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investment. It can be increased significantly without increasing capital input through the application of improved practices, improved seeds, good rotations and growing more cash crops, etc.

(3) *Making larger funds available :* (*i*) Co-operative credit must be enlarged and linked with productive investment. Some capital-forming activities should be undertaken by co-operative institutions. Co-operative organisation should be assisted technically and financially for such investments.

(*ii*) Some constructional works, *i.e.*, reclamation and levelling of wide tracts of land, excavation of tanks, sinking of tubewells and installation of small plants or machinery should be undertaken by development authorities at least in the initial stages.

(*iii*) Central and State Governments should provide some funds and channelise them through the establishment of industries, construction of storage houses or godowns and provision of transport facilities in rural areas.

INVESTMENT PATTERNS IN AGRICULTURE

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The level of investment per holding might be broadly regarded as an index of commercialisation and intensity of agriculture and the prosperity of the agriculturists in a region. This varies not only from region to region but also within the region according to holding size and cropping pattern adopted by the individual farmers. Considerable data on investment for various holding sizes and regions have become available from a number of farm management and cost of cultivation studies made in recent years. The object of the present paper is to examine such data collected in a recent survey for cost of cultivation of cotton, oilseeds and rotation crops conducted in important cotton tracts of the country during the period 1960-63 with the financial assistance of the Cotton Committee, Indian Central Oilseeds Committee and the Indian Council of Agricultural Research.

The survey was located in the States of Punjab, Gujarat, Maharashtra and Mysore. Only the most important cotton and oilseeds producing districts in these States were covered by the enquiry. The districts were as follows :

Punjab—Ludhiana, Bhatinda, Sangroor and Hissar.

Gujarat—Surat, Broach, Baroda, Ahmedabad, Mehsana, Sabarkanta and Junagadh.

Maharashtra—Akola, Buldana, Amravati, Yeotmal, Aurangabad and Jalgaon.

Mysore—Dharwar, Bijapur and Raichur.

Ferozepore and Amritsar districts of Punjab were not included in the enquiry though they were important cotton growing districts as they formed part of the farm management study undertaken by the Directorate of Economics and Statistics, Government of India completed a few years earlier.

The design of sampling adopted was a two-stage stratified random sampling design, with village as the primary sampling unit and the holding as the second stage unit. The districts served as strata. Forty villages were selected in each region, the number of villages selected in a district being roughly proportional to the area under cotton and oilseeds in that district. The selection of villages was done with probability proportional to the acreage under cotton and oilseeds in a village from the list of villages growing these crops. In each selected village a complete list of operational holdings was prepared and the holdings were grouped into three size classes—small, medium and large. Uniform class limits were adopted in all villages in a region, the limits being as follows :

State	Class		
	Small	Medium	Large
Punjab	Less than 15 acres	15 acres to less than 30 acres	30 acres and above
Gujarat and Maharashtra	Less than 13 acres	13 acres to less than 27½ acres	27½ acres and above
Mysore	Less than 15 acres	15 acres to less than 35 acres	35 acres and above

Two holdings were selected from each size class in Maharashtra (6 per village), and 2 holdings in the 'large' class and 3 each in the other 2 (8 per village), in the remaining States subject to availability of required number of holdings in the village. Data on investment in agricultural assets were collected for these holdings initially and later annually. There was no appreciable variation in the investments from year to year and therefore for simplicity data for the middle year, 1961-62 of the enquiry are taken for the present study.

Table I gives averages for investments separately for the three size classes. The items of investment are bullocks, carts, minor implements, major equipment such as chaff-cutters, pumping sets, etc., and in a few cases tractors, and farm structures—mainly cattle and storage sheds. Percentage break-up of the total investment according to the items is shown in Table II.

TABLE I—ASSETS OF SELECTED HOLDINGS : 1961-62

State	Size class	No. of holdings	Average size of holdings (acres)	Draught animals		Carts		Major equipments Rs./ holding	Minor implements Rs./ holding	Farm structures Rs./ holding	Total investment Rs./ holding
				Number per holding	Value Rs./ holding	Number per holding	Value Rs./ holding				
1	2	3	4	5	6	7	8	9	10	11	12
Punjab	Small	105	10.41	2.00	720.7	0.62	218.6	213.4	182.4	1,803.8	3,138.9
	Medium	131	20.31	2.44	952.2	0.83	384.5	496.1	273.6	2,638.9	4,745.3
	Large	60	41.65	3.57	1,528.7	1.00	472.7	2,197.8	371.4	4,721.7	9,292.3
	Average	296*	24.12	2.67	1,067.2	0.82	358.6	963.1	275.8	3,054.8	5,719.5
Maharashtra	Small	69	8.46	1.64	271.1	0.43	61.2	1.7	75.9	1,341.3	1,751.2
	Medium	72	17.82	3.24	613.1	0.97	191.4	363.6	159.4	1,651.7	2,979.2
	Large	98	50.44	6.28	1,381.7	1.49	285.6	283.5	304.7	2,686.7	4,942.2
	Average	239*	25.57	3.72	755.3	0.96	179.4	216.3	180.0	1,893.2	3,224.2
Mysore	Small	96	8.23	1.93	374.6	0.81	289.3	9.3	97.0	137.0	907.2
	Medium	113	19.97	2.10	235.2	0.89	289.7	20.5	165.4	561.5	1,272.3
	Large	68	49.24	3.40	1,012.4	0.98	333.2	42.7	283.7	1,071.4	2,743.4
	Average	276*	25.81	2.48	540.8	0.89	304.0	24.2	182.0	590.0	1,641.0
Gujarat	Small	130	6.95	1.69	600.0	0.48	197.8	66.7	191 8	1,468.5	2,524.8
	Medium	112	17.30	2.24	844.3	0.83	346.8	402.5	241.7	2,851.6	4,686.9
	Large	67	30.47	2.88	1,194.8	0.96	453.2	423.6	325.5	2,716.3	5,113.4
	Average	309*	18.24	2.27	879.7	0.76	332.6	297.6	253.0	2,345.5	4,108.3

* Totals.

