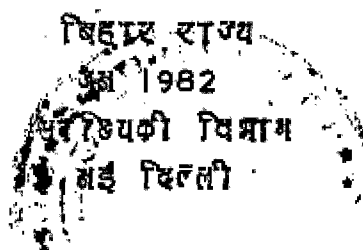




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हजतीसवां दौर
जुलाई 1976 - जून 1977
संख्या 300/2

पारिवारिक ओतों में सिंचाई के उपयोग के संबंध
में टिप्पणियों सहित तात्त्विकार्



GOVERNMENT OF INDIA
NATIONAL SAMPLE SURVEY ORGANISATION
THIRTY FIRST ROUND

JULY 1976 - JUNE 1977
NUMBER 300/2

TABLES WITH NOTES ON USE OF IRRIGATION IN
HOUSEHOLD HOLDINGS

BIHAR STATE

JUNE 1982

DEPARTMENT OF STATISTICS
NEW DELHI

300/2

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NATIONAL SAMPLE SURVEY ORGANISATION

TABLES WITH NOTES

ON

USE OF IRRIGATION IN HOUSEHOLD HOLDINGS

NSS , 31ST ROUND : JULY 1976 - JUNE 1977

BIHAR STATE

<u>CONTENTS</u>	Page
Section 1 : Introduction	1 - 2
Section 2 : Concepts and Definitions	3 - 4
Section 3 : Some Survey Findings	5 - 13
Appendix I: Sample Design and Estimation Procedure	14 - 16
Appendix II: List of Tables and the Tables	17 - 33

NATIONAL SAMPLE SURVEY

TABLES WITH NOTES

USE OF IRRIGATION IN HOUSEHOLD HOLDINGS

NSS 31ST ROUND : JULY 1976 - JUNE 1977

STATE : BIHAR

SECTION ONE

INTRODUCTION

1.1 A survey on the use of irrigation in rural areas was carried out by the National Sample Survey Organisation (NSSO) in the thirty-first round of the NSS from July 1976 to June 1977. In this survey particulars of irrigation in household holdings were collected by household enquiry from a sample of household holdings. Information on crops grown and use of fertilisers, manures and pesticides in the household holdings was also collected. The reference period for the survey was the agricultural year July 1975-June 1976.

1.2 The survey covered the whole of rural India except the states of Sikkim, Nagaland and Meghalaya and Union Territories of Chandigarh, Arunachal Pradesh, Andaman & Nicobar Islands, Mizoram, Lakshadweep and Dadra & Nagar Haveli 1/.

1.3 All the States and Union Territories included in the geographical coverage of the survey participated in the survey at least on a full matching basis by canvassing a sample of equal size following identical concepts and definitions.

1.4 For the purpose of the survey there was a general sample of villages, distributed all over the country. Also, there was an additional special sample of villages from the command areas of (i) major irrigation projects commissioned after 1947 and (ii) medium irrigation projects commissioned after 1964. In the general sample, the number of villages planned to be surveyed was 8304 for general sample and 2054 for the special sample from the command areas of major and medium projects.

1.5 For the general sample the design was stratified two stage with district (or portion of district) as stratum, village as first stage unit and household as second stage unit of sampling. The lists of 1971 census villages was used as sampling frame for the general sample. In each sample village a fixed number of households was initially selected circular systematically after arranging all the households in the village in a specified order 2/.

1/ Two tehsils of district Surguja & tehsils of district Bastar of Madhya Pradesh; three tehsils of district Chandrapur & one tehsil of district Amravati of Maharashtra and Ladakh District of Jammu & Kashmir were also not covered.

2/ For details, see the note on sample design and estimation procedure given in Appendix-I.

1.6 The sample households selected in each sample village were divided into three mutually exclusive categories : category 1 consisted of households which cultivated atleast some plot of land during 1975-76 with irrigation, category 2 consisted of the households which cultivated land during 1975-76 wholly without irrigation and category 3 consisted of residual households which did not cultivate any land during the period. Such households which cultivated usually using irrigation were however included in category 1 and not in category 2 even if they cultivated land during 1975-76 wholly without irrigation. For the sample households of category 1, that is the households which cultivated land during 1975-76 with (or usually using) irrigation, particulars on irrigation, crops grown, use of fertiliser, manure and pesticides etc. were collected in schedule 22.1. For the sample households of category 2, that is the sample households which cultivated land without irrigation during 1975-76, particulars of unirrigated household holding were collected in schedule 22.2. For the households of category 3, no schedule was canvassed.

1.7 This report is for Bihar state and is based on the data collected in Schedule 22.1 in the general sample of 712 villages planned to be surveyed and actually surveyed in the state for the central sample. It presents information on number of households usually using irrigation, area possessed, net area irrigated, net area sown, area cropped more than once, area irrigated by different types of irrigation etc., area under various irrigated & unirrigated crops, use of fertiliser, manure and pesticides, expenditure on irrigation, fertiliser, manure and pesticides, inventory of agricultural and irrigation equipments and draught animals owned etc.

1.8 Important concepts and definitions used in the survey are presented in Section 2 of this note. Some important findings of the survey as observed on the basis of the results are discussed in Section 3. Appendices I and II give sample Design & Estimation procedure and Statistical Tables respectively.

SECTION TWO
Concepts and Definitions

2.1 Some of the important concepts and definitions adopted in the survey are given below.

2.2 Household : A household was defined as a group of persons normally living together and taking food from a common kitchen. Thus a household was considered as constituted by normally resident members, including temporary stay ways but excluding temporary visitors,

2.3 Household holding : A holding was defined as constituted by all land possessed by the household. Land possessed was taken as the sum of land owned but not leased out and land taken on lease. In case of joint ownership or joint leasing in by the sample household with other households, only the sample household's share of such land was taken as the part of the household holding.

