

## **An Empirical Analysis of Profitability of Wheat Cultivation**

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### **Abstract**

India is the second largest producer of wheat. The crop has been under cultivation in about 30 million hectares (14% of global area) to produce the all time highest output of 99.70 million tonnes of wheat (13.64% of world production) with a record average productivity of 3371 kg/ha. The cultivated area under wheat at national level has shown increasing trend, from 29.04 million hectare to 30.54 million hectare with a magnitude of 1.5 million hectare (5%) net gain in terms of area. Uttar Pradesh has largest share in area with 9.75 million hectare (32%), followed by Madhya Pradesh (18.75%), Punjab (11.48%), Rajasthan (9.74%), Haryana (8.36%) and Bihar (6.82%). The study implies that the use of all inputs except bullock labour in wheat cultivation was found to be increasing in after credit use situation from their respective levels in before credit use situation. Thus the total cost of wheat cultivation was increased by 7.18 per cent after credit use situation. It observed that the farmers fetched about 6.55 per cent higher price for wheat in after credit use situation. Thus, net returns received were increased by 31.83 per cent after credit use situation over the same in before credit use situation. The

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

**Key words:** Wheat, institutional agriculture credit, CACP cost concept, net farm income

### **Introduction**

Wheat is one of the principal cereal crops grown worldwide and one of the important staples of nearly 2.5 billion of world population. Globally wheat occupies around 217 million hectares holding the position of highest acreage among all crops with an annual production hovering around 731 million tonnes. India is the second largest producer of wheat. The crop has been under cultivation in about 30 million hectares (14% of global area) to produce the all time highest output of 99.70 million tonnes of wheat (13.64% of world production) with a record average productivity of 3371 kg/ha. India is not only the largest producer of cereal as well as largest exporter of cereal products in the world. India's export of cereals stood at Rs. 56,841.08 crore / 8,180.87 USD Millions during the year 2018-19. Rice occupy the major share in India's total cereals export with 95.7% whereas, other cereals including wheat represent only 4.3 % share in total cereals exported from India during this period. World trade in wheat is greater than for all other crops combined. Demand of India's wheat in the world shows a rising trend. The country has exported 2.26 mt of wheat to the world for the worth of Rs. 424.94 crores / 60.55 USD Millions during the year of 2018-19. In 2018-19 major importers are Nepal, Bangladesh, UAE, Somalia and Sri Lanka.

The cereal is one of the cheapest sources of energy, provides a major share of protein (20%) and calorie intake (19%) from consumption. Nutritional value per 100 g of wheat flour contains Energy : 1,368 kJ (327 kcal), Carbohydrates (71.18 g), Sugars 0.41, Dietary fiber (12.2 g), Fat (1.54 g), Protein (12.61 g). In India wheat crop is cultivated in Rabi season. It is normally sown during November and harvested between March and April. The cultivated area under wheat at national level has shown increasing trend, from 29.04 million

hectare to 30.54 million hectare with a magnitude of 1.5 million hectare (5%) net gain in terms of area. Uttar Pradesh has largest share in area with 9.75 million hectare (32%), followed by Madhya Pradesh (18.75%), Punjab (11.48%), Rajasthan (9.74%), Haryana (8.36%) and Bihar (6.82%). With the above context, the wheat requires high concern to improve the net farm income. Therefore this research is carried out in Madhubani district of Bihar to find the role of the institutional agriculture credit in wheat production.

### **Discussion**

The impact of institutional agriculture production credit on net farm income was estimated by comparing the costs and returns in crop cultivation of loanee farmers before and after using the institutional agriculture production credit. Costs and returns were recalculated using cost concepts as given by Commission for Agricultural Costs and Prices (CACP).

### **CACP cost concept**

CACP cost concepts are widely used because of their relevance in the decision-making process. This means that these costs serve as a basis to expand the size of the farm, to buy the requisite capital assets in the long run and the requisite inputs in the short run. For example, variable costs have a bearing on the level of production in the short run, on the other hand the decision like expanding the size of the farm, buying the durable assets, etc., are based on the total costs. Crop costs are split up into various cost components, such as cost  $A_1$ ,  $A_2$ ,  $B_1$ ,  $B_2$ ,  $C_1$ ,  $C_2$ ,  $C_2^*$  and  $C_3$ .