Note :—Data in this and subsequent tables refer to an enquiry for cost of cultivation of cotton and rotation crops undertaken in selected districts of States mentioned.

TABLE II—INVESTMENT ON VARIOUS AGRICULTURAL ASSETS (OTHER THAN LAND) AS PERCENTAGE OF TOTAL INVESTMENT ON SUCH ASSETS

State	Size class	Draught animals	Carts	Major equipments	Minor implements	Farm structures
Punjab	Small	23.0	6.9	6.8	5.8	57.5
	Medium	20.0	8.1	10.5	5.8	55.6
	Large	16.4	5.1	23.7	4.0	50.8
	Average	18.6	6.3	16.8	4.9	53.4
Maharashtra	Small	15.5	3.5	0.1	4.3	76.6
	Medium	20.6	6.4	12.2	5.4	55.4
	Large	27.9	5.8	5.7	6.2	54.4
	Average	23.4	5.6	6.7	5.6	58.7
Mysore	Small	41.3	31.9	1.0	10.7	15.1
	Medium	18.5	22.8	1.6	13.0	44.1
	Large	36.9	12.1	1.6	10.3	39.1
	Average	32.9	18.5	1.5	11.1	36.0
Gujarat	Small	23.8	7.8	2.6	7.6	58.2
	Medium	18.0	7.4	8.6	5.2	60.8
	Large	23.4	8.9	8.3	6.4	53.0
	Average	21.4	8.1	7.2	6.2	57.1

It is observed from these tables that farm structures constitute the principal item of investment in agriculture other than land followed by draught animals. Investment in major equipment and agricultural machinery is not appreciable except in large size holdings in the Punjab zone. Even in this class the average is largely affected by a few holdings possessing tractors. Investment on such items might therefore be considered very uncommon in other regions. The tables also show interesting regional variations as well as variation according to holding size. The level of investment per holding is seen to be highest in the Punjab zone followed by Gujarat, Maharashtra and Mysore zones. Although, the number of draught animals per holding in Punjab, Mysore and Gujarat regions is of the same order the actual investment in terms of monetary values varies considerably from region to region. Incidentally, it reflects the superior quality of draught animals in the Punjab zone. The level of investment is broadly in the same order as acre yields of principal crops in the respective regions and as might be expected the investment is higher in the more productive regions. In other words, productivity of land seems to increase with increased capital investment. As regards variation with holding size actual investment per holding naturally goes up with increase in holding sizes. It is interesting to consider the variation in investment per acre. For this purpose estimates of investment per acre, total and for different components, were calculated. These are presented in Table III. This table also shows that the investment per acre is the highest in the Punjab zone followed by

Gujarat, Maharashtra and Mysore zones. The total investment per acre and with a few exceptions the investment per acre on individual items declines with increase in holding sizes indicating the magnitude of economy that might be expected by an enlargement of the holding sizes, for example, through co-operative farming.

TABLE III—INVESTMENT ON VARIOUS AGRICULTURAL ASSETS (OTHER THAN LAND) IN RUPEES PER ACRE

State	Size class	Draught animals	Carts	Major equipments	Minor implements	Farm structures	Total
Punjab	Small	69.23	21.00	20.50	17.52	173.27	301.52
	Medium	46.88	18.93	24.43	13.47	129.93	233.64
	Large	36.70	11.35	52.77	8.92	113.37	223.11
	Average	44.24	14.87	39.93	11.43	126.65	237.12
Maharashtra	Small	32.04	7.23	0.20	8.97	158.55	206.99
	Medium	34.40	10.74	20.40	8.94	92.69	167.17
	Large	27.39	5.66	5.62	6.04	53.26	97.97
	Average	29.54	7.02	8.46	7.04	74.04	126.10
Mysore	Small	45.51	35.15	1.13	11.78	16.64	110.21
	Medium	11.78	14.51	1.03	8.28	28.18	63.72
	Large	20.56	6.77	0.88	5.76	21.76	55.73
	Average	20.95	11.78	0.94	7.05	22.86	63.58
Gujarat	Small	86.33	28.46	9.60	27.60	211.29	363.28
	Medium	48.80	20.05	23.27	13.97	164.83	270.92
	Large	39.21	14.87	13.90	10.68	89.15	167.81
	Average	48.23	18.23	16.32	13.87	128.59	225.24

It might be incidentally observed that while productivity per man-day or per unit of capital might increase with greater investment on fixed assets other than land it might not be closely connected with productivity per acre as the principal measures of improvement of crop yields recommended by Agronomy are items of working capital, for example, investment in fertilizers and improved seed. Measures of land improvement which confer lasting benefit on land and thus increase its productivity are rarely undertaken by cultivators except perhaps in small pockets. Consequently, cost of cultivation or general farm management surveys do not usually throw up considerable data on economics of land improvement. This highlights the need of special surveys to study the economics of land improvement measures.