2.4 Land owned : A plot of land was considered to be owned by the household if the right of permanent heritable possession with or without right to transfer title was vested in a member or members of the household. Land owned included also land held directly from Government under a grant, lease or assignment. Land owned by a household might be leased out to another household without losing ownership right.

2.5 Irrigation : Irrigation was considered to denote the practice of purposely providing land with water by artificial means for crop production.

2.6 Types of irrigation : Irrigation was broadly grouped into two categories namely flow irrigation and lift irrigation. When irrigation did not involve any use of power for lifting of water, it was considered under the flow type. Flow irrigation covered irrigation by canal, diversion scheme, tank and others not involving any lifting of water. Irrigation from wells, tube-wells, rivers, tanks and other sources using some lift arrangement constituted lift irrigation.

2.7 Net area irrigated : When a plot of land was irrigated more than once in the same or different seasons of an agricultural year, its area was considered only once for obtaining net area irrigated. In case the plot was having irrigation facility from more than one source of flow and/or lift irrigation, the major source was treated as the

type of irrigation for the plot. For deciding the major source, the gross area irrigated was taken as the base.

2.8 Net area sown : When a plot of land was sown more than once in the same or different seasons of an agricultural year, its area was considered only once for obtaining net area sown.

2.9 Gross crop area : When a plot of land was cropped more than once in an agricultural year, the area of the land was counted as many times as it was cropped in obtaining the gross cropped area for the plot.

SECTION THREESummary Findings

3.1 Some important findings of the survey as observed for the rural sector of Bihar State are discussed in this section. The results are based on the data collected from 7819 Sample households which usually used irrigation and cultivated land during the agricultural year 1975-76 selected from a sample of 712 villages.

3.2 Household using irrigation : There were about 3.57 million households usually using irrigation which cultivated land during the agricultural year 1975-76 and they constituted about 49 p.c. of rural households which cultivated land during the year ^{1/}. Of these households usually using irrigation 3.53 million forming 99 percent actually irrigated their land during the year.

3.3 Area possessed by the households usually using irrigation : Besides land with irrigation facility, a household might also possess land without such facility. The total area possessed by 3.57 million households usually using irrigation was about 4.85 million hectares of which 2.52 million constituting 52 percent was land with irrigation facility (irrigable land). Average area of total land and irrigable land possessed by a household thus worked out to be 1.36 and 0.70 hectares respectively. The irrigable land was formed by 7.71 million parcels of land where a parcel of land is defined as a plot or group of continuous plots possessed by a household having common source of irrigation facility. Average area of a parcel of land was only about 0.33 hectares.

3.4 Net area irrigated : Net area irrigated during the year was about 2.33 million hectares. Of this, about 0.89 million hectares were irrigated by flow type irrigation. Flow type irrigation thus accounted for about 38 percent of the net area irrigated. Average net area irrigated per household was only 0.65 hectare, 0.25 hectare by flow type irrigation 0.40 hectare by left type.

1/ According to the quick estimates based on Schs. 22.1 and 22.2 canvassed in the general sample, there were about 7.35 million households which cultivated land in 1975-76, 3.58 million cultivating land usually with irrigation and 3.77 million usually without irrigation-vide NSS Draft Report No.289. Total number of all households in the rural sector was estimated as 9.61 million - vide NSS Draft Report No. 291 Part I.

Table (3.1) : Estimates of number of households usually using irrigation, area possessed, net area sown, net area irrigated, gross crop area and number of parcels of land possessed during the agricultural year 1975-76.

item	estimate
(1)	(2)
1. number of households (00)	35744
(a) usually using irrigation	35744
(b) actually used irrigation	35304
2. area possessed (hectares 00) :	48529
(a) irrigable land	25184
(b) land without irrigation facility	23345
3. number of parcels (00) of irrigable land possessed	77066
4. net area (hectares 00) irrigated :	23344
(a) by flow type irrigation	8886
(b) by lift type irrigation	14458
5. net area (hectares 00) sown :	45858
(a) in irrigable land	24876
(b) in land without irrigation facility	20982
6. gross crop area (hectares 00) :	72571
(a) under irrigated crop	33334
(b) under unirrigated crop	39237
(c) in irrigable land	45584
(d) in land without irrigation facility	26987

3.5 Net area sown About 4.59 million hectares of the 4.85 million possessed by the households (i.e. 94 percent) were sown during the agricultural year. 2.49 millions hectares of the total net area sown (i.e. 54 percent) were irrigable land.

3.6 Area under crop : Gross area under all crops was estimated to be of the order of 7.26 millions hectares; 4.56 million hectare (i.e. 63 percent) of this gross crop area was from irrigable land and 2.70 million (i.e. 37 percent) from land without irrigation facility.

3.7 Distribution of households area possessed, net area sown, net area irrigated and gross crop area by size class of holding:
About 55 percent of the cultivating households usually using irrigation were in the household land possessed class less than half hectare and these households together possessed only less than 7 percent of the total area possessed. Households in the land possessed class 0.5 to 1.0 hectare formed 22 percent of the total households and their share of the total area possessed was about 12 percent. Thus, households possessing less than 1 hectare of land formed 57 percent of the cultivating households usually using irrigation and these 57 percent households possessed only about 18 percent of the total area. Their share of the net area sown and gross crop area was also of similar order. However they claimed slightly larger share (23 percent) of both the irrigable area and the net area irrigated. About 36 percent of the households belonged to the land possessed class 1 to 4 hectares. They possessed 51 percent of the total area and their share on net area sown, gross crop area, irrigable area possessed and net area irrigated was also of the same order. About 6 percent of the households came under the holding class 4 hectares or more. These top 6 percent households enjoyed the possession of 30 percent of the total area possessed and their possession accounted for 30 percent of the net area sown, 29 percent of the gross ^{crop} area, 26 percent of the irrigable area and 25 percent of the net area irrigated.

