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NATIONAL SAMPLE SURVEY ORGANISATION

THIRTY FIRST ROUND : JULY 1976 — JUNE 1977

NUMBER 300/7

USE OF IRRIGATION IN HOUSEHOLD HOLDINGS IN INDIA

AUGUST 1986

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DEPARTMENT OF STATISTICS
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NATIONAL SAMPLE SURVEY ORGANISATION

USE OF IRRIGATION IN HOUSEHOLD HOLDINGS IN INDIA
NSS 31ST ROUND : JULY 1976 - JUNE 1977

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NATIONAL SAMPLE SURVEY ORGANISATION

USE OF IRRIGATION IN HOUSEHOLD HOLDINGS IN INDIA
NSS 31ST ROUND : JULY 1976 - JUNE 1977

SECTION-ONE

I N T R O D U C T I O N

- 1.1 A comprehensive enquiry on irrigation in rural areas was carried out by the National Sample Survey Organisation (NSSO) in its 31st round survey operation (July 1976-June 1977). In this survey, particulars of irrigation in the household holdings were collected by household enquiry from a sample of households. Besides, data on crops grown and use of fertilisers, manures and pesticides in the household holdings were also collected. The reference period for the survey data 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 the Union Territories of Chandigarh, Arunachal Pradesh, Andaman & Nicobar Islands, Mizoram, Lakshadweep and Dadra & Nagar Haveli. Two tehsils of district Surguja and four tehsils of district Bastar of Madhya Pradesh; three tehsils of district Chandrapur and one tehsil of district Amravati of Maharashtra and Ladakh district of Jammu & Kashmir were also not covered.
- 1.3 All the states and union territories included in the geographical coverage of the survey, participated in it, 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 geographical coverage of the survey. 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. In the central sample, the number of villages planned to be surveyed was 8304 for general sample 2054 for special sample.

- 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 list of 1971 census villages was used as sampling frame for the general sample. At all India level, 8292 sample villages were surveyed. In each sample village, a fixed number of households was selected for survey. Selection of households was done circular systematically after arranging all the households in the village in a specified order^{1/}.
- 1.6 The sample households selected in each sample village were divided into three mutually exclusive categories : category 1 consisted of households which cultivated at least some plot of land during the agricultural year 1975-76 with irrigation, category 2 consisted of the households which cultivated land during this period wholly without irrigation and category 3 consisted of the residual households which did not cultivate any land during the period. Such households which cultivated land usually using irrigation were however, included in category 1 and not in category 2 even if their cultivation during the year was wholly without irrigation. For the sample households of category 1 - that is the households which cultivated land during the year with irrigation/and usually used irrigation - particulars of irrigation, crops grown, use of fertiliser, manure and pesticides etc. were collected in Schedule 22.1. For sample households of category 2, that is the sample households which usually did not use irrigation and cultivated land during the year without irrigation, particulars of un-irrigated household holdings were collected in Schedule 22.2. Households of category 3 were not covered by the survey.

^{1/} Sample design and estimation procedure are described in Appendix-II.

1.7 This Report for all India is based on the data collected in Schedule 22.1 in the general sample of the central sample.

It presents information on number of households usually using irrigation, area possessed net area sown, net area irrigated, area cropped more than once, net area/crop area irrigated by various types of irrigation, area under irrigated and unirrigated crops, use of fertiliser, manure and pesticides, expenditure on irrigation, ^{fertiliser} ~~fertiliser~~, manure and pesticides, inventory of agricultural and irrigation equipments and draught animals owned etc.

1.8 Important concepts and definition used in the survey are presented in Section 2. A summary of findings of the results is presented in Section 3. In section 4 is presented the sample design and estimation procedure adopted for this survey. The detailed statistical tables are given in Appendix - I.

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SECTION TWO
~~APPENDIX - II~~

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 ~~aways~~ 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.

2.10 Irrigable land : Land belonging to a household was broadly classified into two groups - land having irrigation facilities and land not having any irrigation facility. Land having irrigation facilities was considered as irrigable irrespective of whether it was irrigated or not in 1975-76.

2.11 Value of agricultural/irrigation equipments : The value of agricultural/irrigation equipment owned by the household was evaluated at the price prevailing in the local market for the item in its present condition. For items owned jointly along with other households only the share of value of the household has been presented in Table 14. Similar procedure was followed for value of draught animals owned by the households.

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Summary of Findings

- 3.1 Some broad findings of the NSS 31st round survey on cultivator households are discussed briefly in this section. The results are based essentially on the data collected in schedule 22.1 (cultivator households usually using irrigation). However, some results obtained from schedule 22.2 (cultivator households usually not using irrigation) are also included in table (A) of this section.
- 3.2 Cultivator households and some particulars of the agricultural operation. According to this NSS round, total number of rural households was of the order of 88.5 million. About 63.3 million rural households cultivated land during the agricultural year 1975-76, 34.7 million with irrigation and 28.6 million without.
- 3.22 Area possessed by the cultivator households totalled to about 126 million hectares, about 70 million possessed by households usually using irrigations and 56 million by households not using irrigation. 36 million hectares of area under the possession of cultivator households was irrigable and the remaining 90 million was without irrigation facility.
- 3.23 Total of the net area sown during the year by cultivator households as about 113 million hectares. Area of about 62 million hectares was sown by households usually using irrigation and the rest by households not using irrigation. About 35 of 36 million hectares of irrigable land and 78 of the 90 million hectares of land without irrigation facility were cultivated during the year. Out of about 35 million hectares of irrigable land sown, 30 million hectares were reported to have been irrigated during crop production.

Table(A) : Estimated number of cultivator households and particulars of their agricultural operation during the agricultural year

1975 - 76

1. total number of households (00)	884,518
2. number of cultivator households (00)	633,162
(2) usually using irrigation (Sch. 22.1)	346,684
(11) not using irrigation (Sch. 22.2)	286,478
3. area of land possessed by cultivator households (hectares 00)	1,261,315
(1) usually using irrigation	697,131

(ii) not using irrigation	564,184
(iii) irrigable land (Sah. 22.1)	363,281
(iv) land without irrigation facility (Sahs. 22.1 & 22.2)	898,034
4. net area of land sown (hectares 00)	1,130,570
(i) by households usually using irrigation	625,205
(ii) by households not using irrigation	505,365
(iii) in irrigable land	346,973
(iv) in land without irrigation facility	783,597
5. net area of irrigated land (hectares 00)	295,759
6. area of land cropped more than once (hectares 00)	251,461
(i) by households usually using irrigation	192,829
(ii) by households not using irrigation	586,32
(iii) in irrigable land	163,834
(iv) in land without irrigation facility	87,627
7. gross area of land cropped (hectares 00)	1,398,001
(i) by households usually using irrigation	830,695
(ii) by households not using irrigation	567,306
(iii) in irrigable land	520,375
(iv) in land without irrigation facility	877,626

3.24 Out of the 11½ million hectares of land under cultivation only 25 million had multiple crops. Multiple cropping was found to be positively associated with irrigation. Area cropped more than once per household was 0.56 hectare for households usually using irrigation and only 0.20 hectare for households not using irrigation. Also, about 47 percent of the irrigable land sown was cropped more than once whereas area cropped more than once formed only about 11 percent of the net area sown in land without irrigation facility.

