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**Mohit Malik**  
Department of Horticulture, CS  
Azad University of Agriculture  
and Technology, Kanpur, Uttar  
Pradesh, India

**Subhash Kumar Jawla**  
Department of Agricultural  
Economics and Extension,  
Lovely Professional University,  
Jalandhar, Punjab, India

**Avinash Kumar**  
Chaudhary Sarwan Kumar  
Himachal Pradesh Krishi  
Vishvavidyalaya, Palampur,  
Himachal Pradesh, India

**Teshu Kumar**  
Department of Agriculture,  
Graphic Era Hill University,  
Dehradun, Uttarakhand, India

**Corresponding Author:**  
**Avinash Kumar**  
Chaudhary Sarwan Kumar  
Himachal Pradesh Krishi  
Vishvavidyalaya, Palampur,  
Himachal Pradesh, India

## Impact of institutional agriculture credit on profitability of paddy

**Mohit Malik, Subhash Kumar Jawla, Avinash Kumar and Teshu Kumar**

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### Abstract

Rice is the staple food for largest community in the world belongs to the poaceae family. It is 10,000 years old farming covering alone 11% of arable land. It is considered to be the largest source of energy for poor men. This crop is leading among all other food crop worldwide. In India, it is grown over an area of about 45 million hectares producing about 112.91 million tonnes of grain. In terms of both area and production, it stood second after wheat. It alone provides about 22 percent and 17 percent of calories and proteins to the world's total supply. The yield of paddy in before credit use situation was estimated to be 48 Qt. per ha, which increased to 52 Qt. per ha in after credit use situation. The increase in yield was estimated to be 7.06 percent. The average price realized by farmers for paddy was found to be Rs.950 per Qt. in before credit use situation, while same realized in after credit use situation was Rs.1060 per Qt. Thus, net returns received were found to be increasing by 37.01 percent after credit use situation over the same in before credit use situation. The higher net returns realized in after credit use situation from paddy were on account of higher yield obtained and better price fetched by the farmers.

**Keywords:** Paddy, institutional agriculture credit, CACP cost concept, net farm income

### Introduction

Rice (*Oryza sativa*) the staple food for largest community in the world belongs to the poaceae family. It is 10,000 years old farming covering alone 11% of arable land. It is considered to be the largest source of energy for poor men. India and Burma was considered to be the centre of origin of cultivated rice as per Vavilov (1926). This crop is leading among all other food crop worldwide. In India, it is grown over an area of about 45 million hectares producing about 112.91 million tonnes of grain. In terms of both area and production, it stood second after wheat. It alone provides about 22 percent and 17 percent of calories and proteins to the world's total supply. Rice growing states are West Bengal, Uttar Pradesh, Andhra Pradesh, Bihar and Madhya Pradesh. Of which West Bengal is leading in both area and production followed by Uttar Pradesh. Punjab is having the highest average yield per of about 3346 kg/ha. Only 6-7% of total production is exported to other countries. The income generated through its cultivation is used to pay debts, wages, rent, etc.

### Discussion

The impact of institutional agriculture credit on profitability of paddy cultivation was estimated by comparing the costs and returns in crop cultivation by loanee farmers before and after using the institutional agriculture production credit. Costs and returns were calculated using cost concepts as given by Commission for Agricultural Costs and Prices.

### CACP cost concept

CACP cost concepts are used to calculate the effective cost of cultivation including managerial activity performed by farmer and family labour. Crop costs are split up into various cost components, such as cost A<sub>1</sub>, A<sub>2</sub>, B<sub>1</sub>, B<sub>2</sub>, C<sub>1</sub>, C<sub>2</sub>, C<sub>2</sub>\* and C<sub>3</sub>.

Cost A<sub>1</sub>: The following items are included in cost A<sub>1</sub>.

1. Wages of hired human labour.
2. Wages of permanent labour.
3. Wages of contract labour.
4. Wages of hired bullock labour.
5. Imputed value of owned bullock labour.

6. Charges of hired machinery.
7. Imputed value of owned machinery.
8. Markets rate of manures and fertilizers.
9. Markets rate of seeds.
10. Imputed value of owned seeds.
11. Imputed value of owned manures.
12. Market value of pesticides, herbicides, hormones, etc.
13. Irrigation charges.
14. Land revenue, cess and other tax
15. Depreciation on equipments, farm buildings, farm machineries, irrigation structures, etc.
16. Working capital interest.
17. Value of other items which are used up in current production.

**Cost A<sub>2</sub>:** Cost A<sub>1</sub> + Rent paid for leased in land.

**Cost B<sub>1</sub>:** Cost A<sub>1</sub> + interest on value of owned capital assets (excluding land).

**Cost B<sub>2</sub>:** Cost B<sub>1</sub> + imputed rental value owned land (net of the land revenue) and rent paid for leased - inland.