Table (3.2) : Percentage distribution of households usually using irrigation, area possessed, net area sown, net area irrigated and gross crop area over size class of holding by type of land

[illegible]

3.8 Distribution of households reporting irrigation and net area irrigated by type of irrigation :

According to the survey results about 76 percent of the households reporting irrigation used lift irrigation and 30 percent used flow type irrigation^{2/}. More commonly used sources for lift irrigation were tube-well and well and about 36 percent of the households used the former source and 28 percent the latter. Among different types of flow irrigation canal irrigation was most common and nearly 22 percent of the households reported canal irrigation.

Table (3.3) : Percentage distribution of (i) net area irrigated by size class of holding and (ii) households reporting irrigation, both over types of irrigation.

size class of holding (hectare)	canal	diver-sion scheme	tank	others	all flow	well	tube-well	river	tank	others	all lift	flow & lift combined
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>net area irrigated</u>												
less than 0.5	23.85	2.01	3.07	1.24	30.17	21.84	34.29	4.22	5.12	4.36	69.83	100.00
0.5 to 1.0	24.94	2.61	3.56	2.33	33.44	17.36	35.34	4.11	5.89	3.86	66.56	100.00
1.0 to 2.0	28.17	3.53	4.32	1.69	38.21	12.29	36.07	4.81	5.18	3.44	61.79	100.00
2.0 to 4.0	30.67	3.35	4.65	1.41	40.08	6.89	39.20	4.84	3.68	5.31	59.92	100.00
4.0 to 10.0	32.76	3.72	3.52	1.73	41.78	4.75	40.77	4.89	3.45	4.36	58.22	100.00
10.0 & above	15.96	10.51	7.72	4.40	38.65	8.02	44.10	3.86	1.66	3.71	61.35	100.00
all	28.23	3.65	4.35	1.84	38.07	10.63	38.05	4.63	4.32	4.30	61.93	100.00
<u>household reporting irrigation</u>												
all	21.52	2.93	4.29	1.84	29.57	27.67	36.43	5.87	6.97	6.18	75.96	100.00

^{2/} For a parcel of land, its major source of irrigation was treated as its irrigation type. Since a household might possess more than one parcel, it might be reported against more than one irrigation type. Hence, percentage of households reporting different types irrigation might add upto more than 100 percent.

About 62 percent of the net area irrigated was irrigated by lift type and 38 percent by flow type irrigation. Lift irrigation from tube-well accounted for 38 percent of the net area irrigated. About 11 percent of the net area irrigated was irrigated by lift irrigation from well. Water flows from canal accounted for 28 percent of the net area irrigated. All other types of irrigation put together accounted for only 23 percent of the total net area irrigated.

The proportion of net area irrigated by all types of flow irrigation was noticed to have a very moderate increasing trend over the increasing size class of holding for size classes upto 10 hectares. In the case of proportion of net area irrigated by all types of lift, there is a very moderate decreasing trend upto size class 10 hectares.

3.9 Source of power for lift irrigation : Of the households reporting use of lift irrigation during the agricultural year. 58 percent used human power, 28 percent used diesel, 22 percent used electricity and 4 percent used animal power as source of power for the lifting equipment ^{3/}. About 39 percent of the net area irrigated by lift irrigation was irrigated by lifting equipments using diesel power. Lifting equipments using electricity irrigated 33 percent, using human power irrigated 24 percent and using animal power irrigated 3 percent of the net area irrigated by lift irrigation.

^{3/} As a household might use more than one source of power for the same or different lifting equipments and consequently might be reporting against each of such sources, the percent of households over different sources might add up to more than 100 percent.

Table (3.4) Percentage distribution of (i) households reporting lift irrigation and (ii) net area irrigated by lift by source of power of the lifting equipment

source of power of the lifting equipment	percentage of	
	household reporting lift irrigation	net area irriga- ted by lift irrigation
(1)	(2)	(3)
electricity	21.91	33.12
diesel	27.51	39.22
windmill	0.05	0.03
animal	3.74	3.25
human	51.55	24.38
all	100.00	100.00

3.10 Ownership of lifting equipment : Little more than 95 percent of the net area under lift irrigation was irrigated by lifting equipments owned by private bodies or individuals, nearly 88 percent by equipments owned singly and nearly 8 percent by equipments owned jointly. Only about 4 percent of the net area irrigated by lift was irrigated by equipments owned by Government.

Table (3.5) . Percentage distribution of net area irrigated by lift irrigation by ownership of lifting equipment

ownership of lifting equipment	percentage of net area irrigated
(1)	(2)
government	4.45
co-operative	0.12
private joint	7.73
private single	87.70
all	100.00

3.11 Distribution of area under different crops . It is observed from the results that about 79 percent of the gross crop area was under cereal crops; nearly 44 percent under paddy, 4 percent under wheat, 8 percent under maize and the remaining under other cereal crops. Pulses accounted for 15 percent of the gross area under ~~gross area under~~ for 15 percent of the gross area under

Table (3.6) : Percentage distribution of (i) area under crop, (ii) area under irrigated crop and (iii) area under ~~unirrigated~~ crop and percentage of area under irrigated crop to area under crop by crop and crop group

crop/ crop group	percentage distribution of area under			percentage area under irrigated to area under crop
	crop	irrigated crop	unirrigated crop	
(1)	(2)	(3)	(4)	(5)
paddy	43.93	48.36	40.17	50.56
maize	7.94	4.57	10.80	26.43
wheat	23.66	41.87	8.18	81.31
all cereals	79.06	96.65	64.11	56.15
all pulses	15.01	0.97	26.94	2.96
all oil seeds	1.29	0.19	2.22	6.94
all other crops	4.64	2.19	6.73	21.68
all crops	100.00	100.00	100.00	45.93

~~Whereas~~ all crops and the share of oil seeds was only about 1 percent. Considerable variation is observed between the distribution of area under irrigated crops and unirrigated crops. Whereas about 42 percent of irrigated cropped area was under wheat, only 8 percent of the unirrigated cropped area was under the same crop. Variation of a lesser magnitude and of the same nature is observed for the paddy and all-cereals also.