3.25 Gross cropped area was estimated to be of the order of 140 million hectares. Of this, about 83 million hectares was with households usually using irrigation and 57 million with households not using irrigation. About 35 million hectares of irrigable land under cultivation accounted for 52 million hectares of cropped area under different crops. But 78 million hectares of net area sown in land without irrigation facility accounted for only 88 million hectares of gross cropped area.

3.3 Households usually using irrigation and some particulars of their agricultural operation:

- 3.31 About 26 percent of the cultivating households usually using irrigation were in the household land possessed class less than 0.5 hectare. These households together possessed only less than 4 percent of the land in the possession of households usually using irrigation. Households in the land possessed class 0.5 to 1.0 hectare formed 20 percent of households, and their share of the total area was little more than 7 percent. Thus, ~~households possessing less than 1 hectare of land~~ none of the lowest 46 percent households usually using irrigation (when ranked in ascending order of land possessed size) possessed atleast one hectare of land and this 46 percent possessed only 11 percent of the total land in the possession of the households usually using irrigation.

Table (7) : Percentage distributions of households usually using irrigation and their area possessed by size class of holding.

size class of holding (hectare)	percentage distribution of	
	households usually using irrigation	area possessed
less than 0.5	25.93	3.54
0.5 - 1.0	20.24	7.48
1.0 - 2.0	23.49	16.58
2.0 - 4.0	17.74	24.54
4.0 - 10.0	10.35	29.99
10.0 & above	2.35	17.87
all classes	100.00	100.00

About 41 percent of the households belonged to the land possessed class 1 to 4 hectares and their share of the area possessed was also of the same order. Little less than 13 percent of the households came in the land possessed class 4 or more hectares. But these households enjoyed the possession of nearly 48 percent of the area.

- 3.32 Of the total area possessed by households usually using irrigation, 52 percent was irrigable land and 90 percent was sown with crops. Net area irrigated formed 47 percent of the net area sown and gross cropped area was 1.33 times the net area sown. Percentage of irrigable area to area possessed showed a definite decreasing trend

over size class of holding. This percentage is about 77 for the lowest size class and 33 for the highest. In the case of percentage of net area sown to area possessed, figures for the different size classes are in the neighbourhood of 90 with figures larger than 90 in the lower size classes. Percentage of net area irrigated to net area sown by size class of holding shows a pronounced decreasing trend and the figure for the lowest

Table(C) : Percentage of irrigable area and area sown to area possessed and percentage of irrigated area and area under crop to area sown by size class of holding (for households usually using irrigation)

size class of holding (hectare)	percentage of			
	irrigable area to area possessed	net area sown to area possessed	net area irrigated to net area sown	gross cropped area to net area sown
less than 0.5	76.93	91.10	75.55	141.20
0.5 - 1.0	70.30	93.61	64.96	147.55
1.0 - 2.0	63.07	93.04	56.94	140.50
2.0 - 4.0	55.71	88.40	51.51	139.06
4.0 - 10.0	47.11	90.16	40.93	125.83
10.0 & above	32.87	85.01	28.86	117.43
a l l	52.12	89.68	47.31	132.87

size class is about 76 percent and that, for the highest size class is about 29 percent. Ratio of gross cropped area to net area sown also shows a decreasing trend, though moderate, over size class of holding. This ratio for the lowest class is 1.41 and for the highest class is 1.17.

3.33 Utilisation of land for crop production was more for irrigable land. About 96 percent of the irrigable land ⁱⁿ the possession of households usually using irrigation was sown and gross crop area for this type of land was one and half times the net area sown. On the other hand, only about 83 percent of the land without irrigation facility was sown and the ratio of gross crop area to the net area sown was only 1.12 for this type of land.

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Table(D) : Percentage of net area sown to area possessed and gross crop area to net area sown by type of land (for households usually using irrigation)

type of land	percentage of	
	net area sown to area possessed	gross crop area to net area sown
irrigable land	95.51	149.98
land without irrigation facility	83.34	111.53
t o t a l	89.68	132.87

3.4 Distribution of households reporting irrigation and net area irrigated by type of irrigation

3.41 As per the survey findings, about 37 percent of the households used flow irrigation and 70 percent used lift irrigation. Most commonly used water flow for irrigation was canal and nearly 24 percent of the households reporting irrigation used this flow for the purpose. About 10 percent of the households used water flows from tanks for irrigating their plots.

Table(E) : Percentage distributions of households reporting irrigation and net area irrigated by type of irrigation.

type of irrigation	percentage distribution of	
	households reporting irrigation	net area irrigated
canal	23.56	30.55
diversion scheme	2.93	2.04
tank	9.74	6.34
others	2.34	1.43
all flow	37.40	40.37
well	35.60	24.66
tube-well	23.96	28.05
river	3.91	2.29
tank	8.69	2.88
others	3.68	1.74
all lift	70.34	59.63
flow & lift combined	100.00	100.00

Households using diversion schemes formed only about 3 percent of the households reporting irrigation. Wells and tube wells were more popular as source of water for lift irrigation with households. Of the households using irrigation, 36 percent reported lift irrigation from well and 24 percent, from tube well. Use of lift irrigation from tanks was reported by almost 9 percent households using irrigation. 1/

3.42 About 40 percent of the net area irrigated was irrigated through flow type and 60 percent by lift type. Canal flow accounted for about 31 percent of net area irrigated and tank flow, about 6 percent. About 28 percent of the net area irrigated was irrigated by lift irrigation from tube well and 25 percent by lift irrigation from well.

3.5 Lift irrigation :

3.51 About 94 percent of the net area under lift irrigation was irrigated by lifting equipments owned by private bodies or individuals: 74 percent (by private agency) singly and 20 percent, jointly. Only 5 percent of the area under lift irrigation was irrigated by equipments owned by Government.

Table(F) : Percentage distribution of net area irrigated by lift irrigation by ownership of lifting equipment:

ownership of lifting equipment	percentage of net area irrigated
government	5.16
cooperative	0.53
private joint	19.91
private single	74.38
not recorded	0.02
<u>a l l</u>	<u>100.00</u>

3.52 Main sources of power for operating lifting equipments were

1/ For any parcel of land, its major source of irrigation was only considered. But a household might report more than one source of irrigation if it possessed different parcels of land with different major source of irrigation. Hence, while percentage of net area irrigated by different sources would add up to 100.00, that of the households reporting different sources might add to more than 100.00.

electricity and diesel. These two sources together provided power for lifting equipments which irrigated about 72 percent of the area under lift irrigation and the share of these two sources was almost even. Lifting equipments using animal power irrigated about 16 percent of the area under lift irrigation. Human power accounted for 10 percent of the area under lift irrigation.

