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Among the progressive farmers the highest proportion of investment is made in irrigation equipment by the medium and large farmers of Budaun. The less progressive farmers have also made similar investments but on a smaller scale. This brings out the great priority that all the progressive farmers give to irrigation.

Investments in farm machinery and vehicles are quite high for the large farmers both the progressive and the less progressive. This is due to the fact that multiple cropping and short duration crops need completion of processes well in time.

#### CONCLUSION

With the introduction of the new technology, the income levels of progressive farmers have considerably increased. There is a significant difference in the income levels of progressive and less progressive farmers in the different size-groups of holdings. A significant proportion of the gross income of progressive farmers is ploughed back into agriculture by the use of new inputs as HYV seed, fertilizers and irrigation. Considerable capital formation, unprecedented in the annals of Indian agriculture, is going on specially in farm machinery and owned means of irrigation by the progressive farmers. There are variations in the investment between progressive and less progressive farmers and also on different size-groups of holdings. This analysis shows that the new technology has created inequitable distribution of income as is evidenced by the variation between the incomes of progressive and less progressive farmers and also inequalities due to the pattern of working expenditures in new inputs and capital investments by these farmers.

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### IMPACT OF HIGH-YIELDING VARIETIES OF CROPS ON PATTERNS OF INCOME DISTRIBUTION

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The impact of high-yielding varieties is in evidence in various sectors of agricultural economy—land utilization, cropping pattern, employment of human and bullock labour and the levels of earnings of farmers thereby setting in Green Revolution in agriculture. The present study, however, is confined to income distribution as influenced by the high-yielding varieties programme.

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*Note :* The data have been taken from a study entitled "An Appraisal of the Improved Technology on Farm Resources and Farm Returns in Kalyanpur Block, Kanpur," in progress, in the Division of Agricultural Economics, U.P. Institute of Agricultural Sciences, Kanpur.

**Objectives**

The following are the main objectives of the study: (1) to determine the impact of high-yielding varieties of crops on net income per farm and per hectare, and (2) to work out income distribution.

**Methodology**

The results are based on an intensive inquiry of 50 cultivators, using high-yielding crop varieties on some of their plots, selected from ten villages of Kalyanpur block, Kanpur. The cultivators were grouped under four categories, viz., 0—2, 2—4, 4—6 and 6 hectares and above size-groups. The inquiry was conducted by survey method during the year 1966-67, 1967-68 and 1968-69.

## FINDINGS

**Area under High-Yielding Crop Varieties**

Table I shows the percentage area under high-yielding crop varieties to the total cropped area, in different size-groups from the year 1966-67 to 1968-69.

TABLE I

Size-group (hectares)	Percentage area under high-yielding crops		
	1966-67	1967-68	1968-69
0 — 2 .. ..	8.35	12.25	21.12
2 — 4 .. ..	17.47	21.24	27.34
4 — 6 .. ..	24.35	34.11	45.12
6 and above .. ..	23.11	31.16	43.47
Average .. ..	21.39	28.87	40.19

The above table reveals that, on an average, the percentage area under high-yielding varieties has considerably increased from 21.39 per cent in 1966-67 to 40.19 per cent in 1968-69. There is an overall increase in the area under high-yielding varieties in almost all the size-groups. However, it was much higher on larger size-farms. The simple reason for the same might be that the farmers of large size-groups could afford to invest and bear greater risk.

**Income and Investment**

The per farm and per hectare values of input, output and net income under different size-groups from the year 1966-67 to 1968-69 are given in Table II.

TABLE II

(in Rs.)

Size-group (hectares)	Per farm			Per hectare		
	Input	Output	Net income	Input	Output	Net income
1966-67						
0-2 .. ..	1,009·34	3,367·06	2,357·72	753·24	2,512·73	1,759·49
2-4 .. ..	1,975·08	6,122·68	4,147·60	742·51	2,301·76	1,559·25
4-6 .. ..	3,313·20	9,998·93	6,685·73	690·25	2,083·11	1,392·86
6 and above	7,770·61	19,695·71	11,925·10	625·15	1,584·53	959·38
Average ..	3,671·25	10,176·98	6,505·73	662·68	1,837·00	1,174·32
1967-68						
0-2 .. ..	1,561·29	4,090·71	2,529·42	1,165·14	3,052·77	1,887·63
2-4 .. ..	2,992·10	7,731·45	4,739·35	1,124·85	2,906·56	1,781·71
4-6 .. ..	5,035·34	13,400·21	8,364·87	1,049·03	2,791·71	1,742·68
6 and above ..	12,498·49	13,805·14	19,306·65	1,005·51	2,558·74	1,553·23
Average ..	5,733·84	14,727·09	8,993·25	1,034·99	2,658·32	1,623·33
1968-69						
0-2 .. ..	1,557·28	4,051·62	2,494·34	1,162·15	3,023·60	1,861·45
2-4 .. ..	3,142·90	8,205·78	5,062·88	1,181·54	3,084·88	1,903·34
4-6 .. ..	5,839·87	15,094·94	9,255·07	1,216·64	3,144·78	1,928·14
6 and above ..	13,584·12	33,863·67	20,279·55	1,092·85	2,724·35	1,631·50
Average ..	6,203·25	15,659·47	9,456·22	1,119·72	2,826·62	1,706·90