**Cost C<sub>1</sub>:** Cost B<sub>1</sub> + imputed value of family labour.

**Cost C<sub>2</sub>:** Cost B<sub>2</sub> + imputed value of family labour.

**Cost C<sub>2</sub>\*:** Cost C<sub>2</sub> estimated by taking into account statutory minimum wage or actual wage rate, whichever is higher.

**Cost C<sub>3</sub>:** Cost C<sub>2</sub>\* + 10% of Cost C<sub>2</sub>\* on account of managerial function performed by farmers.

### Gross returns

Returns from each selected crops were calculated by multiplying of physical output of main and by-products with their respective current year prices. By adding returns from main and by-product gross return from the crop were calculated.

Symbolically,

$$GR_{ij} = [Y_{ij} * P_i] + [y_{ij} * p_i]$$

### Where

GR<sub>ij</sub> = gross returns from ith crop,

Y<sub>ij</sub> = physical output of main product from ith crop, y<sub>ij</sub> = physical output of byproduct from ith crop,

P<sub>i</sub> = prevailing price of main product of ith crop, p<sub>i</sub> = prevailing price of byproduct of ith crop and I = paddy.

### Farm income measures

These are the returns over different costs. Different income measures are derived using the cost concepts. These measures include farm business income, family labour income, net farm income, farm investment income, etc. The farm income measures were estimated using following formulae.

1. Farm business income = Gross income – Cost A<sub>2</sub>
2. Family labour income = Gross income – Cost B<sub>2</sub>
3. Net farm income = Gross income – Cost C<sub>3</sub>

Farm investment income = Farm business income – Wages of family labour.

Input use levels in Paddy cultivation before and after using the institutional agriculture credit.

The input use level in paddy cultivation has been given in table 1. A perusal of the table indicates that the use of human labour before and after using the institutional agriculture credit was 83.22 man-days per hectare and 71.28 man-days per hectare, respectively, which decreased by around 14 percent after using institutional agriculture credit. The level of

use of bullock labour before and after using institutional agriculture credit was of 35.67 hours and 20.75 hours per hectare, respectively and the use of bullock labour found to be decreasing by around 42 percent in after use situation.

**Table 1:** Input use levels in paddy cultivation in before and after credit use situation (Unit/ha)

Sl. No.	Inputs	Before	After	Change (%)
1.	Human Labour (man days)	83.22	71.28	-14.34
2.	Bullock Labour (hours)	35.67	20.75	-41.83
3.	Machine Power (hours)	4.0	12.07	201.75
4.	Seed (Kg)	31.25	44.75	43.20
5.	Manure (qtl)	3.14	4.88	55.41
6.	Fertilizer (Kg)	112	207	84.82
(i)	Urea (Kg)	60	120	100.00
(ii)	DAP (Kg)	32	59	84.37
(iii)	MOP (Kg)	20	28	40.00
7.	Plant Protection Chemicals (Kg)	1.22	1.88	54.10
8.	Irrigation (hours)	10.68	27.05	153.28

The use of machine power was increased from 4.00 hours per hectare in before credit use situation to 12.07 hours per hectare in after credit use situation and this increase was estimated to be more than 200 percent. The quantity of seed used per hectare increased by around 43 percent, from 31.25 Kg per hectare in before credit use situation to 44.75 Kg per hectare in after credit use situation. The use of fertilizer as a whole was also found to be increasing by around 84 percent, as it was 112 Kg per hectare in before credit use and 207 Kg per hectare in after credit use situation, respectively. Further, the application of urea, diammonium phosphate (DAP) and murate of potash (MOP) was increased by 100 percent, 84 percent and 40 percent, respectively from their respective application levels in before credit use situation. Similarly, after using of institutional agriculture credit the application of plant protection chemicals and irrigation was also found to be increasing by around 54 percent and 153 percent, respectively. It is clear from the above that the application of all inputs except human labour and bullock labour in paddy cultivation was increased in after credit use situation from the irrespective level in before credit use situation. The decrease in human labour and bullock labour in after credit use situation was due to increase in use of machine power in after credit use situation by more than 200 percent.