Table (6) : Percentage distribution of area under different crops and percentage of irrigated area to total area under each crop (for households usually using irrigation)

crop	percentage of area under crop	percentage of irrigated area to total area under crop
paddy	26.81	55.32
jowar	8.26	11.08
bajra	6.45	10.03
maize	4.25	29.13
ragi	0.51	62.20
wheat	18.00	85.03
barley	1.99	70.60
other cereals	1.69	6.93
all cereals	67.96	51.17
gram	4.43	25.70
tur	1.42	4.17
other pulses	5.78	9.77
all pulses	11.63	15.15
rape & mustard	0.70	56.55
ground nut	4.73	13.87
sesamum	0.42	9.61
other oil seeds	1.09	6.22
all oil seeds	6.94	16.75
sugar cane	2.64	90.95
cotton	2.93	47.98
jute	0.42	10.18
other fibres	0.10	4.95
tobacco	0.28	55.92
spices	0.73	60.15
other crop commodities	6.37	45.99
all crops	100.00	45.07

- 3.6 Area under different crops : It is observed from table (G) that about 68 percent of the gross ^{crop} area was under cereal crop - 27 percent under paddy, 18 percent under wheat, 8 percent under jowar, 6 percent under bagra and 4 percent under maize. Pulses accounted for about 12 percent of the gross crop area and the share of oil seeds was about 7 percent. Paddy, ragi, wheat, barley, rape & mustard, sugar cane, tobacco and spices were found to be cultivated more as irrigated crops. Percentage of irrigated crop area to total crop area was 90.95 for sugar cane, 85.03 for wheat, 70.60 for barley, 62.24 for ragi, 60.15 for spices, 56.55 for rape & mustard, 55.92 for tobacco and 55.32 for paddy. Essentially unirrigated crops were bagra, ^{jowar} and 'other cereals' among the cereal crops, pulses in general, oil seeds in general except 'rape & mustard', jute and 'other fibres'.

- 3.7 Irrigated crops and types of irrigation : As observed for the

Table(H) : Percentage distribution of crop area over types of irrigation by crop/crop group.

crop/ crop group	percentage of crop area irrigated by											all lift & flow combined
	canal	difer- sion scheme	tank	others	all flow	well	tube well	river	tank	others	all lift	
paddy	42.11	4.04	15.63	2.92	64.70	11.40	16.75	2.07	3.13	1.95	35.30	100.00
jowar	25.62	2.21	2.80	1.25	31.88	60.67	3.40	3.53	0.24	0.28	68.12	100.00
bagra	31.81	0.61	1.00	0.07	33.49	43.54	21.43	0.93	0.07	0.54	66.51	100.00
maize	10.36	1.28	0.77	2.04	14.45	21.72	60.64	1.48	0.36	1.35	85.55	100.00
ragi	6.25	0.27	10.12	1.02	17.66	67.90	7.43	5.04	1.33	0.64	82.34	100.00
wheat	24.71	0.90	0.75	0.42	26.78	22.58	43.62	2.44	2.85	1.73	73.22	100.00
barley	12.23	0.83	2.62	0.51	16.19	48.46	31.20	0.69	2.30	1.16	83.81	100.00
all cereals	31.06	2.29	7.32	1.57	42.24	20.72	30.40	2.20	2.72	1.72	57.76	100.00
all pulses	27.31	1.21	2.77	0.36	31.65	20.70	37.57	1.30	6.24	2.54	68.35	100.00
all oil seeds	35.45	5.31	22.45	1.66	44.87	30.01	21.08	1.11	1.60	1.33	55.13	100.00
sugar cane	22.94	1.31	1.10	0.26	25.61	26.92	40.41	5.39	0.94	0.73	74.39	100.00
cotton	50.41	0.16	0.32	0.04	50.93	30.72	17.40	0.57	0.03	0.34	49.07	100.00
all crops	30.84	2.05	5.96	1.38	40.23	22.70	30.52	2.29	2.62	1.64	59.77	100.00

net area irrigated, about 60 percent of the crop area irrigated also was irrigated by lift irrigation. A large proportion of irrigated crop area was under lift irrigation for maize(85.55%), barley(83.81%), ragi(82.34%), wheat(73.22%) and sugar cane(74.39%).

This proportion was large also for jowar(68.12%) and bazra(66.51%) of the cereal crops and pulses group(68.35%) and oil seeds group (55.13%). More than half of irrigated crop area was under flow irrigation for paddy(64.70%) and cotton(50.93%) crops only. Canal flow was the most important irrigation type for paddy and cotton. This portion was held by 'lift irrigation from well' for the crops of jowar, bazra, ragi and barley. 'Lift irrigation from tube well' was the dominant source for maize, wheat and sugar cane. These three types together accounted for 84% of the irrigated crop area for all crops put together.

3.8 Irrigated crops and frequency of irrigation : It is observed that about 57 percent of the total irrigated area under all crops was irrigated more than thrice. Crop area irrigated once, twice and thrice formed 14 percent each of the total irrigated crop area. As per table(I), most frequently irrigated crops are paddy, ragi, wheat, sugar cane and cotton. Percentage of irrigated crop area irrigated three times or more is quite high for paddy (79%), ragi(92%), wheat(72%), sugar cane(87%) and cotton(83%).

Table(I) : Percentage distribution of area under irrigated crops by number of times irrigated and by crops.

crop/crop group	percentage of irrigated crop area by number of times irrigated					all
	once	twice	thrice	more than thrice	not recorded	
paddy	11.13	9.36	8.58	70.69	0.24	100.00
jowar	14.81	20.74	19.54	44.26	0.65	100.00
bazra	36.04	16.95	13.58	32.02	1.41	100.00
maize	31.46	23.36	13.70	30.21	1.27	100.00
ragi	3.36	4.17	4.28	87.99	-	100.00
wheat	9.83	18.09	22.65	49.08	0.35	100.00
barley	22.58	19.51	18.62	38.36	0.93	100.00
all cereals	13.96	23.31	15.09	44.97	2.67	100.00
all pulses	54.49	23.31	9.06	11.22	1.92	100.00
all oil seeds	19.16	17.77	10.76	51.36	0.95	100.00
sugar cane	5.43	7.20	8.69	78.36	0.32	100.00
cotton	5.74	11.06	14.67	68.22	0.31	100.00
all crops	13.70	14.22	14.48	57.10	0.50	100.00

3.9 Improved variety seeds : About 20 percent of the total crop area was found to have been under improved variety of seed. This supposedly high yielding variety of seed was sown in large proportion of () area under cotton(55.81%), wheat(53.09%), sugar cane (25.06%) and paddy(20.62%) cultivation and in sizable proportion of crop area for bazra (9.59%), ragi (7.07%), jowar(7.05%) and maize(6.95%). High yielding variety was cultivated generally with irrigation. Whereas about 38 percent of the total irrigated crop area was under improved variety of seed, only 5 percent of the total unirrigated crop area was under such seeds.

Table (J) : Percentage of area under improved variety of seed to total crop area for irrigated and unirrigated land by crop/crop group (for households usually using irrigation)

crop/crop group	percentage of area under improved variety of seed		
	irrigated area	unirrigated area	combined
paddy	33.75	4.37	20.62
jowar	16.75	5.85	7.05
bazra	23.05	8.09	9.59
maize	12.92	4.50	6.95
ragi	3.33	13.22	7.07
wheat	61.35	16.19	53.09
barley	0.87	0.08	0.64
all cereals	42.80	6.11	24.88
all pulses	1.10	0.70	0.76
all oil seeds	4.19	2.26	2.58
sugar cane	25.58	19.88	25.06
cotton	95.74	18.97	55.81
all crops	37.78	4.95	19.75

3.10 Use of fertiliser : About 36 percent of the gross crop area was applied with fertiliser, about 65 percent for irrigated crop area and 13 percent for unirrigated crop area. A large proportion of area under sugar cane (72.99%), ragi (68.75%), wheat (63.80%) and paddy (49.46%) was applied with fertiliser. Application of fertiliser was reported to be practiced more in the case of irrigated crops than unirrigated for all major crops and crop groups. Whereas about 65 percent of the total irrigated crop area was

applied with fertiliser, unirrigated crop area applied with fertiliser was only about 13 percent.

