of serious nature, details are not mentioned here.