**Cost  $A_1$ :** The following items are included in cost  $A_1$ .

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 farm machineries, equipments, farm buildings, irrigation structures, etc.
16. Interest on working capital.
17. Miscellaneous expenses (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><sup>\*</sup>:** 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><sup>\*</sup> + 10 % of Cost C<sub>2</sub><sup>\*</sup> 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,

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

Where,

$GR_{ij}$  = gross returns from  $i^{th}$  crop,

$Y_{ij}$  = physical output of main product from  $i^{th}$

crop,  $y_{ij}$  = physical output of byproduct from  $i^{th}$  crop,

$P_i$  = prevailing price of main product of  $i^{th}$  crop,  $P_i$  = prevailing price of byproduct of  $i^{th}$  crop and  $i$  = paddy, wheat, wheat and potato.

### **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.  $\text{Farm business income} = \text{Gross income} - \text{Cost A}_2$
2.  $\text{Family labour income} = \text{Gross income} - \text{Cost B}_2$
3.  $\text{Net farm income} = \text{Gross income} - \text{Cost C}_3$
4.  $\text{Farm investment income} = \text{Farm business income} - \text{Wages of family labour.}$

### **Input use levels in Wheat cultivation before and after using the institutional agriculture credit**

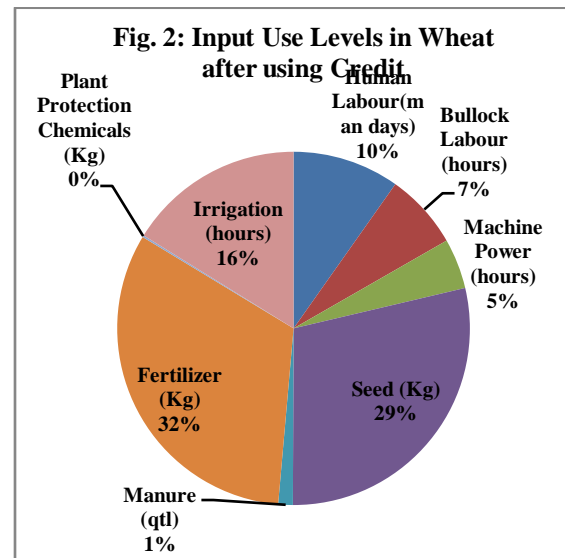
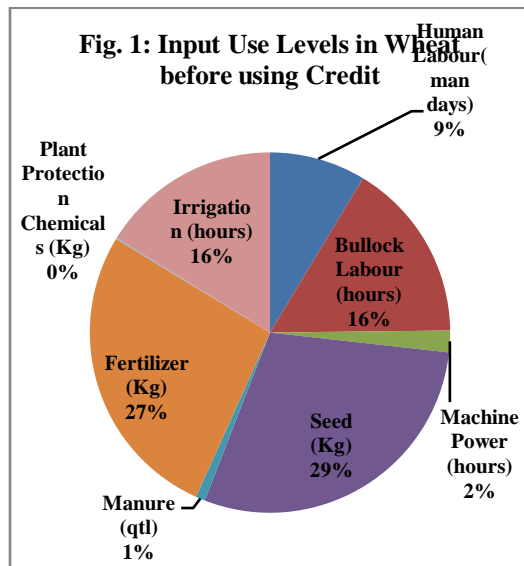
The input use level in wheat cultivation has been given in table 1, fig. 1 and fig. 2. A perusal of the table indicates that the use of human labour in before and after credit use situation was 30.44 mandays per hectare and 38.80 mandays per hectare, respectively. The use of human labour registered 27.46 percent increase in after credit use situation over the same in before credit use situation.

### **Table 1: Input Use Levels in Wheat cultivation before using and after using the**

Institutional Agriculture Credit

(Unit/ha)

Sl.No	Inputs	Before	After	Change (%)
1.	Human Labour (man days)	30.44	38.80	27.46
2.	Bullock Labour (hours)	57.00	27.47	-51.80
3.	Machine Power (hours)	6.86	18.27	166.32
4.	Seed (Kg)	102.66	114.00	11.04
5.	Manure (qtl)	2.91	5.28	291.00
6.	Fertilizer (Kg)	95.00	128.00	34.73
(i)	Urea (Kg)	47	60	27.66
(ii)	DAP (Kg)	28	40	42.85
(iii)	MOP (Kg)	20	28	40.00
7.	Plant Protection Chemicals (Kg)	0.36	0.67	86.11
8.	Irrigation (hours)	57.10	64.11	12.27