Table(K) : Percentage of crop area applied with fertiliser to total crop area for irrigated and unirrigated land by crop/crop groups. (for households usually using irrigation) .

crop/crop group	percentage of crop area applied with fertiliser		
	irrigated area	unirrigated area	combined
paddy	72.69	20.71	49.46
jowar	35.85	7.31	10.47
bajra	37.10	6.84	9.87
maize	68.31	22.92	36.14
ragi	57.48	87.28	68.75
wheat	73.22	40.28	63.80
barley	25.92	1.69	18.80
all cereals	68.97	13.89	42.07
all pulses	10.43	2.76	39.56
all oil seeds	50.47	19.00	24.27
sugar cane	76.34	39.30	72.99
cotton	72.75	21.68	46.19
all crops	64.95	12.56	36.18

3.11 Use of manure : About 38 percent of the gross crop area was applied

Table(L) : Percentage of crop area applied with manure to total crop area by crop/crop group (for households usually using irrigation) .

	percentage of crop area applied with manure		
	irrigated area	unirrigated area	combined
paddy	66.69	45.25	57.11
jowar	40.66	22.02	24.08
bajra	42.16	28.48	29.86
maize	57.80	46.60	49.86
ragi	72.34	98.69	82.30
sesa	31.29	36.54	32.08
barley	36.43	12.11	29.28
all cereals	48.39	35.47	42.08
1 pulses	18.27	10.80	11.94
all oil seeds	40.90	39.29	39.56
sugar cane	60.52	38.24	58.59
cotton	45.20	33.37	39.05
all crops	47.37	30.58	38.15

with manure, 47 percent of irrigated crop area and 31 percent of the unirrigated crop area. Paddy, ragi, maize and sugar cane reported large proportion of the area under them, applied with manure. Application of manure was reported to be more with irrigated crops than with unirrigated for most of the crops/crop groups although this association was much less pronounced than that observed for fertiliser and irrigation.

3.12 Invasion of pests and diseases : About 17 percent of the gross crop area was affected by pests and diseases, 20 percent of the irrigated crop area and 14 percent of the unirrigated. Crops more affected by pests and diseases were paddy, bazra, ragi and cotton ; percentage of area under them thus affected was respectively 23.23, 29.63, 27.62 and 40.96. There appeared to be some positive association between irrigation and affectation by pests and diseases for most of the crops.

Table (M) : Percentage of crop area affected by pests and diseases for irrigated and unirrigated crops by crop/crop group (for households usually using irrigation)

crop/crop group	percentage of crop area affected by pests and diseases		
	irrigated crop	unirrigated crop	combined
paddy	31.92	12.47	23.23
jowar	14.45	14.56	14.54
bazra	25.67	30.07	29.63
maize	9.69	5.95	7.04
ragi	20.35	39.59	27.62
wheat	9.62	5.77	9.04
barley	13.65	7.59	11.87
all cereals	19.80	14.55	17.24
all pulses	11.45	9.17	9.52
all oil seeds	28.71	17.85	19.67
sugar cane	16.69	3.99	15.63
cotton	59.23	24.11	40.96
all crops	20.22	13.72	16.65

Sample Design and Estimation Procedure

4.1 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.

4.2 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.

4.3 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 (for subdivisions 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.

4.4 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 sample from the command areas of irrigation projects and other subjects of enquiry of the round.

4.5 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.

4.6 Selection of villages : Within each stratum, allotted number of villages was selected with probability proportional to 1971 population and with ~~the same~~ The list of 1971 census villages was used as the sampling frame.

- 4.7 Revenue village : Unit of selection was 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.
- 4.8 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.
- 4.9 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.
- 4.10 Estimation procedure : The following notation are used in the formulas for obtaining various estimates :

- S : subscript for the S-th State/Union Territory.
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.
h : 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 in the sample.
Y : total value of the characteristics in the population

The States and Union Territories pooled estimate is obtained as the sum of the estimates of the States and Union Territories. Estimate for a State/Union Territory is obtained as the sum of the estimates of the constituent regions. Estimate of the regional total \hat{Y}_r of the characteristic y is given by $\hat{Y}_r = M_r \sum_{s=1}^{m_r} \frac{m_{rs}}{H_r} y_{rsi}$ where \sum extends over households surveyed for schedule 22:1 and $M_r = \frac{\sum_{s=1}^{m_r} H_{rsi}}{\sum_{s=1}^S H_{rsi}}$, where H_r is the estimate of the total rural households in the r-th region and is given by

$$\hat{H}_r = \sum_{s=1}^S (P_{rs} / m_{rs}) \sum_{i=1}^{m_{rs}} \frac{D_{rsi}}{f_{rsi}} \frac{H_{rsi}}{P_{rsi}}$$

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. States and Union Territories pooled estimate is obtained as $\hat{Y} = \sum_s \hat{Y}_s$

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

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

Appendix - I

Statistical Tables

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N.D.		

Table (O) : Number of sample villages allotted and the number surveyed, number of sample households surveyed for schedule 22.1, estimated number of total households and estimated number of cultivator households usually using irrigation and the number usually not using irrigation.

All India

item	number
1. number of sample villages allotted for survey	8472
2. number of sample villages actually surveyed	8460
3. number of sample households surveyed for schedule 22.1	88046
4. estimated number of total households (OO) ^{a/}	884518
5. estimated number of cultivator households (OO)	633162
(i) usually using irrigation	346684
(ii) usually not using irrigation ^{b/}	286478

^{a/} from listing schedule - Draft Report No. 291, Part-1

^{b/} from schedule 2.2 - Draft Report No. 312

N.D.

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

All India

size class of holding (hectares)	no of households with irrigable land (00)	irrigable area (hectares 00)					area without irrigation facility (hectares 00)						
		area possessed			net area sown	area cropp- ed more than once	area possessed			net area sown	area cropp- ed more than once	gross cropp- ed area	
		owned	leased	total			owned	leased	total				
		in					in						
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
less than 0.5	89556	16911	2079	18990	18624	11196	30187	5293	402	5695	3865	727	4669
0.5 - 1.0	70161	33561	3086	36647	35959	19819	56481	14180	1306	15486	12842	2463	15524
1.0 - 2.0	81434	67463	5447	72910	71122	36183	108543	39791	2900	42691	36432	5629	42568
2.0 - 4.0	61498	88702	6603	95305	88142	43848	138001	70547	5236	75783	63104	8209	72328
4.0 - 10.0	35891	93459	5020	98479	94248	38989	134004	106498	4063	110561	94214	8237	103143
10.0 & above	8144	38040	2910	40950	38878	13799	53159	81289	2345	83634	67775	3730	72088
all classes	346684	338136	25145	363281	346973	163834	520375	317598	16252	333850	278232	28995	310320