### Cost of paddy cultivation before and after using institutional agriculture credit

The component-wise various costs incurred in the cultivation and returns from paddy in before and after institutional agriculture production credit use situations have been given in table 2. A perusal of table reveals that the total cost of paddy cultivation (C<sub>3</sub>) increased in after credit use situation from Rs.36230 to Rs. 39003 per hectare in before credit use situation. This raise in cost of cultivation was on account of increase in expenditure on seeds, fertilizer and manures, irrigation and plant protection measures. The expenses on human labour hired increased from Rs.5262 per hectare in before credit use situation to Rs.7523 per hectare in after credit use situation this increase was estimated to be 42.96 percent. Further, the expenditure on hired human labour stood at 14.52 percent of total cost of cultivation in before use situation and the same was estimated 19.29 percent of the total cost in after credit use situation. The expenditure on family labour was found to be decreasing by 61.55 percent

from Rs.6389 per hectare in before use situation to Rs.2456 per hectare in after credit use situation. The expenditure on family labour was estimated to be 17.63 percent of total cost

in before credit use situation, which decreased to 6.30 percent in after credit use situation.

**Table 2:** Cost of paddy cultivation before and after using institutional agriculture credit (Rs./hectare)

No.	Cost items	Paddy		
		Before	After	Change (%)
1	Hired Human Labour	5262 (14.52)	7523 (19.29)	42.96
2	Bullock Labour	2140 (5.91)	1245 (3.2)	-41.80
3	Machine Power	800 (2.21)	2415 (6.2)	201.84
4	Seed	750 (2.07)	1253 (3.21)	66.99
5	Manure	629 (1.73)	976 (2.50)	55.18
6	Fertilizer	1667 (4.6)	3087 (7.91)	85.16
7	Irrigation Charges	1068 (2.95)	2705 (6.93)	153.31
8	Plant Protection	343 (0.95)	526 (1.35)	53.57
9	Working Capital	12660 (34.94)	19732 (50.60)	55.86
10	Interest On Working Capital	316 (0.87)	443 (1.13)	40.06
11	Land Revenue And Other Taxes	62 (0.17)	62 (0.16)	0.00
12	Depreciation On Farm Assets	756 (2.08)	756 (1.94)	0.00
13	Cost A <sub>1</sub>	13416 (37.03)	20488 (52.53)	52.71
14	Rental Value Of Own Land	11430 (31.55)	11430 (29.30)	0.00
15	Cost A <sub>2</sub>	13416 (37.03)	18488 (47.40)	37.80
16	Fixed Capital (14+15+17+18)	12249 (33.81)	12249 (31.40)	0.00
17	Interest On Fixed Capital	696 (1.92)	696 (1.78)	0.00
18	Cost B <sub>1</sub>	14113 (38.95)	21185 (54.31)	50.11
19	Cost B <sub>2</sub>	25543 (70.50)	32615 (83.62)	27.68
20	Family Labour	6389 (17.63)	2456 (6.30)	-61.55
21	Cost C <sub>1</sub>	20502 (55.69)	23641 (60.61)	15.31
22	Cost C <sub>2</sub>	31932 (88.13)	35071 (89.92)	9.83
23	Cost C <sub>2</sub> *	32936 (90.91)	35457 (90.91)	7.65
24	Cost C <sub>3</sub>	36230 (100.00)	39003 (100.00)	7.65

**Note:** The figures in parentheses denote percentage share in total cost of cultivation

Table also shows that the expenditure on bullock labour decreased by 41.8 percent from Rs.2140 per hectare in before to Rs.1245 per hectare in after credit use situation. The same as a percentage of the cost of cultivation was 5.91 percent in before credit use situation, while it estimated to be 3.2 percent in after credit use situation. The expenditure on machine power was found to be increasing by around 200 percent from Rs.800 per hectare in before to Rs.2415 per hectare in after credit use situation. The expenditure on machine power stood at was 2.21 percent of total cost in before credit use situation, which increased to 6.2 percent in after credit use situation. The expenditure on seed was found to be increasing by around 67 percent from Rs.750 per hectare in before to Rs.1253 per hectare in after credit use situation. The proportion of expenditure on seed as a percentage of the total cost was worked out to be 2.07 percent in before credit use situation, which increased to 3.21 percent in after credit use situation. The magnitude of expenditure on manures and fertilizers was found to be increasing by 55.18 percent and 85.16 percent from Rs.629 per hectare and Rs.1667 per hectare, respectively in before to Rs.976 per hectare and Rs.3087 per hectare, respectively in after credit use situation. The proportions of expenditure on manure and fertilizers of the total cost were estimated to be 1.73 percent and 4.6 percent, respectively in before credit use situation, which increased to 2.50 percent and 7.91 percent, Tomar *et al.* 2018a [10-13, 15-21]; Tomar *et al.* 2018b [10-13, 15-21]; Tomar *et al.* 2015 [10-13, 15-21]; Tomar *et al.* 2020b [10-13, 15-21]; Rajput *et al.* 2020b [19-21]; Rajput *et al.* 2020a and Tomar *et al.* 2019 [10-13, 15-21].