The level of use of bullock labour in before and after credit use situation was of 57.00 hours per hectare and 27.47 hours per hectare, respectively, and the use of bullock labour decreased by around 52 per cent in after credit use situation. Whereas the use of machine power increased from 6.86 hours per hectare in before credit use situation to 18.27 hours per hectare in after credit use situation and this increase was estimated to be 166.32 per cent. The quantity of seed used per hectare was also found to be increasing by around 11 percent from 102.66 Kg per hectare in before credit use situation to 114.00 Kg per hectare in after credit use situation. The use of fertilizer as a whole was also found to be increasing by 34.73 per cent; as the same was 95 Kg per hectare in before credit and 128 Kg per hectare in after credit use situation.

Further, the application of urea, DAP and MOP was increased by 27.66 per cent, 42.85 per cent and 40 per cent, respectively from their respective application levels in before credit use situation. Similarly, in after credit use situation the application of plant protection chemicals and irrigation was found to be increasing by 86.11 per cent and 12.27 per cent, respectively.

The analysis of table indicates that the application of all input except bullock labour in wheat cultivation was increased in after credit use situation from their respective levels in before credit use situation. The decrease in bullock labour in after credit use situation was due to 166.32 percent increase in use of machine power in after credit use situation.

### **Cost of Wheat Cultivation Before and after using institutional agriculture production credit**

The component-wise various costs incurred in the cultivation and returns received from wheat cultivation before and after using institutional agriculture production credit have been given in table 2 and fig. 3. A perusal of table reveals that the total cost of wheat cultivation ( $C_3$ ) increased after using institutional agriculture credit from Rs.43978 to Rs.47137 per hectare. This increase in

total cost of cultivation was on account of increase in expenditure on seed, manures and fertilizer, irrigation and plant protection chemicals. Table also shows that the expenditure on hired human labour increased from Rs.4261 per hectare in before credit use situation to Rs.5432 per hectare in after credit use situation. This increase was estimated to be 27.46 percent. The expenditure on hired human labour was estimated to be 9.69 percent of total cost in before credit use situation and 11.52 percent in after credit use situation, respectively. The expenditure on family labour was found to be decreasing by 70.44 percent from Rs.3716 per hectare in before credit use situation to Rs.1099 per hectare in after credit use situation. The expenditure on family labour was estimated to be 8.4 per cent of total cost of cultivation in before credit use situation, which decreased to 2.33 per cent in after credit use situation. Further, the expenditure on bullock labour was also decreased by 51.76 percent from Rs.3417 per hectare in before to Rs.1648 per hectare in after credit use situation. The expenditure on same as a percentage of the total cost was 7.77 in before credit use situation, while it was only 3.50 per cent in after credit use situation. The expenditure on machine power was found to be increasing by 166.19 percent from Rs.1373 per hectare in before to Rs.3654 per hectare in after credit use situation. The expenditure on machine power stood at 3.13 percent of total cost in before credit use situation, which increased to 7.75 percent in after credit use situation. The expenditure on seed was also found to be increasing by around 25 percent from Rs.2464 per hectare in before to Rs.3076 per hectare in after credit use situation. The proportion of expenditure on seed as the percentage of the total cost was 5.60 in before credit use situation, which increased to 6.53 percent in after credit use situation.

The magnitude of expenditure on manures and fertilizers was found to be increasing by 81.31 per cent, 35.20 per cent from Rs.582 per hectare and Rs.4347 per hectare, respectively in before credit use situation to Rs.1056 per hectare and Rs.5878 per hectare, respectively in after credit use situation. The proportion of expenditure on manure and fertilizers of the total cost were estimated to be 1.32 per cent and 9.88 per cent, respectively in before credit use situation, which increased to 2.24 percent and 12.50 per cent,

respectively in after credit usesituation.