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

All India												
size class of holding (hectares)	f l o w						l i f t				flow and lift combined	
	canal scheme	diversion	tank	others	all flow	well tube- well	river	tank	others	all lift		
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
number of households reporting area irrigated (00)												
less than 0.5	18284	2189	8847	2143	30701	26107	20081	3594	9949	4129	59765	87967
0.5 = 1.0	16543	2519	6736	2001	25747	21926	17189	2454	7246	2781	47234	68901
1.0 = 2.0	19703	2802	7704	2044	31027	28175	20400	3291	7323	2859	56650	79841
2.0 = 4.0	15195	1663	6067	1116	23403	23553	15152	2289	3845	1832	43259	60058
4.0 - 10.0	8513	762	3076	536	12492	16768	7690	1332	1098	733	26346	35327
10.0 + above	1871	229	705	117	2826	4524	978	333	93	168	5943	7987
a 1-1	80110	9964	33135	7957	127196	121053	81490	13293	29554	12502	239197	340081
net area irrigated (hectares 00)												
less than 0.5	4108	393	1780	406	6687	4198	3956	555	1100	494	10303	16990
0.5 = 1.0	8643	806	2610	798	12857	7584	7953	827	1675	804	18843	31700
1.0 = 2.0	17630	1413	4230	1219	24492	14752	16784	1467	2522	1219	36744	61236
2.0 = 4.0	24279	1378	4632	947	31236	18223	23446	1666	2050	1292	46677	77913
4.0 - 10.0	24462	994	3944	674	30074	19679	23944	1552	987	909	47071	77145
10.0 + above	11232	1053	1564	199	14048	8509	6883	717	188	430	16727	30775
a 1-1	90354	6037	18760	4243	119394	72945	82966	6784	8522	5148	176365	295759

Table (3) : Estimates of number of households reporting lift irrigation and net area irrigated by lift by size class of holding and by source of power

All India

size class of holding (hectares)	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
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
less than 0.5	14709	9980	25	8935	26797	59765	3201	1978	4	1955	3165	10303
0.5 - 1.0	12107	10414	44	10277	15221	47234	6320	4588	17	4034	3884	18843
1.0 - 2.0	14847	14175	23	13640	15110	56650	12614	10849	6	7997	5278	36744
2.0 - 4.0	12251	12951	16	11285	7421	43259	16957	17092	45	8753	3830	46677
4.0 - 10.0	7852	9300	9	7254	2599	26346	17772	20404	10	7364	1521	47071
10.0 + above	2147	2485	-	1295	298	5943	7355	7474	-	1629	269	16727
a l l	63913	59305	117	52686	67446	239197	64219	52385	82	31732	17947	116365

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

All India

ownership of source of water for irrigation	net area irrigated (hectares 00) by type of irrigation											flow and lift combined
	flow					lift						
	canal	diversion scheme	tank	others	all flow	well	tube- well	river	tank	others	all lift	
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
government	89260	3635	17204	2035	113134	290	7524	5829	4891	2970	21504	134638
co-operative	25	93	10	2	130	16	118	115	25	61	335	465
private-joint	717	1590	1015	449	3771	26220	14261	106	1212	323	42122	45893
private-single	136	716	531	749	2182	46372	61063	730	2391	1793	112349	114531
not recorded	166	3	-	8	177	47		4	3	1	55	232
a 1 1	90354	6037	18760	4247	119394	772945	82966	6784	8522	5148	176365	295759

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

All-India

ownership of lifting equipment	net area irrigated (hectares 00) by source of power					
	electrical- city	diesel	wind mill	animal	human	all
(0)	(1)	(2)	(3)	(4)	(5)	(6)
government	8383	289	-	67	353	9092
co-operative	608	297	1	4	30	940
private joint	14315	12477	55	7346	915	35108
private - single	40913	49294	26	24313	16649	131195
not recorded	-	28	-	2	-	30
all	64219	62385	82	31732	17947	176365

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

All-India

size class of holding (hectares)	area (hectares 00) by reason for not irrigated			
	adequate rainfall	non-avail- ability of water	other reasons	all reasons
(0)	(1)	(2)	(3)	(4)
less than 0.5	348	441	805	1594
0.5 1.0	990	942	1691	3623
1.0 2.0	1942	2737	3848	8529
2.0 4.0	3147	4066	5679	12892
4.0 10.0	2883	7705	5893	16481
10.0 & above	1471	4276	2348	8095
all	10781	20169	20264	51214

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.

All-India

size class of parcel (hectares)	no. of parcels (00)	area (hectares 00)			
		irrigable land	net area irrigated	net area not irrigated	net area sown
(8)	(1)	(2)	(3)	(4)	(5)
less than 0.05	77488	2063	1876	130	2006
0.05 - 0.10	98505	6958	5884	796	6680
0.10 - 0.20	136784	19009	16234	2201	16435
0.20 - 0.30	105050	24557	21521	2417	23938
0.30 - 0.40	54055	18232	15668	2019	17687
0.40 - 0.50	74463	32183	28045	3236	31271
0.50 - 1.00	110895	78595	66370	9019	75389
1.00 - 2.00	59780	79331	64488	11116	75804
2.00 & above	29731	102353	75473	20290	95763
<u>all classes</u>	<u>746754</u>	<u>363281</u>	<u>296759</u>	<u>554214</u>	<u>346973</u>

Table (8.1) : Estimates of irrigated area under crop and particulars of use of fertiliser, manure and pesticide by crop.

All-India

crop	area (hectare 00)				value (Rs.000)				
	under crop	applied with ferti- ferti- lisers	mandre	affected by pestici- des & diseases	sprayed with pesti- cides	crop finally damaged	ferti- liser used	manure used	pesticide sprayed
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. paddy	123154	89515	82131	39306	31147	3526	2682797	889578	267330
2. jowar	7598	2724	3089	1098	710	162	70291	82372	1187
3. bajra	5375	1994	2266	1380	275	92	44176	62519	2097
4. maize	10281	7023	5942	996	425	82	195305	157105	1964
5. ragi	2639	1517	1909	537	347	48	41146	57546	2409
6. wheat	127180	93126	39796	12234	2609	361	2729224	637266	11871
7. barley	11646	3019	4243	1590	72	2	52549	99503	179
8. other cereals	974	301	406	59	26	25	6597	10199	143
9. other cereals s.t.	288847	199219	139782	57200	35678	4298	5822085	1996088	287180
9. gram	9463	999	1397	1405	186	27	20680	19185	270
10. tur	492	31	227	71	54	-	811	1246	75
11. other pulses	4695	527	1052	201	35	11	7562	10995	363
11. pulses s.t.	14650	1557	2676	1677	285	38	29053	31426	1408
12. rape & mustard	3308	1484	924	642	187	59	29859	14148	1437
13. groundnut	5445	3231	2878	2034	1483	119	84156	58427	16586
14. sesamum	337	-	-	15	10	1	1066	2640	45
15. other oil seeds	562	156	146	80	17	8	3110	1924	100
16. oil-seeds s.t.	9652	4871	3948	2771	1697	187	118191	77139	18168
16. sugarcane	19907	15197	12047	3323	10165	140	915817	336734	18974
17. cotton	11690	10599	9285	5284	5722	462	280656	111855	137936
18. jute	357	257	232	51	124	104	4787	2923	1179
19. other fibres	42	1	6	-	-	-	90	104	-
20. tobacco	1285	1113	917	213	165	12	58243	31383	2527
21. spices	3667	2289	1901	1042	666	139	79581	66666	15160
22. others	24331	10199	10562	2486	1470	188	417693	448306	36658
other crops s.t.	61279	37541	30961	14079	10362	947	1736867	997971	212434
all crops	374428	243188	177367	75727	47955	5470	7726196	3102624	519190

Table (8.2) : Estimates of irrigated area under crop and particulars of use of fertiliser, manure and pesticide by crop.