It is further observed from the table (3.6) that about 46 percent of the gross crop area was irrigated during the year. While a very large proportion (81 percent) of the gross area under wheat was irrigated, only about 51 percent of the gross area under paddy was irrigated. Although 56 percent of the area under 'all cereals' was irrigated only 26 percent of the area under maize was irrigated.

3.12 Frequency of irrigation : It will be informative to know how often the various crops are irrigated during cultivation. It is seen from table (3.7) that about 39 percent of the total irrigated area under all crops was irrigated more than thrice, 31 percent thrice, 20 percent twice and 10 percent once only during cultivation. In the case of paddy 52 percent of area was irrigated more than thrice, 18 percent thrice, 15 percent twice and 12 percent only once. In the case of wheat 24 percent of area was irrigated more than thrice, 49 percent thrice, 22 percent twice and 6 percent only once.

Table (3.7) : Percentage distribution of area under irrigated crops over the number of times irrigated by crop and crop group

crop/crop group	percentage of irrigated crop area by number of times irrigated				
	once	twice	thrice	more than thrice	all
(1)	(2)	(3)	(4)	(5)	(6)
paddy	12.00	17.48	18.29	52.23	100.00
maize	23.32	24.97	19.51	32.20	100.00
wheat	5.57	21.98	48.49	23.96	100.00
all cereals	9.83	20.04	31.52	38.51	100.00
all pulses	32.30	18.63	8.08	40.99	100.00
all oil seeds	18.46	24.62	29.23	27.69	100.00
all other crops	14.36	9.99	11.76	63.89	100.00
all crops	10.26	19.82	30.85	39.07	100.00

Appendix - I

Sample Design and Estimation Procedure

1. For the household survey on irrigation in the 31st round, there was a general sample of villages distributed all over the country. Also, there was a special sample of villages from the command areas of (i) major irrigation projects commissioned after 1947 and (ii) medium irrigation projects commissioned after 1964. The sample design and estimation procedure for the survey carried out in the general sample of villages is discussed in the following paragraphs.
2. Sample design and sample size : The design was a stratified two stage with district (or portion of district) as stratum, village as the first stage unit and household as the second stage unit. In the central sample, number of villages planned to be surveyed was 8304.
3. Stratification : There were 63 regions all over India coming under the geographical coverage of the present survey. These regions were formed during 1965 in such a way that they did not cut across the State/Union Territory boundaries. Also excepting a few regions in some States, none of the regions cut across district boundaries. Each district, contained within a region with 1971 district census rural population less than 1.5 million, formed one basic stratum by itself. Districts with more than 1.5 million 1971 census rural population were divided into two or more basic strata by grouping contiguous tehsils (or sub-divisions in the States of Bihar, Orissa and West Bengal) on consideration of homogeneity, density of rural population, crop pattern etc. so that the rural population of each basic stratum, so formed, was less than 1.5 million.
4. Determination of sample size : The sample size of the general sample in each State/Union Territory was decided taking into consideration available strength of the field staff in the State/Union Territory, resources required for special samples from the command areas of irrigation projects and other subjects of enquiry of the round.
5. Allocation of sample size : Total number of sample villages for a State was first allocated to different regions roughly in proportion to the total irrigated area in them. The regional allocation was then distributed among the constituent strata in proportion to population.
6. Selection of villages : With each stratum, allotted number of villages was selected with probability proportional to 1971 population and with replacement. The list of 1971 census villages was used as the sampling frame.

7. Revenue village : Unit of selection was ~~the~~ census village. But in cases where census village did not coincide with revenue village or census village could not be uniquely identified, the revenue village corresponding to the selected census village was surveyed.

8. Hamlet group : Sample villages with large population were divided into a number of hamlet groups having nearly equal population content. One of such hamlet groups was selected at random and the survey was confined to the selected hamlet group only.

9. Selection of a household : From each sample village, a fixed number of households determined at the regional level was initially selected circular systematically after arranging the households in a specified order. The sample households selected from each sample village were divided into three mutually exclusive categories. Category 1 consisted of households which had cultivated land during the agricultural year 1975-76 with irrigation (or which usually used irrigation), category 2 consisted of remaining households which had cultivated land during the 1975-76 without irrigation and category 3 consisted of households which had not cultivated any land during 1975-76. For the households of category 1, particulars of irrigation etc. were collected in schedule 22.1, for the households of category 2, particulars of unirrigated household holding were collected in schedule 22.2 and for the households belonging to category 3, no schedule was canvassed.

10. Estimation procedure : The following notation are used in the formulae for obtaining various estimates :

- r : subscript for r-th region of a State/Union Territory
- s : subscript for s-th stratum
- i : subscript for i-th surveyed village/hamlet group
- j : subscript for j-th sample household
- f : adjustment factor for the survey of revenue village
- p : village population
- m : number of surveyed villages
- n : number of sample households initially selected
- P : total rural population (used for selection)
- D : number of hamlet groups actually formed
- y : value of the characteristic
- Y : total value of the characteristic in the population

Estimates of state totals : Estimate for a State/Union Territory is obtained as the sum of the estimates of the constituent regions. Estimate of the regional total Y_r of the characteristic y is given by $\hat{Y}_r = M_r \sum_s \sum_t \sum_j y_{rsij}$ where \sum_j extends over households surveyed for schedule 22.1 and $M_r = \frac{\hat{H}_r}{\sum_s \sum_t h_{rsi}}$, where \hat{H}_r is the estimate of the total rural households

in the r -th region and is given by

$$\hat{H}_r = \sum_s (P_{rs}/m_{rs}) \sum_t \sum_j \frac{D_{rsi} \cdot H_{rsi}}{f_{rsi} \cdot P_{rsi}},$$

where H_{rsi} is total households in the sample hamlet group/village.