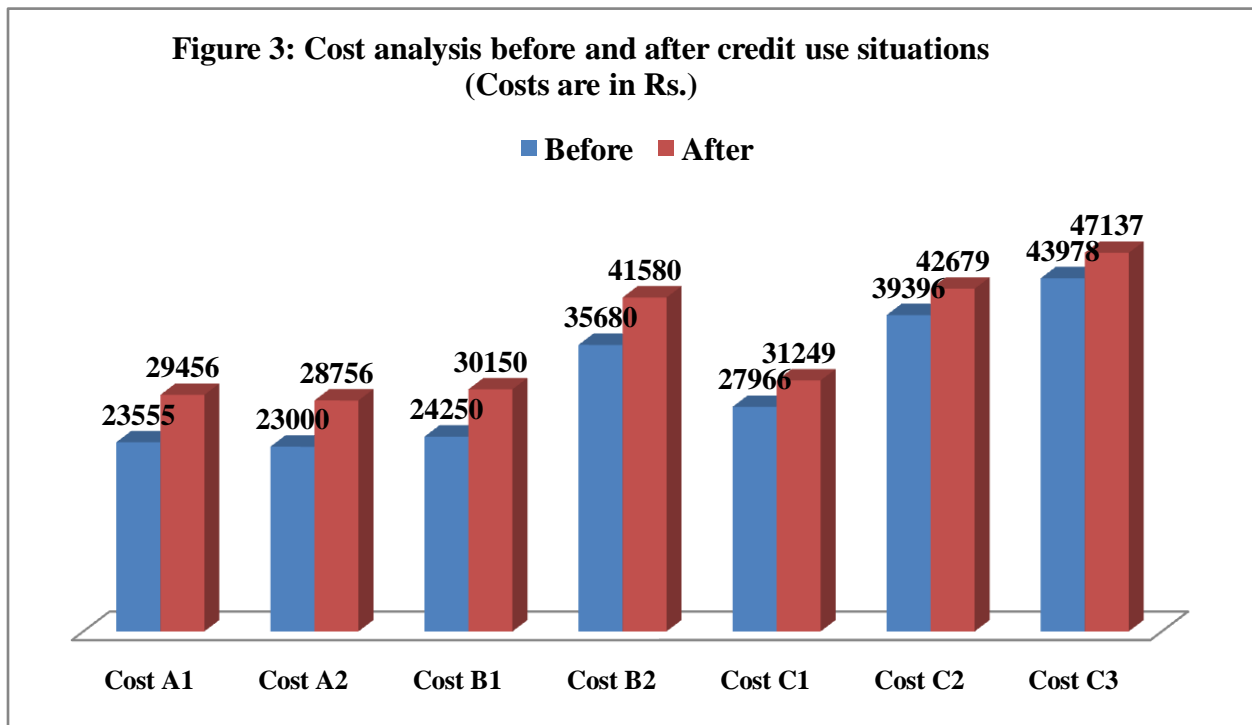
**Table2:Cost ofWheatCultivationBeforeandafterusinginstitutionalagriculture production credit**

(Rs./hectare)

Sl. No.	Cost items	Wheat		
		Before	After	Change (%)
1.	<b>Hired Human Labour</b>	4261 (9.69)	5432 (11.52)	27.46
2.	<b>Bullock Labour</b>	3417 (7.77)	1648 (3.50)	-51.76
3.	<b>Machine Power</b>	1373 (3.13)	3654 (7.75)	166.19
4.	<b>Seed</b>	2464 (5.60)	3076 (6.53)	24.86
5.	<b>Manure</b>	582 (1.32)	1056 (2.24)	81.31
6.	<b>Fertilizer</b>	4347 (9.88)	5878 (12.50)	35.20
7.	<b>Irrigation Charges</b>	5710 (12.98)	6412 (13.60)	12.28
8.	<b>Plant Protection</b>	65 (0.15)	121 (0.26)	86.15
9.	<b>Working Capital</b>	<b>22220 (50.52)</b>	<b>27976 (59.35)</b>	25.90
10.	<b>Interest On Working Capital</b>	555 (1.26)	699 (1.48)	25.90
11.	<b>Land Revenue And Other Taxes</b>	62 (0.14)	62 (0.13)	0.00
12.	<b>Depreciation On Farm Assets</b>	717 (1.63)	717 (1.52)	0.00
13.	<b>Cost A<sub>1</sub></b>	23555 (53.56)	29456 (62.49)	25.05
14.	<b>Rental Value Of Own Land</b>	11430 (25.99)	11430 (24.25)	0.00
15.	<b>Cost A<sub>2</sub></b>	23000.01(52.30)	28756 (61.00)	25.03
16.	<b>Fixed Capital (14+15+17+18)</b>	<b>12210(27.76)</b>	<b>12210(25.90)</b>	0.00
17.	<b>Interest On Fixed Capital</b>	694(1.58)	694(1.47)	0.00
18.	<b>Cost B<sub>1</sub></b>	24250(55.14)	30150(63.96)	24.33