All-India

crop	under crop	area (hectares 00)			affected pests and diseases	sprayed with pesti- cides	crop fically damaged	value (Ra. 000)		
		applied fertilis- ers	with manure	pestici- des sprayed				ferti- liser sed	manure sed	
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
1. paddy	99472	20603	45010	12404	5207	1300	362285	514980	27002	
2. jowar	60996	4461	13433	8879	1454	507	30102	165946	9031	
3. bajra	48217	3296	13734	14497	393	155	57386	166525	1734	
4. maize	25015	5734	11657	1488	150	211	122281	281119	785	
5. ragi	1604	1400	1583	635	128	112	26719	35003	4883	
6. wheat	22383	2301	8178	1292	48	25	30568	82875	242	
7. barley	4849	82	587	368	9	-	2450	7089	30	
8. other cereals	13082	393	3578	531	21	17	5743	44661	188	
cereals sub- sub-total	275618	38270	97760	40094	7410	2327	707534	1298198	39875	
9. gram	27363	520	1686	3606	173	62	6795	13862	753	
10. tur	11314	354	2118	1399	345	440	5557	23564	3057	
11. other pulses pulses	43352	1394	5059	2520	706	1189	15512	54399	4695	
12. pulses sub-total	82031	2268	8863	7525	1228	1698	27664	89825	8505	
12. rapeseed mustard	2542	78	595	642	10	5	1079	9875	71	
13. groundnut	33807	8758	16786	7030	1892	311	142225	223207	8390	
14. sesamum	3168	106	638	109	13	8	2055	8799	109	
15. other oil- seeds	8469	178	834	785	284	107	1571	8444	737	
oil seeds sub-total	47986	9119	18853	8566	1899	431	146930	250325	9307	
16. sugarcane	1982	779	758	99	40	2	16735	12271	151	
17. cotton	12675	2748	4230	3056	1633	370	59589	52743	34975	
18. jute	3151	595	1433	287	504	12	9631	17456	3925	
19. other fi- bres	807	40	311	85	13	2	491	3307	32	
20. tobacco	1013	735	483	435	376	62	21125	11591	3466	
21. spices	2429	703	1083	559	338	123	20160	19554	2840	
22. other cro- ps	28575	2063	5768	1899	753	71	53411	129354	16642	
other crops sub-total	50632	7663	14066	6420	3657	642	181142	246076	62031	
all crops	456267	57320	139542	62605	14194	5098	1063470	1884424	119738	

Table (9.1) : Estimates of area under crop (i) total (ii) applied with fertiliser, (iii) applied with manure and (iv) affected by pests and diseases separately for irrigated and unirrigated crop for ordinary variety of seed by crop

All India

crop	irrigated crop area (hectares)				unirrigated crop area (hectares)			
	total	applied with ferti- liser	manure	affected by pests & disea- ses	total	applied with ferti- liser	manure	affected by pests & diseases
(a)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. paddy	81589	51394	56269	20698	95122	17913	42642	11497
2. jowar	6325	1745	2476	738	57430	2746	12278	8293
3. bajra	4136	1192	1621	946	44316	2412	11969	12349
4. maize	8953	5848	5241	716	23890	5053	11083	1316
5. ragi	2551	1445	1842	492	1392	1230	1381	626
6. wheat	49155	27600	19050	6158	18759	1080	7112	927
7. barley	11545	2960	4219	1580	4845	82	587	368
8. other crops	970	298	403	59	13021	380	3567	529
9. cereals								
sub-total	165224	92482	91121	31387	258775	30896	90619	35905
10. gram	9401	974	1386	1392	27147	507	1671	3598
11. tur	485	25	223	68	11954	350	2113	1395
12. other pulses	4603	510	1031	198	43158	1251	5047	2369
13. pulses :								
sub-total	14489	1509	2640	1658	81459	2108	8831	7362
14. rape & mus- tard	3056	1353	869	602	2456	65	576	624
15. groundnut	5308	3170	2798	1980	32916	8444	16577	6911
16. sesumum	335	-	-	14	3156	103	633	109
17. other oil- seeds	549	145	136	75	8374	151	789	767
18. oil seeds :								
sub-total	9248	4668	3803	2671	46902	8763	18575	8411
19. sugarcane	14815	7577	6544	1249	1588	640	600	78
20. cotton	498	2582	2185	436	10270	1517	3262	1997
21. jute	299	152	175	46	2578	351	1075	203
22. other fibres	42	1	6	-	772	22	278	85
23. tobacco	1217	1003	852	206	766	560	366	239
24. spices	3630	2234	1864	1023	2409	689	1077	552
25. others	23517	9084	9643	2238	28162	1931	5661	1824
26. other crops :								
sub-tototal	44018	22633	21269	7118	46545	5710	12319	4978
27. all groups	232979	121292	118833	42834	433681	47477	130344	56656

Table (9.2) Estimates of area under crop (i) total (ii) applied with fertiliser, (iii) applied with manure and (iv) affected by pests and diseases separately for irrigated and unirrigated crop for improved variety of seed by crop
ALL INDIA

crop	irrigated crop area (hectares 00)				unirrigated crops area (hectares 00)			
	total	applied with ferti- liser	manure	affected by pests & disea- ses	total	applied with ferti- liser	manure	affected by pests & diseases
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. paddy	41565	38121	25862	18608	4350	2690	2368	907
2. jowar	1273	979	613	360	3566	1715	1155	586
3. bajra	1239	802	645	434	3901	204	1765	2148
4. maize	1328	1175	701	280	1125	681	574	172
5. ragi	88	72	67	45	212	170	202	9
6. wheat	78025	65526	20746	6076	3624	1221	1066	365
7. barley	101	59	24	10	4	-	-	-
8. other crops	4	3	3	-	61	13	11	2
cereals: sub-total	123623	106737	48661	25813	16843	7374	7141	4189
9. gram	62	25	11	13	216	13	15	8
10. tur	7	6	4	3	162	4	5	4
11. other pulses	92	17	21	3	194	143	12	151
all pulses: sub-total	161	48	36	19	572	160	32	163
12. rape & mustered	252	131	55	40	86	13	19	18
13. groundnut	137	61	80	54	891	314	209	119
14. sesamum	2	-	-	1	12	2	5	-
15. other oil-seeds	13	11	10	5	95	27	45	18
oilseeds: sub-total	404	203	145	100	1084	356	278	155
16. sugarcane	5092	7620	5503	2074	394	139	158	21
17. cotton	11192	5923	3099	4568	2405	1231	968	1059
18. jute	58	85	69	45	573	244	358	84
19. other fibre	-	-	-	-	35	18	33	-
20. tobacco	68	110	65	7	247	175	117	196
21. spices	37	55	37	19	20	14	6	7
22. other crops:	814	1115	919	248	413	132	107	75
other crops: sub-total	17261	14908	9692	6961	4087	1953	1747	1442
all crops	141449	121896	58534	32893	22586	9843	9198	5949

Table (10.1) : Estimates of area under irrigated crops applied with fertiliser having nutrients N only, NP only, NPK only and others by crop.