Table II shows that, on an average, the per hectare values of input, output and net income were higher in 1968-69 than in 1966-67. The larger percentage of area under the high-yielding varieties programme has contributed to this effect. The higher expenditure on the input structure has resulted into higher production and net income. In 1968-69, the per hectare values of input, output and net income showed an increasing trend with the increase in the size of farms. The size-group of 6 hectares and above was an exception to it. However, the trend in the year 1966-67 was otherwise. Since the high-yielding varieties programme in the State was introduced on commercial lines in 1966-67, it might not have caught the imagination of the cultivators to the desired extent, with the effect that the utilization of recommended doses of inputs in a scientific way might have been limited.

The additional income obtained and expenses incurred per farm and per hectare during 1967-68 and 1968-69 over 1966-67 are given in Table III.

TABLE III

(in Rs.)

Size-group (hectares)	Additional expenses			
	1967-68 (per farm)		1968-69 (per hectare)	
0-2 .. .. .	551.95	547.94	411.90	408.91
2-4 .. .. .	1,017.02	1,167.82	382.34	439.03
4-6 .. .. .	1,722.14	2,526.67	358.78	526.39
6 and above .. .. .	4,727.88	5,813.51	380.36	467.70
Average .. .. .	2,062.59	2,532.00	372.31	457.04

  

Size-group (hectares)	Additional income			
	1967-68 (per farm)		1968-69 (per hectare)	
0-2 .. .. .	723.65	684.56	540.04	510.87
2-4 .. .. .	1,608.77	2,083.10	604.80	783.12
4-6 .. .. .	3,401.28	5,096.01	708.60	1,061.67
6 and above .. .. .	12,109.43	14,167.96	974.21	1,139.83
Average .. .. .	4,550.11	5,482.49	821.32	989.62

Table III clearly indicates that, on an average, the additional income per hectare obtained was more than double of the additional expenditure incurred. A similar trend was observed in both the years, almost in all the size-groups.

#### Pattern of Income Distribution

In the case of farm families, possibly there may be three channels of income distribution, *viz.*, investment on crop production, investment on farm assets and home consumption or savings.

Table IV shows the pattern of income distribution during 1967-68 and 1968-69.

TABLE IV

(in Rs.)

Size-group (hectares)	Income distribution			Total
	Crop production	Farm assets	Home consump- tion or saving	
(1)	(2)	(3)	(4)	(5)
		1967-68		
0-2 .. .. .	1,561.29 (38.17)	148.19 (3.62)	2,381.23 (58.21)	4,090.71 (100.00)
2-4 .. .. .	2,992.10 (38.70)	303.19 (3.92)	4,436.16 (57.38)	7,731.45 (100.00)
4-6 .. .. .	5,035.34 (37.58)	487.34 (3.64)	7,877.53 (58.78)	13,400.21 (100.00)
6 and above .. .. .	12,498.49 (39.30)	822.99 (2.59)	18,483.66 (58.11)	31,805.14 (100.00)
Average .. .. .	5,733.84 (38.93)	432.62 (2.94)	8,560.63 (58.13)	14,727.09 (100.00)

(Contd.)

TABLE IV (Concl'd.)

(1)	(2)	(3)	(4)	(5)
		1968-69		
0—2 .. .. .	1,557.28 (38.43)	129.98 (3.21)	2,364.36 (58.36)	4,051.62 (100.00)
2—4 .. .. .	3,142.90 (38.30)	393.81 (4.80)	4,669.07 (56.90)	8,205.78 (100.00)
4—6 .. .. .	5,839.87 (38.69)	729.12 (4.83)	8,525.95 (56.48)	15,094.94 (100.00)
6 and above .. .. .	13,584.12 (40.11)	1,941.44 (5.73)	18,338.11 (54.16)	33,863.67 (100.00)
Average .. .. .	6,203.25 (39.61)	828.78 (5.29)	8,627.44 (55.10)	15,659.47 (100.00)

Note : Figures within brackets indicate percentages to the total.

Table IV shows that, on an average, out of the total gross income, 39.61 per cent was invested on crop production, 5.29 per cent on farm assets and the balance of 55.10 per cent either utilized for home consumption or saving. The most interesting part of the study was that the above trend was observed in all the size-groups in both the years.

The distribution of additional expenses in crop production on various input factors during 1967-68 and 1968-69 over 1966-67 is given in Table V.