19.	Cost B <sub>2</sub>	35680(81.13)	41580(88.21)	16.54
20.	Family Labour	3716 (8.45)	1099 (2.33)	-70.44
21.	Cost C <sub>1</sub>	27966 (63.59)	31249 (66.29)	11.74
22.	Cost C <sub>2</sub>	39396(89.58)	42679(90.54)	8.33
23.	Cost C <sub>2</sub> *	39980 (90.91)	42852 (90.91)	7.18
24.	Cost C <sub>3</sub>	43978(100)	47137(100)	7.18

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



The expenditure on irrigation and plant protection chemicals registered an increase of 12.28 percent and 86.15 percent, respectively, after institutional agriculture production credit use situation over their respective levels in before credit use situation. The expenditure on irrigation and plant protection chemicals stood at 12.98 per cent and 0.15 per cent of total cost, respectively, in before credit use situation, while the same stood at 13.60 percent and 0.26 percent, respectively, after credit use situation. The working ca

pital incurred by farmers in wheat cultivation increased by around 26 per cent from Rs.22220 per hectare in before and Rs.27976 per hectare in after credit use situation. As a proportion of total cost the working capital was found to be 50.52 percent in before credit use situation while the same was estimated to be 9.35 per cent in after credit use situation. Further the total cost of wheat cultivation ( $C_3$ ) which was estimated to be Rs.43978 per hectare in before credit use situation. While having increased by 7.18 per cent the same reached to Rs.47137 per hectare in after credit use situation.

### **Returns received from Wheat cultivation by loanee farmers in before and after credit use situations**

Returns received from wheat cultivation over cost have been shown in table 3. The table shows that the average yield obtained of wheat (main product) by farmers was 40 Qt. per ha in before credit use situation, while the same in after credit use situation was 42 Qt. per ha, thus farmers obtained 6.17 per cent higher yield in after credit use situation over the same in before credit use situation. Table also reveals that in after credit use situation the price realized farmers fetched 6.55 per cent higher price for their produce, as the average price realized in before and after credit use situation was Rs.1220 per quintal and Rs.1300 per quintal, respectively. Further, the gross returns received by farmers from wheat cultivation were Rs.60064 per hectare in before credit use situation, which reached to Rs.68343 per hectare in after credit use situation having increased by 13.78 per cent. The net returns received were also increased from Rs.16086 per hectare in before credit use situation to Rs.21204 per hectare in after credit use situation. This increase was estimated to be 31.83 per cent over the same in before credit use situation.

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

Sl. No.	Output/Income	Wheat		
		Before	After	Change(%)
1.	Main product (Qt. per ha)	40	42	6.17
2.	by-product (Qt. per ha)	57	64	10.96
3.	Price Main product (Rs./qtl)	1220	1300	6.55
4.	Price By-product (Rs./qtl)	200	210	5.00
5.	Gross returns (Rs./ha)	60064	68343	13.78
6.	Farm business income (Rs./ha)	37064	39587	6.80
7.	Family labour income (Rs./ha)	24385	26763	9.75
8.	Family investment income (Rs./ha)	33348	38488	15.41
9.	Net return (Rs./ha)	<b>16086</b>	<b>21206</b>	31.83

The table clearly indicates that the farmers received more gross returns and net returns from wheat cultivation in a after credit use situation than that in before credit use situation. The same was due to higher yield obtained and better average price realized by the farmers in a after institutional agriculture credit use situation.

### **Impact of institutional agriculture production credit on Net Farm Income**

In order to assess the impact of institutional agriculture production credit on net farm income the changes in cost of cultivation, gross returns, net farm income and net return over one rupee expenditure have been calculated in before and after agricultural production credit use situations. The magnitudes and percentage changes in respect of wheat have been presented in table 4 and figure 4.