All-India

crop	area (00 hectares) under fertiliser having nutrient				
	N only	NP only	NPK only	others	total
(0)	(1)	(2)	(3)	(4)	(5)
1. paddy	53646	10169	20454	5246	89515
2. jowar	1272	220	1064	148	2724
3. bajra	1284	208	361	141	1994
4. maize	5536	758	551	178	7023
5. ragi	990	75	352	100	1517
6. wheat	58411	21173	9391	4151	93126
7. barley	2426	407	115	71	3019
8. other cereals	212	33	52	4	301
9. sub-total cereals	123777	33043	32360	10039	199219
9. gram	506	319	59	115	999
10. tur	30	1			31
11. other pulses	413	26	51	37	527
sub-total : pulses	949	346	110	152	1557
12. rape & mustard	1082	162	170	70	1484
13. groundnut	848	968	1037	378	3231
14. sesamum	-	-	-	-	-
15. other oilseeds	104	29	23	-	156
sub-total : oil-seeds	2034	1159	1230	448	4871
16. sugarcane	8941	2392	2276	1588	15197
17. cotton	6309	1090	728	378	8505
18. jute	17	9	3	108	237
19. other fibres	-	-	1	-	1
20. tobacco	922	62	82	47	1113
21. spices	1657	122	419	91	2289
22. others	7563	518	1119	999	10199
sub-total : other crops	25509	4193	4628	3211	37541
all crops	152269	38741	38328	13650	243188

'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, diamonium phosphate, urea ammonium phosphate and ammonium nitrate phosphate. It also includes phosphate fertilisers like single super phosphate, triple super phosphate and apatite in combination with nitrogenous fertilisers.

'NPK only' means : nitrogenous phosphatic potash fertilisers like nitro phosphate and NPK complex fertilisers. It also includes potash fertilisers like sulphate of potash in combination with NP fertilisers.

Table (10.2) : Estimates of area under unirrigated crops applied with fertiliser having nutrients N only, NP only, NPK only and others by crop.

All - India

crop		area (00 hectares) under fertiliser having nutrients				
		N only	NP only	NPK only	others	total
(0)		(1)	(2)	(3)	(4)	(5)
1.	paddy	15003	1800	1722	2078	20603
2.	jowar	1922	870	1403	266	4461
3.	bajra	2377	434	185	300	3296
4.	maize	4928	389	268	149	5734
5.	ragi	453	227	665	55	1400
6.	wheat	1206	250	275	570	2301
7.	barley	52	21	3	6	82
8.	other cereals	188	57	117	31	393
9	sub-total : cereals	26129	4048	4638	3455	38270
9.	gram	117	160	13	230	520
10.	tur	209	63	65	17	354
11.	other pulses	584	346	235	229	1394
	sub-total : pulses	910	569	313	476	2268
12.	rape & mustard	70	5	2	1	78
13.	groundnut	1427	4924	919	1488	8758
14.	sesamum	48	18	15	24	105
15.	other oilseeds	34	59	65	20	178
	sub-total : oilseeds	1579	5006	1001	1533	9119
16.	sugarcane	500	154	54	71	779
17.	cotton	1106	546	973	93	2748
18.	jute	353	11	76	155	595
19.	others fibres	35	5	-	-	40
20.	tobacco	255	266	130	84	735
21.	spices	218	206	238	41	703
22.	others	659	300	708	396	2063
	sub-total : other crops	3126	1518	2179	840	7663
	all crops	31744	11141	8131	6304	57320

Table (11) : Estimates of area under irrigated crops (hectares 00) by crop and type of irrigation
All-India

c r o p	f l o w t y p e					l i f t t y p e					flow & lift	
	canal	diversion	tank	others	total	well	tube- well	river	tank	others	to- tal	combined
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. paddy	51862	4974	19249	3590	79675	14038	20628	2545	3860	2408	43479	123154
2. jowar	1946	168	213	95	2422	4610	259	268	18	21	5176	7598
3. bajra	1710	33	54	3	1800	2340	1152	50	4	29	3575	5375
4. maize	1065	132	79	210	1486	2233	6234	152	37	139	8795	10281
5. ragi	165	7	267	27	466	1792	196	133	35	17	2173	2639
6. wheat	31423	1152	951	535	34061	28716	55482	3107	3620	2194	93119	127180
7. barley	1424	97	305	60	1886	5643	3634	80	268	135	9760	11646
8. other cereals	130	37	25	18	210	470	227	35	15	17	764	974
9. all cereals	89725	6600	21143	4538	12006	59842	87812	6370	7857	4960	16841	288817
10. tur	236	2	7	112	357	84	36	6	7	2	135	9463
11. other pulses	1282	57	130	17	1486	972	1764	61	293	119	3209	4695
12. ragi & mustard	1447	1	5	126	1579	559	1063	16	69	22	1729	3308
13. groundnut	1701	480	208	26	2415	2110	755	64	22	79	3030	5445
14. sesamum	58	-	13	4	75	108	72	21	50	11	262	337
15. other oil seeds	216	32	10	4	262	120	145	6	13	16	300	562
all oil seeds	3422	513	236	160	4331	2897	2035	107	154	128	5321	9652
16. sugar cane	4567	261	220	51	5099	5359	8045	1072	187	145	14808	19907
17. cotton	5893	19	37	5	5954	3591	2034	67	4	40	5736	11690
18. jute	13	-	-	-	13	5	116	112	71	39	344	357
19. other fibres	14	-	3	-	17	7	5	11	2	-	25	42
20. tobacco	67	20	6	32	125	751	330	36	23	20	1160	1285
21. spices	780	40	86	5	911	2090	490	70	62	44	2756	3667
22. other crops	4695	126	243	232	5296	7396	9641	496	997	505	19035	24331
all others	16029	466	595	325	17415	19200	20661	1864	1346	793	43864	61279
t o t a l	115455	7692	22325	5162	150634	84987	114296	8560	9803	6148	223794	374428

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

All India

c r o p	area (00 hectares) under irrigated crops by number of times irrigated					total
	once	twice	thrice	more than thrice	not recorded	
(0)	(1)	(2)	(3)	(4)	(5)	(6)
1. paddy	13706	11523	10562	87060	303	123154
2. jowar	1125	1576	1485	3363	49	7598
3. bajra	1937	911	730	1721	76	5375
4. maize	3234	2402	1408	3106	131	10281
5. ragi	94	110	113	2322	-	2639
6. wheat	12507	23011	28801	62418	443	127180
7. barley	2630	2272	2168	4467	109	11646
8. other cereals	136	227	147	438	26	974
a l l c e r e a l s	35369	42032	45414	164895	1137	288847
9. gram	5545	2174	739	849	156	9463
10. tur	81	163	24	202	22	492
11. other pulses	2356	1078	565	593	103	4695
a l l p u l s e s	7982	3415	1328	1644	281	114650
12. rape & mustard	1132	930	512	677	57	3308
13. groundnut	418	604	408	3988	27	5445
14. sesamum	86	58	34	159	-	337
15. other oil seeds	213	123	85	133	8	562
a l l o i l s e e d s	1849	1715	1039	4957	92	9652
16. sugar cane	1081	1433	1730	15599	64	19907
17. cotton	671	1293	1715	7975	36	11690
18. jute	157	52	17	131	-	357
19. other fibres	28	3	2	8	1	42
20. tobacco	79	148	176	872	10	1285
21. spices	99	229	369	2957	13	3667
22. other crop prod.	3972	2918	2435	14754	252	24331
a l l o t h e r c r o p s	6087	6076	6444	42296	376	61279
A L L C R O P S	51287	53238	54225	213792	1886	374428