State level estimate \hat{Y}_s is obtained as $\hat{Y}_s = \sum_r \hat{Y}_r$, where the summation extends over all the regions.

Estimates of ratios : Let \hat{Y}_s and \hat{X}_s be the estimates of the aggregates at the State/U.T. level of the two characteristics y and x respectively. The ratio of the aggregates of the two characteristics $R_s = \frac{Y_s}{X_s}$ is estimated by the ratio of the estimates of Y_s and X_s and is given by

$$\hat{R}_s = \frac{\hat{Y}_s}{\hat{X}_s}.$$

Appendix - II

List of Tables and the Tables

table no.	description of table	page no.
(1)	(2)	(3)
1	Estimates of number of households usually using irrigation, area possessed, net area sown, area cropped more than once and gross cropped area separately for irrigable land and land without irrigation facility by size class of holding	19
2	Estimates of number of households reporting area irrigated and net area irrigated by size class of holding and type of irrigation	20
3	Estimates of number of households reporting lift irrigation and net area irrigated by lift by size class of household holding and by source of power	21
4	Estimates of net area irrigated by type of irrigation and ownership of the source of water for irrigation	22
5	Estimates of net area irrigated by ownership of lifting equipment and by source of power	22
6	Estimates of area having irrigation facility not irrigated by size class of holding and reason for not irrigating	23
7	Estimates of number of parcels of irrigable land possessed, total area of the plots, net area irrigated, net area not irrigated and net area sown by size class of parcels	23
8	Estimates of area (i) under crop, (ii) applied with fertiliser, (iii) applied with manure, (iv) affected by pests & diseases, (v) sprayed with pesticides, (vi) of crops finally damaged and value of (i) fertiliser used, (ii) manure used and (iii) pesticides sprayed separately for irrigated and unirrigated crops	24
9	Estimates of area under crop, area applied with fertiliser and manure and area affected by pests and diseases for irrigated and unirrigated crops by crop/crop group separately for ordinary and improved variety of seed	25

table no.	description of table	page no.
(1)	(2)	(3)
10	Estimates of area under crop applied with fertiliser having nutrients N only, NP only, NPK only and others separately for irrigated and unirrigated crops by crop/crop group	26
11	Estimates of area under irrigated crops by crop/crop group and type of irrigation	27
12	Estimates of area under irrigated crops by crop/crop group and number of times irrigated	28
13	Estimates of area under irrigated crop with subsidiary irrigation and without subsidiary irrigation by crop/crop group	28
14	Estimates of value of agricultural implements, irrigation equipments and draught animals owned by households by size class of household holding	29
15	Estimates of number of households reporting pump sets and number of pump sets possessed by size class of household holding	30
16	Estimates of number of pump sets possessed by source of power and by horse-power	30
17	Estimates of number of pump sets and household share of value of owned equipments by type of possession and source of power	31
18	Estimates of number of pump sets reporting area irrigated by source of power and source of water separately by possession type	32
19	Estimates of expenses for irrigation on other than capital account by items of expenditure	33

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (1) : Estimates of number of households usually using irrigation and area possessed, net area sown, area cropped more than once and gross cropped area separately for irrigable land and land without irrigation facility by size class of holding

General Sample

Bihar

size class of holding (hectare)	no. of households usually using irrigation (00)	irrigable land							land without irrigation facility					
		area possessed (hectares 00)			net area sown (hectares 00)	area cropped more than once (hectares 00)	gross cropped area (hectares 00)		area possessed (hectares 00)			net area sown (hectares 00)	area cropped more than once (hectares 00)	gross cropped area (hectares 00)
		owned	leased-in	total					owned	leased-in	total			
(C)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
less than 0.5	12595	1864	472	2336	2192	2076	4277	723	115	838	611	229	859	
0.5 - 1.0	7884	3059	409	3468	3430	2734	6285	2020	280	2300	2013	583	2608	
1.0 - 2.0	7900	5467	511	5978	5961	4633	10742	4569	405	4974	4573	1218	5793	
2.0 - 4.0	5119	6570	402	6972	6937	5720	12843	6315	588	6903	6260	1880	8141	
4.0 - 10.0	1975	4848	91	4939	4926	3965	8978	5901	185	6086	5556	1476	7034	
10.0 & above	271	1461	30	1491	1430	993	2459	2162	82	2244	1969	583	2552	
all classes	35744	23269	1915	25184	24876	20121	45584	21690	1655	23345	20982	5969	26987	

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (2) : Estimates of number of households reporting area irrigated and net area irrigated by size class of holding and type of irrigation

General Sample

Bihar

size class of holding	type of irrigation											flow and life combined
	flow irrigation					lift irrigation						
	canal	diversion scheme	tank	others	total	well	tube-well	river	tank	others	total	
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
number of households (00) reporting area irrigated												
below 0.5	2491	286	326	173	3232	3692	4167	545	804	724	9451	12359
0.5 - 1.0	1639	219	377	177	2311	2301	2749	373	568	480	5928	7826
1.0 - 2.0	1707	269	428	146	2460	2215	2798	521	590	451	5921	7829
2.0 - 4.0	1214	140	285	97	1656	1109	2097	400	366	377	3777	5064
4.0 -10.0	496	88	77	41	670	382	911	200	124	133	1509	1955
10.0 & above	50	34	23	14	112	71	141	13	9	18	230	271
all classes	7597	1036	1516	648	10441	9770	12863	2072	2461	2183	26816	35304
net area irrigated (hectares 00)												
below 0.5	498	42	64	26	630	456	716	88	107	91	1458	2088
0.5 - 1.0	813	85	116	76	1090	566	1152	134	192	126	2170	3260
1.0 - 2.0	1582	196	271	95	2146	690	2026	270	291	193	3470	5616
2.0 - 4.0	1998	218	303	92	2611	449	2554	315	240	346	3904	6315
4.0 -10.0	1488	169	160	81	1898	216	1852	222	157	198	2645	43
10.0 & above	211	139	102	59	511	106	583	51	22	49	811	1322
all classes	6590	851	1016	429	8886	2483	8883	1080	1009	1003	14458	23344