**Table 4: Impact of institutional agriculture production credit on Net Farm Income before and after credit use situations**

Crop	Cost/Return	Before Using	After Using	Change (%)
<b>Wheat</b>	Total cost of cultivation (Rs./ha)	43978	47137	7.18***
	Gross returns (Rs./ha)	60064	68343	13.78*
	Net Farm Income (Rs./ha)	16086	21206	31.83***
	Net Return over one rupee expenditure	<b>0.36</b>	<b>0.44</b>	<b>22.22</b>

Note: \*, \*\* and \*\*\* significant at 1 per cent, 5 per cent and 10 per cent level, respectively.

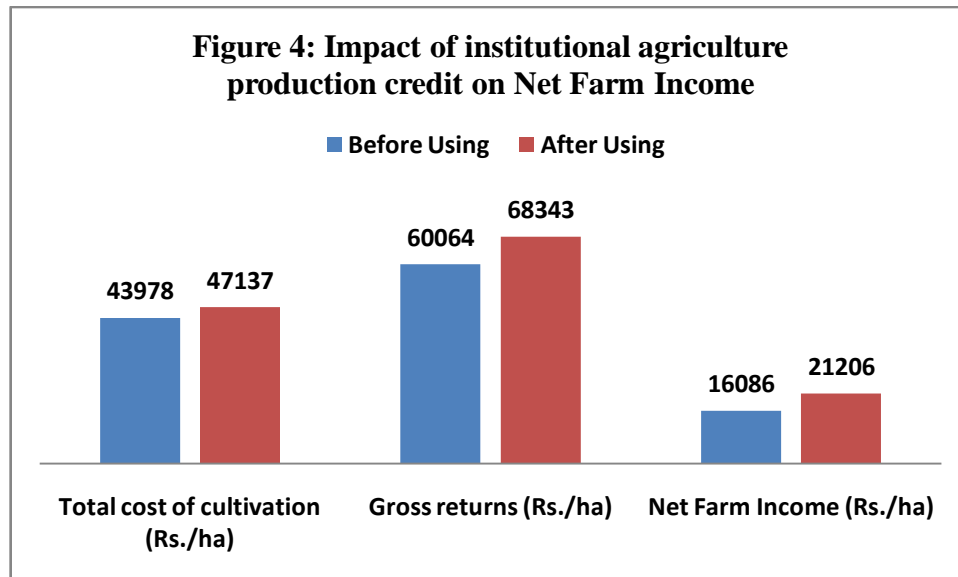


Table also shows that the cost of cultivation of wheat in before agriculture credit use situation was Rs. 43978 per hectare, which reached to Rs. 47137 per hectare, having increased by 7.18 percent. In case of gross returns in before agricultural credit use situation gross returns realized were estimated to be Rs. 60064 per hectare, which turned to be Rs. 68343 per hectare. This increase in gross return turned out to be 13.78 percent. The net farm income realized by wheat growing farmers in after agricultural credit use situation was Rs. 21206 per hectare which was 31.83 per cent higher than that in before agricultural

credit use situation.

### **Conclusion**

The use of all inputs except bullock labour in wheat cultivation was found to be increasing in after credit use situation from their respective levels in before credit use situation. The decrease in bullock labour in after credit use situation observed due to increase in use of machine power in after credit use situation. The expenditure on different inputs, like human labour, machine power, seeds, manures and fertilizer, irrigation and plant protection chemicals in wheat cultivation was recorded to be increasing by varying rates, whereas the expenditure on bullock labour showed a decrease in after credit use situation over their respective levels in before credit use situation. Thus the total cost of wheat cultivation was increased by 7.18 per cent from Rs.43978 per hectare in before credit use situation to Rs.47137 per hectare in after credit use situation. The yield of wheat in before credit use situation was estimated to be 40 Qt. per ha, which increased to 42 Qt. per ha in after credit use situation. The increase in yield was estimated to be 6.17 percent. The average price realized by farmers for wheat was found to be Rs.1220 per Qt. in before credit use situation, while same realized in after credit use situation was Rs.1300 per Qt.

Thus, the farmers fetched about 6.55 per cent higher price for wheat in after credit use situation. Again, the net returns received by farmers from wheat cultivation were recorded to be increasing from Rs.16086 per hectare in before credit use situation to Rs.21206 per hectare in after credit use situation. Thus, net returns received were increased by 31.83 per cent after credit use situation over the same in before credit use situation. The higher net returns realized in after credit use situation from wheat were on account of higher yield obtained and better price fetched by the farmers.

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