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

All-India

(0)	Area (in 00 hectares) under irrigated crops		
	with subsidiary irrigation	without subsidiary irrigation	total
(1)	(2)	(3)	(4)
1. paddy	9333	113821	123154
2. jowar	147	7451	7598
3. bajra	229	5146	5375
4. maize	643	9638	10281
5. ragi	165	2454	2639
6. wheat	7130	120050	127180
7. barley	225	11421	11646
8. other cereals	59	915	974
all	17951	270896	288847
9. gram	122	9341	9463
10. tur	179	313	492
11. other pulses	71	4624	4695
all	372	14278	14650
12. rape & mustard	107	3201	3308
13. groundnut	213	5232	5445
14. sesamum	20	317	337
15. other oil seeds	9	553	562
all	349	9303	9652
16. sugarcane	1631	18276	19907
17. cotton	121	10419	11690
18. jute	5	352	357
19. other fibres	-	42	42
20. tobacco	8	1277	1285
21. spices	92	3575	3667
22. other crops	1977	22354	24331
all	4984	56295	61279
all crops	23656	350772	374428

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

All-India

items of asset		value (Rs. 000) of agricultural implements, irrigation equipments and adult cattle & buffaloes by size class of holding (hectares)						
		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)
agricultural implements	1. tractor	15263	46859	201029	604118	2380869	2630439	5878577
	2. power-tiller	82	75	6018	30825	95351	72272	204623
	3. sprayer	549	1809	8076	24024	34889	31786	101133
	4. duster	113	379	500	2626	6782	3435	13835
	5. thrasher	1994	6533	40385	110109	214620	114044	487685
	6. Cane Crusher	8571	26092	50303	66019	87935	29490	268410
	7. Oil Crusher	491	1305	4253	1872	4403		12324
	8. all	27063	83052	310564	839593	2824849	2881466	6966587
irrigation equipments	1. electric pumps	196052	576397	1424137	2303477	2605107	1015646	8120816
	2. diesel pumps	104847	407962	1290774	2388691	2615740	991858	7799582
	3. wind mill	706		2040	992	876	99	4713
	4. moat	42627	73757	122114	139637	102191	23825	504151
	5. persian wheel	35739	127421	247745	258933	179249	25917	875004
	6. others (animal driven)	6697	11907	18000	39126	24553	5584	105867
	7. counter poise	16996	24091	34582	24555	11353	2360	113937
	8. manual pumps	7180	4840	8949	5610	3020	521	30120
	9. others	18503	18263	32186	24174	11605	2671	107402
	10. all	429347	1244638	3180527	5185195	5553694	2068491	17561892
adult cattle & buffaloes	1. cattle	1265033	3119637	5807528	6774088	6096959	2350041	25413286
	2. buffaloes	153652	373603	741032	1061635	1038166	638180	4006316
	3. all	1418685	3493238	6548610	7835723	7135125	2988221	29419602
total		1875095	4820928	10039701	13860511	15513668	7938178	54048081

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

All-India

size class of holding (hectares)	number of households reporting pump sets (00)	number of pump sets (00) possessed *
(0)	(1)	(2)
less than 0.5	3543	3666
0.5 - 1.0	6481	6858
1.0 - 2.0	12777	13671
2.0 - 4.0	16296	18064
4.0 - 10.0	14718	17294
10.0 & above	4555	5866
all classes	58370	65419

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

Table (16) : Estimates of number of pump sets possessed by source of power and horse -power.

All-India

horse power	number of pump sets(00)* / having source of power				
	electricity	diesel	both elect- ricity & diesel	not recorded	total
(0)	(1)	(2)	(3)	(4)	(5)
below 1.0	682	814	551	4	2051
1.0 - 2.0	131	107	-	4	242
2.0 - 3.0	324	420	4	-	748
3.0 - 4.0	11306	1151	48	4	12509
4.0 - 5.0	34	171	57	-	210
5.0 & above	19698	26610	99	45	46452
not recorded	633	2396	17	161	3207
all	32808	31669	724	218	65419

* See foot-note on table (15).

Table (17) : Estimates of number of pump sets* and household share of value of owned equipments by type of possession and source of power.
All -India

source of power	possession type									
	owned singly		owned jointly		rented		not recorded		total	
	no. of pump-sets (00)	h.h. share of value of owned equipments (Rs. 000)	no. of pump-sets (00)	h.h. share of value of owned equipments (Rs. 000)	no. of pump-sets (00)	h.h. share of value of owned equipments (Rs. 000)	no. of pump-sets (00)	h.h. share of value of owned equipments (Rs. 000)	no. of pump-sets (00)	h.h. share of value of owned equipments (Rs. 000)
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
electricity	15022	5578523	16192	2355936	1586	2715	8	-	32808	7937174
diesel	16356	6455597	10666	1845203	4633	2842	14	1648	31669	8305290
electricity & diesel	205	39556	68	8010	451	786	-	-	724	48352
not recorded	59	6617	22	1351	92	-	45	485	218	8453
total	31642	12080293	26948	4210500	6762	6343	67	2133	65419	16299269

* See foot-note on table (15).

Table (18) : Estimates of number of pump sets reporting area irrigated by source of power and source of water separately by possession type.

All India

source of power	no. of pump sets (00) reporting area irrigated by source of power					
	open- well	tube- well	rivers & steams	others	not recorded	total
(0)	(1)	(2)	(3)	(4)	(5)	(6)
<u>owned singly</u>						
1. electricity	10026	4310	237	255	28	14856
2. diesel	7019	7587	714	798	34	16152
3. both electricity & diesel	65	42	-	2	-	109
4. not recorded	23	20	8	-	-	51
5. total	17133	11959	959	1055	62	31168
<u>owned jointly</u>						
1. electricity	11807	3729	365	155	4	16060
2. diesel	5457	4530	401	198	-	10586
3. both electricity & diesel	29	33	-	1	-	63
4. not recorded	15	-	-	-	-	15
5. total	17308	8292	766	354	4	26724
<u>rented</u>						
1. electricity	710	495	249	50	4	1508
2. diesel	1386	1106	1066	827	19	4404
3. both electricity & diesel	16	86	-	20	-	122
4. not recorded	7	4	8	4	-	23
5. total	2119	1691	1323	901	23	6057
<u>not recorded</u>						
1. electricity	4	4	-	-	-	8
2. diesel	4	-	1	-	2	7
3. both electricity & diesel	-	-	-	-	-	-
4. not recorded	-	2	-	-	16	18
5. total	8	6	1	-	18	33
<u>total</u>						
1. electricity	22547	8538	851	460	36	32432
2. diesel	13866	13223	2182	1823	55	31149
3. both electricity & diesel	110	161	-	23	-	294
4. not recorded	45	26	16	4	16	107
5. total	36568	21948	3049	2310	107	63982

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* See footnote on table (15) .

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

All India	
items of expenditure	amount (Rs. 000)
(0)	(1)
repair and maintenance expenses on bunds and field channels	733018
water charges	2005770
other expenses on independently owned lift irrigation	3411422
share of expenses on joint arrangements	1108270
receipt from sale of water	(-) 337153
t o t a l	6921327