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (3) Estimates of ^{nu}number of households reporting lift irrigation and net area irrigated by lift by size class of household holding and by source of power

General Sample

Bihar

size class of holding (hectare)	no. of households(00) reporting lift irrigation using						net area irrigated (hectares 00) by lift using					
	electricity	diesel	wind-mill	animal	human	all	electricity	diesel	wind-mill	animal	human	all
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
less than 0.5	2119	1932	9	201	5363	9451	391	357	1	39	670	1458
0.5 - 1.0	1262	1500	-	280	3185	5928	666	645	-	118	741	2170
1.0 - 2.0	1242	1636	5	314	3094	5921	1141	1175	3	167	984	3470
2.0 - 4.0	832	1485	-	171	1558	3777	1362	1677	-	112	753	3907
4.0 - 10.0	370	700	-	32	518	1509	983	1326	-	24	312	2645
10.0 & above	50	125	-	4	86	230	245	491	-	10	65	811
all	5875	7376	14	1002	13824	26816	4788	5671	4	470	3525	14458

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (4) : Estimates of net area irrigated by type of irrigation and ownership of the source of water for irrigation

General Sample

Bihar

ownership of source of water for irrigation	net area irrigated (hectares 00) by type of irrigation											flow & lift combined
	flow					lift						
	canal	diver- sion scheme	tank	others	all flow	well	tube- well	river	tank	others	all lift	
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
government	6543	712	617	252	8324	30	554	878	398	265	2125	10449
co-operative	1	10	-	-	11	2	-	-	-	1	3	14
private joint	-	97	114	32	243	320	534	27	126	52	1059	1302
private single	46	32	85	145	308	2131	7795	175	485	685	11271	11579
all	6590	851	1016	429	8886	2483	8883	1080	1009	1003	14453	23344

Table(5) : Estimates of net area irrigated by ownership of lifting equipment and by source of power

General Sample

Bihar

ownership of lifting equipment	net area irrigated (hectares 00) by source of power					
	electricity	diesel	wind-mill	animal	human	all
	(0)	(1)	(2)	(3)	(4)	(5)
government	545	25	-	-	73	643
co-operative	-	2	-	-	16	18
private joint	301	378	-	94	344	1117
private single	3942	5266	4	376	3092	12680
all	4788	5671	4	470	3525	14458

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (6) : Estimates of area having irrigation facility by size class of holding and reason for not irrigating

General Sample		Bihar			
size class of holding(hectare)		area (hectares 00) by reason for not-irrigating			
		adequate rainfall	non-availability of water	other reasons	all reasons
(0)		(1)	(2)	(3)	(4)
less than 0.5		43	45	46	104
0.5 - 1.0		21	95	54	170
1.0 - 2.0		33	175	137	345
2.0 - 4.0		36	208	178	422
4.0 - 10.0		61	99	223	383
10.0 & above		-	73	35	108
all		164	695	673	1532

Table(7) : Estimates of number of parcels of irrigable land possessed, total area of the plots, net area irrigated, net area not irrigated and net area sown by size class of parcels

General Sample			Bihar			
size class of parcels(hectare)		number of parcels (00)	area (hectares 00)			
			total irrigable land	net area irrigated	net area not irrigated	net area sown
(0)		(1)	(2)	(3)	(4)	(5)
less than 0.05		10081	278	248	23	27
0.05 - 0.10		13613	966	874	86	96
0.10 - 0.20		15620	2199	1986	204	219
0.20 - 0.30		10462	2433	2282	142	242
0.30 - 0.40		5051	1688	1568	101	166
0.40 - 0.50		7844	3305	3120	171	329
0.50 - 1.00		9441	6522	6029	446	647
1.00 - 2.00		3953	5098	4738	299	503
2.00 & above		1001	2695	2499	60	255
all		77066	25184	23344	1532	2487

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table(8) : Estimates of area (i) under crop, (ii) applied with fertiliser, (iii) with manure, (iv) affected by pests and diseases, (v) sprayed with pesticides and (vi) of crop finally damaged and value of (i) fertiliser used, (ii) manure used and (iii) pesticides sprayed separately for irrigated and unirrigated crops by crop/crop group

General Sample							Bihar		
area (hectares 00)							value (Rs. 000) of		
crop/ crop group	under crop	applied with ferti- liser	applied with manure	affected by pests and diseases	sprayed with pesti- cides	of crops finally damaged	ferti- liser used	manure used	pesti- cides sprayed
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<u>irrigated crops</u>									
paddy	16120	11783	7587	832	469	102	111582	43399	2549
maize	1522	1032	622	139	85	12	20794	5455	489
wheat	13958	11139	3770	367	159	10	198437	27153	749
all cereals	32216	24281	12198	1379	736	124	336566	78165	3946
all pulses	322	47	38	-	-	-	465	255	-
all oil seeds	65	27	20	1	-	-	334	171	9
all other crops	731	395	334	33	29	1	9448	5890	363
all crops	33334	24750	12590	1413	765	125	346813	84481	4318
<u>unirrigated crops</u>									
paddy	15760	2976	1296	592	117	53	34997	37303	338
maize	4237	875	1988	274	22	22	76531	21513	110
wheat	3209	807	670	16	4	-	9836	3697	31
all cereals	25157	4708	4621	918	143	75	121861	66939	480
all pulses	10569	196	640	18	3	3	666	2905	19
all oil seeds	871	6	67	2	-	-	20	395	4
all other crops	2640	267	394	17	4	-	3967	4270	388
all crops	39237	5177	5722	955	150	78	126514	74509	891

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table(9) : Estimates of area under crop, area applied with fertiliser and manure and area affected by pests and diseases for irrigated and unirrigated crops by crop/crop group separately for ordinary and improved variety of seed.