respectively in after credit use situation. The expenditure on irrigation and plant protection chemicals were found to be increasing by 153.31 percent and 53.57 percent, respectively in after credit use situation over their respective levels in before credit use situation. The expenditure on irrigation and plant protection chemicals of occupied 2.95 percent and 0.95 percent proportion of total cost, respectively in before credit use situation, which increased to 6.93 percent and 1.35 percent, respectively in after credit use situation. Further, the working capital incurred in paddy cultivation increased by 55.86 percent from Rs.12660 per hectare in before and Rs.19732 per hectare in after institutional agriculture production credit use situation. As a proportion of total cost the working capital occupied 34.94 percent in before, which reached to 50.60 percent in after use situation. The total cost of paddy cultivation which was estimated to be Rs.36230 per hectare in before credit use situation increased to Rs.39003 per hectare in after credit use situation. This raise in total paddy cost of cultivation was estimated to be 7.65 percent. Rajput *et al.* 2020c [19-21]; Tomar *et al.* 2017 [10-13, 15-21]; Tomar *et al.* 2020a and Tomar S. 2020 [10-13, 15-21].

Returns received from Paddy cultivation by loanee farmers in before and after credit use situations

The returns received from paddy cultivation over cost of cultivation have been shown in Table 3. The table shows that the yield of paddy (main product) in before credit use situation was estimated to be 48 Qt. per ha, which increased to 52 Qt. per ha in after credit use situation. The increase in yield was estimated to be 7.06 percent.

**Table 3:** Returns received from paddy cultivation by loanee farmers in before and after credit use situations

Sl. No.	Output/Income	Paddy		
		Before	After	Change (%)
1	Main product (Qt. per ha)	48	52	7.06
2	by-product (Qt. per ha)	87	90	3.15
3	Price Main product (Rs./qtl)	950	1060	11.58
4	Price By-product (Rs./qtl)	100	105	4.88
5	Gross returns (Rs./ha)	54946	64646	17.65
6	Farm business income (Rs./ha)	41530	46157	11.14
7	Family labour income (Rs./ha)	29404	32031	8.93
8	Family investment income (Rs./ha)	35140.70	62189	76.97
9	Net return (Rs./ha)	18716	25643	37.01

Table also reveals that the average price realized by farmers for main product was found to be Rs.950 per Qt in before, while same realized in after credit use situation was Rs.1060 per Qt. Thus, the farmers fetched about 12 percent higher price for the main product in after credit use situation. Further, the gross returns received from paddy cultivation were Rs.54946 per hectare in before credit use situation, which having increased by 17.65 percent reached to Rs.64646 per hectare in after credit use situation. Again, the net returns received from paddy cultivation were increase from Rs.18716 per hectare in before credit use situation to Rs.25643 per hectare after credit use situation. Thus, net returns received were increased by 37.01 percent after credit use situation over the same in before credit use situation. It is clear from the above discussion that the farmers realized more net returns and gross returns from paddy cultivation in after credit use situation over the same in before credit use situation. The higher gross returns and net returns realized in after credit use situation from paddy were on account of higher yield obtained and better price fetched by the farmers.

### Conclusion

The use of all inputs except human labour and bullock labour in paddy cultivation was found to be increasing in after credit use situation from their respective levels in before credit use situation. The decrease in human labour and bullock labour in after credit use situation was due to increase in use of machine power in after credit use situation. The expenditure on different inputs, like machine power, seeds, fertilizers and manure, irrigation and biotic stress management in paddy cultivation was found to be increasing by varying magnitudes and proportions, whereas the expenditure on family labour and bullock labour decreased in after credit use situation over their respective levels in before credit use situation. Resultantly the cost of paddy production was raised by 7.65 percent from Rs.36230 per hectare in before credit use situation to Rs.39003 per hectare in after credit use situation. The yield of paddy in before credit use situation was estimated to be 48 Qt. per ha, which increased to 52 Qt. per ha in after credit use situation. The increase in yield was estimated to be 7.06 percent. The average price realized by farmers for paddy was found to be Rs.950 per Qt. in before credit use situation, while same realized in after credit use situation was Rs.1060 per Qt.

Thus, the farmers fetched about 12 percent higher price for the main product in after credit use situation. Again, the net returns received from paddy cultivation were increased from Rs.18716 per hectare in before credit use situation to Rs.25643 per hectare in after credit use situation. Thus, net returns received were found to be increasing by 37.01 percent after credit use situation over the same in before credit use

situation. The higher net returns realized in after credit use situation from paddy were on account of higher yield obtained and better price fetched by the farmers.

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