TABLE V

Input factors	Value in rupees according to size-groups				Average
	0—2	2—4	4—6	6 and above	
	1967-68				
Human labour and bullock labour .. .. .	225.68 (54.79)	167.65 (43.85)	135.03 (37.63)	136.96 (36.00)	145.56 (39.10)
Seed .. .. .	49.35 (11.98)	51.82 (13.55)	60.46 (16.85)	67.98 (17.87)	64.09 (17.21)
Manure and fertilizer .. .. .	46.26 (11.23)	67.77 (17.72)	73.75 (20.55)	75.50 (19.85)	71.09 (19.09)
Irrigation .. .. .	85.48 (14.20)	68.32 (17.87)	63.43 (17.70)	70.14 (18.44)	64.21 (17.25)
Rent and overhead cost .. .. .	32.13 (7.80)	26.78 (7.01)	26.11 (7.27)	29.78 (7.89)	28.36 (7.35)
Total .. .. .	411.90 (100.00)	382.34 (100.00)	358.78 (100.00)	380.36 (100.00)	372.31 (100.00)
	1968-69				
Human labour and bullock labour .. .. .	224.10 (54.80)	180.46 (41.11)	204.32 (38.82)	182.26 (38.97)	181.36 (39.68)
Seed .. .. .	49.60 (12.13)	64.66 (14.73)	71.17 (13.52)	70.91 (15.16)	65.43 (14.31)
Manure and fertilizer .. .. .	46.98 (11.49)	82.38 (18.76)	98.24 (18.66)	85.85 (18.36)	80.67 (17.65)
Irrigation .. .. .	57.88 (14.15)	77.89 (17.74)	117.82 (21.38)	98.52 (21.06)	99.11 (21.68)
Rent and overhead cost .. .. .	30.35 (7.43)	33.64 (7.94)	34.84 (6.62)	30.16 (6.68)	30.47 (6.68)
Total .. .. .	408.91 (100.00)	439.03 (100.00)	526.39 (100.00)	467.70 (100.00)	457.04 (100.00)

Note : Figures within brackets indicate percentages to the total.

It may be observed from Table V that, on an average, seed, manure and fertilizer and irrigation together formed the major portion of additional investment on crop production, contributing 53.64 per cent to the total additional expenditure during 1968-69.

The percentage distribution of investment on farm assets over various items is given in Table VI.

TABLE VI

Item of investment	Percentage distribution according to size-groups				Average
	0—2	2—4	4—6	6 and above	
1967-68					
Irrigation structure .. ..	6.61	32.65	50.14	54.81	45.11
Farm machinery and imple- ments .. ..	4.02	3.24	9.31	5.48	5.53
Livestock .. ..	80.87	58.30	30.88	35.16	43.43
Others .. ..	8.50	5.81	9.67	4.55	5.93
Total .. ..	100.00	100.00	100.00	100.00	100.00
1968-69					
Irrigation structure .. ..	39.17	32.50	41.65	49.36	46.50
Farm machinery and imple- ments .. ..	17.16	12.43	28.47	23.38	22.61
Livestock .. ..	32.20	42.29	13.75	11.97	15.95
Others .. ..	11.47	12.78	16.13	15.29	14.94
Total .. ..	100.00	100.00	100.00	100.00	100.00

From Table VI, it is evident that in both the years, irrigation structure formed a major part of the investment. On an average, it accounted for 45.11 per cent in 1967-68 and 46.50 per cent in 1968-69 of the total investment. This type of investment, in general, was higher on large farms as compared to small farms. The investment made by small farmers was mainly on livestock or irrigation structure.

#### SUMMARY AND CONCLUSION

The analysis presented in this paper clearly indicates that the adoption of high-yielding crop varieties had helped in increasing the income proportionate to the percentage of adoption in all the size-groups. The area under high-yielding crop varieties has shown an increasing trend from year to year.



By adopting the high-yielding crop variety programme, the additional income per hectare accounted for more than double of the expenses. As regards the pattern of income distribution, during 1968-69, on an average, 39.61 per cent was invested on crop production, 5.29 per cent on farm assets, making a total investment on farm production of the order of 44.90 per cent. The remaining 55.10 per cent was spent on either home consumption or saving.

The study suggests that the investment made for augmenting production on the farm was less than required. Therefore, for increasing the farm productivity and income, the farmer should make use of a major portion of his additional income for the utilization of more inputs.

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EXPENDITURE ELASTICITIES FOR RURAL PUNJAB  
(CONCENTRATION CURVES APPROACH)

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The demand for food and other items of consumption in India, as in most developing economies, is increasing rapidly because of population growth, rising incomes and various changes in the structure of population. In order to measure the influence of income on consumption, consumption function on the basis of cross-section data is generally estimated in which the total expenditure per person is used as the principal explanatory variable and money expenditure on a given item is used as the dependent variable. It has been repeatedly shown that the calculated expenditure elasticities depend upon the type of the functions fitted. The choice of the mathematical form for the relationship between expenditure on an item and total expenditure, therefore, must be made carefully, especially when these elasticities are now frequently being used for projections of demand and supply.

Expenditure elasticities are generally computed by assuming certain forms such as semi-log, double log or probit relation for the Engel curves and then estimating them from family budget data by the conventional method of least squares. This procedure becomes complicated in view of the fact that the available cross-section data are generally grouped in size classes of per capita total expenditure of households. What one might get from published source of consumption materials, as are required for the present types of problems are some weighted arithmetic averages of consumption of different groups of consumer items and the averages of total expenditure per capita in each size class. The percen-