General Sample Bihar

crop/crop group	irrigated crop area (hectares 00)				unirrigated crop area (hectares 00)			
	under crop	applied with fertiliser manure	affected by pests & diseases		under crop	applied with fertiliser manure	affected by pests & diseases	
(6)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ordinary variety								
1. paddy	13105	9013	5973	437	15127	2539	935	574
2. maize	335	449	305	35	3635	481	1606	180
3. wheat	7242	5313	1570	92	2514	412	453	10
4. all cereals	21575	14912	7971	564	23213	3473	3661	800
5. all pulses	321	47	38	-	10557	195	640	18
6. all oil seeds	65	27	20	1	871	6	67	2
7. all other crop	686	375	311	24	243	219	347	12
8. all crops	22647	15361	8340	589	37071	3893	4715	932
improved variety								
1. paddy	3015	2770	1614	395	633	437	361	18
2. maize	687	583	317	104	602	394	382	94
3. wheat	6716	5826	2200	275	695	395	217	6
4. all cereals	10641	9369	4227	815	1944	1235	960	118
5. all pulses	1	-	-	-	12	1	-	-
6. all oil seeds	-	-	-	-	-	-	-	-
7. all other crops	45	20	23	9	210	48	47	5
8. all crops	10587	9389	4250	824	2166	1284	1007	123

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table(10) : Estimates of area under crop applied with fertiliser having nutrients N only, N P only, NPK only and others separately for irrigated and unirrigated crops by crop/crop groups

General Sample						Bihar				
crop/crop group	irrigated area (hectares 00) applied with fertilisers having nutrients					unirrigated area (hectares 00) applied with fertilisers having nutrients				
	N only	NP only	NPK only	others	total	N only	NP only	NPK only	others	total
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
paddy	10778	461	196	348	11783	2739	165	22	50	2976
maize	874	71	54	33	1032	820	24	14	17	875
wheat	8946	799	594	800	11139	489	38	43	237	807
all cereals	20855	1354	865	1207	24281	4052	229	85	342	4708
all pulses	31	6	3	7	47	86	30	75	5	196
all oil seeds	25	-	2	-	27	6	-	-	-	6
all other crops	312	31	41	11	395	98	31	45	93	267
all crops	21223	1391	911	1225	24750	4242	290	205	440	5177

'N' only means nitrogenous fertilisers like ammonium sulphate, ammonium sulphate nitrate, calcium ammonium nitrate, ammonium chloride and urea.

'NP' only means nitrogenous phosphate fertilisers like ammonium phosphate, ammonium phosphate sulphate, diammonium phosphate, urea ammonium phosphate and ammonium nitrate phosphate. It also includes phosphate fertilisers like single super phosphate, triple super phosphate and palfos in combination with nitrogenous fertilisers containing 'N' only.

'NPK' means nitrogenous phosphatic potash fertilisers like nitrophosphate and NPK complex fertilisers. It also includes potash fertilisers like sulphate of potash in combination with 'NP' fertilisers noted under 'NP' above.

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (11) : Estimates of area under irrigated crops by crop and crop group and type of irrigation

General Sample						Bihar						
crop/crop group	area under irrigated crops (hactares 00) by type of irrigation											flow & lift combined
	flow					lift						
	canal	diversion scheme	tank	others	total	well	tube-well	river	tank	others	total	
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
paddy	6321	880	1002	368	8571	548	5271	415	733	582	7549	16120
maize	88	22	1	51	162	195	1003	68	16	78	1360	1522
wheat	3240	159	28	101	3528	1854	6893	731	372	580	10430	13958
all cereals	9723	1072	1039	556	12390	2734	13417	1284	1138	1253	19826	32216
all pulses	48	25	7	1	81	55	128	3	17	38	241	322
all oil seeds	11	-	1	1	13	20	27	1	2	2	52	65
all other crops	54	2	-	1	57	317	295	21	13	28	674	731
all crops	9836	1099	1047	559	12541	3126	13867	1309	1170	1321	20793	33334

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (12) : Estimates of area under irrigated crops by crop/crop groups and number of times irrigated

General sample	Bihar				
crop/crop group	crop area (hectares 00) by number of times irrigated				
	once	twice	three	more than three	total
(0)	(1)	(2)	(3)	(4)	(5)
paddy	1934	2818	2948	8420	16120
maize	355	380	297	4900	1522
wheat	777	3068	6769	3344	13958
all cereals	3199	6457	10153	12407	32216
all pulses	104	60	26	132	322
all oilseeds	12	16	19	18	65
all other crops	105	73	86	467	731
all crops	3420	6606	10284	13024	33334

Table (13) : Estimates of area under irrigated crops with subsidiary irrigation and without subsidiary irrigation by crop/crop group

General sample		Bihar	
crop/crop group	area (hectares 00) under irrigated crops		total
	with subsidiary irrigation	without subsidiary irrigation	
(0)	(1)	(2)	(3)
paddy	370	1015750	16120
maize	29	1493	1522
wheat	144	13814	13958
all cereals	549	31667	32216
all pulses	11	311	322
all oil seeds	2	63	65
all other crops	4	727	731
all crops	566	32768	33334

NATIONAL SAMPLE SURVEY : 31ST ROUND : JULY 1976 -JUNE 1977

Table (14) : Estimates of value of agricultural implements, irrigation equipments and adult cattle and buffaloes (3 years or more) owned by households by size-class of household holding

General sample		Bihar						
		value (Rs.000) of agricultural implements, irrigation equipments and adult cattle and buffaloes by size class of holding (hectare)						
		less than 0.5	0.5-1.0	1.0-2.0	2.0-4.0	4.0-10.0	10.0 & above	all classes
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
<u>agricultural implements</u>								
1. tractor	4113	-	32496	30829	31844	150603	249885	
2. power tiller	-	-	758	-	457	-	1215	
3. sprayer	40	-	50	56	176	312	634	
4. duster	-	30	161	228	-	-	419	
5. thresher	-	731	1863	5404	2164	722	10884	
6. cane crusher	-	580	721	758	551	406	3016	
7. oil crusher	-	-	50	-	-	-	50	
8. total	4153	1341	36099	37275	35192	152043	266103	
<u>irrigation equipments</u>								
1. electric pumps	10456	26489	81792	117851	100284	26780	363652	
2. diesel pumps	1769	27946	67235	164810	144426	43236	449422	
3. wind mill	-	-	-	-	-	-	-	
4. moat	667	2573	2710	1489	471	-	7910	
5. persion wheel	-	1316	3015	2374	1120	223	8048	
6. others (animal drawn)	205	984	1082	4749	1059	11	8090	
7. counter poise	3975	5218	6286	2800	729	304	119312	
8. manual pumps	2865	2339	1667	525	69	-	7465	
9. others	4203	4761	9352	6353	3467	107	28243	
total	24140	71626	173139	300951	251625	70661	892142	
<u>adult cattle and buffaloes</u>								
1. cattle	26779	427613	509639	481137	286479	70475	1802122	
2. buffaloes	14223	35788	49227	57991	36627	8330	202186	
3. total	41002	463401	558866	539128	323106	78805	2004308	
grand total	69225	536368	768104	877354	609923	301509	3162553	

* Evaluation is in accordance with the price currently obtainable for it i.e. the current market price prevailing in the locality on the date of survey.

NATIONAL SAMPLE SURVEY
31ST ROUND, JULY 1976 - JUNE 1977

Table (15): Estimates of number of households reporting pumpsets and number of pumpsets possessed by size class of household holding.

General Sample		Bihar
size class of household holding (hectare)	number of households reporting pumpsets (00)	number of pumpsets possessed* (00)
(0)	(1)	(2)
below 0.5	395	430
0.5 - 1.0	507	564
1.0 - 2.0	856	901
2.0 - 4.0	1113	1238
4.0 - 10.0	726	832
10.0 & above	146	177
all classes	3743	4142

*In this and subsequent tables on number of pumpsets, the number includes those possessed jointly as well as on rent. In the case of jointly possessed, instead of the household share of the number possessed the total number possessed jointly has been counted as possessed by the sample household. Hence, the estimated number of pumpsets is inflated to some extent.

Table (16): Estimates of number of pumpsets possessed by source of power and horse power

General Sample		Bihar			
horse-power		number of pumpsets (00) having source of power*			
		electricity	diesel	both electricity and diesel	total
(0)		(1)	(2)	(3)	(4)
below 1.0	1.0	420	554	410	1384
1.0 - 2.0	2.0	4	-	-	4
2.0 - 3.0	3.0	24	9	4	37
3.0 - 4.0	4.0	930	23	4	957
4.0 - 5.0	5.0	-	-	5	5
5.0 and above		442	1303	10	1755
all classes		1820	1889	433	4142

* see foot-note on Table (15).

NATIONAL SATELL SURVEY, 3132 ROAD : JULY 1976 - JUNE 1977

Table (17) : Estimates of number of pumpsets and household share of value of owned equipments by type of possession and source of power

General Sample								Bihar
source of power	owned singly		owned jointly		rented		total	
	no. of pump sets (00)	h.h. share of value of equipments (Rs.000)	no. of pump sets (00)	h.h. share of value of equipments	no. of pump sets (00)	h.h. share of value of equipments (Rs.000)	no. of pump sets (00)	h.h. share of value of equipments (Rs.000)
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
electricity	921	269509	576	75495	323	1	1820	345005
diesel	1024	390845	310	42317	555	2468	1889	455630
both electricity & diesel	11	5750	5	1	414	1	433	5752
total	1959	666104	891	117813	1292	2470	4142	786387

*see footnote on Table (15)

NATIONAL SAMPLE SURVEY, 31ST ROUND : JULY 1976 - JUNE 1977

Table (10) Estimates of number of pumpsets* reporting area irrigated by source of power and source of water separately by possession type

General Sample		Bihar				
source of power	number of pumpsets (00) reporting area irrigated by source of water					
	well	tube-well	Rivers & streams	others	total	
(0)	(1)	(2)	(3)	(4)	(5)	
owned singly						
electricity	119	721	-	40	880	
diesel	121	618	107	122	1868	
electricity & diesel	5	4	-	-	9	
total	245	1343	107	162	1857	
owned jointly						
electricity	99	393	9	14	515	
diesel	69	182	23	23	297	
electricity & diesel	-	-	-	-	-	
total	168	575	32	37	812	
rented						
electricity	4	255	-	9	268	
diesel	32	283	61	150	514	
electricity & diesel	-	82	-	14	96	
total	36	620	61	173	890	
total						
electricity	222	1369	9	63	1663	
diesel	222	1083	191	283	1779	
electricity & diesel	5	86	-	14	105	
total	449	2538	200	360	3547	

* see footnote on Table (15)

NATIONAL SAMPLE SURVEY

31ST ROUND : JULY 1976 - JUNE 1977

Table (19) : Estimates of expenses for irrigation on
other than capital account by items of
expenditure.

General Sample	Bihar
items of expenditure	amount (Rs.000)
(0)	(1)
repair and maintenance expenses of bunds and field channels	49201
water charges	169561
other expenses on independently owned lift irrigation	176216
share of expenses on joint arrangements	7793
receipt from sale of water	34513
total	368258