

# Whether Cultivation Cost is Rising or Profitability is Decreasing for Wheat Production? A case from Rajasthan, India

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Received: 24-05-2021

Revised: 20-07-2021

Accepted: 10-08-2021

## ABSTRACT

The cost of cultivation of crops is vital economic indicator being taken into consideration for framing the agricultural strategies by Government of India. The study used the cost of cultivation data for the period from 2000-01 to 2015-16 compiled from various sources and publications for profitability analysis of wheat crop. The study used the "Cost of Cultivation of Principal Crops in Rajasthan" by DES, New Delhi uses different cost concepts for estimating costs and returns. In the present study, the cost  $C_2$  was considered for computing profitability. Cost  $C_2$  in CCPC data covers all the variables and fixed costs. Net income and return per rupee invested on wheat crop had increased during the period TE 2003 to TE 2015. Farmers received 2.05 rupee extra after spending 1 rupee cost on wheat crop in TE 2015. Total cost per hectare at cost  $C_2$  was found to be ₹ 20293.80 in TE 2003 and ₹ 50404.18 in TE 2013, it showed 148.37 per cent increase. Cost  $C_1$  had the highest percentage change of 149.79 per cent over the period. Cost  $A_1$  and cost  $A_2$  showed 129.05 and 125.58 per cent increase, respectively during TE 2003 to TE 2015. Gross income from wheat increased from ₹ 27378.01/hectare to ₹ 67796.52/hectare between TE 2003 to TE 2015 with 147.63 per cent increase in gross return.

## HIGHLIGHTS

- Farmers received 2.05 rupee extra after spending 1 rupee cost on wheat crop in TE 2015.
- Gross income from wheat increased from ₹ 27378.01/hectare to ₹ 67796.52/hectare between TE 2003 to TE 2015 with 147.63 per cent increase in gross return.
- Net income and return per rupee invested on wheat crop had increased during the period TE 2003 to TE 2015.

**Keywords:** Cost, crop, return, wheat

Agriculture sector in India contributes as the most strategic component in the country's economy. Agricultural research plays an essential role in improving production of crops and livestock as the agricultural research system has expanded research productivity and research resource allocation, which are the issues of prime concern (Sahu *et al.* 2018).

Cost of cultivation of an agricultural commodity is the total expenses incurred on various inputs that are used in the production of the crops. Exact measurement of

**How to cite this article:** Verma, D.K. and Singh, H. (2021). Whether Cultivation Cost is Rising or Profitability is Decreasing for Wheat Production? A case from Rajasthan, India. *Int. J. Soc. Sci.*, 10(03): 295-300.

**Source of Support:** None; **Conflict of Interest:** None



all the components towards total costs is thus of crucial importance for accurate assessment of the cost of cultivation for any agricultural commodity. Traditionally agriculture was carried out by the conventional practices, using farm produced inputs. But modern agriculture is characterized by new practices and modern implements and machinery that require large, purchased inputs. Till 1970s, there was little use of purchased inputs in cultivation of crops. Indigenous varieties of seeds were used which were purchased from the market. It was after 1970 with the advent of green revolution, agricultural production in India (Churpal, V. K. 2015). The cumulative impact of input intensive technology and the domestic reform in agriculture was seen in the form of an increased in the cost of cultivation of crops. The withdrawal, of subsidies from important spheres and multinationals to manufacture and distribute inputs has further increased expansion of the farming community. The ploughing, preparation for seed bed, irrigation, use of seed, hoeing and weeding, fertilizer, insecticides and pesticides were the major inputs cost which have affected the income of the farmers. These huge expenditures on inputs and other overhead charges have adversely affected income of the farmers. Therefore, studies on cost of production of agricultural commodities have grabbed the interest of research workers and policy makers. The need for reliable and representative estimates on production of agricultural crops is obvious to formulate an appropriate strategy for planned agricultural development (Angadiand Patil, 2018).

Sustained growth in crop production can be attained provided the sustainable growth in productivity fuelled with higher yield, at the same time outpacing the growth in cost of production. Adequate returns from the crop encourage farmers to continue with the crop over the years in the cropping structure and also effect changes in crop mix in non-traditional areas. The question ascends whether cost of cultivation of crop is rising or profitability is decrease from crops? Against this backdrop, it is related to understand the changes in cost of cultivation and profitability from crop cultivation over time.

## MATERIALS AND METHODS

### *Profitability analysis*

The study used the cost of cultivation data for the period from 2000-01 to 2015-16 compiled from various sources and publications for profitability analysis of selected crops. The "Cost of Cultivation of Principal Crops in Rajasthan" by DES, New Delhi uses different cost concepts for estimating costs and returns. In the present study, the cost  $C_2$  was considered for computing profitability. Cost  $C_2$  in CCPC data covers all the variables and fixed costs (Sood *et al.* 2018).

- (i) Profitability = Gross value of output – Cost  $C_2$
- (ii) The income measures: The following measure were worked out to compute profitability.
  1. Farm business income = Gross return – Cost  $A_2$
  2. Family labour income = Gross return – Cost  $B_2$
  3. Net income = Gross return – Cost  $C_2$
  4. Farm investment income = Farm business income - Imputed value of family labour.

The items of cost of cultivation cover both paid out cost and the imputed costs. The item covered under these costs were (Perke *et al.* 2017):

### **Paid out costs**

1. Hired labour (human, animal and machinery).
2. Maintenance expenses on owned animals and machinery.
3. Expenses on material inputs such as seed (home grown and purchased), fertilizer, manure (owned and purchased), pesticides and irrigation.
4. Depreciation on implements and farm buildings (such as cattle sheds, machine sheds and storage sheds).
5. Land revenue.
6. Rent paid for leased- in land.

### **Imputed Costs**

Value of family labour / managerial input of the farmer, rent of owned land and interest on owned fixed capital for which farmer does not incur any cash expenses.

Costs were generated following certain cost concepts. These cost concepts and the items of costs included under each concept are given below (Pushpa *et al.* 2017).

**Cost A<sub>1</sub>**

1. Value of hired human labour
2. Value of hired bullock labour
3. Value of owned bullock labour
4. Value of owned machinery labour
5. Hired machinery charge
6. Value of insecticides and pesticides
7. Value of seed (both farm produced and purchased)
8. Value of fertilizer
9. Value of manure (owned and purchased)
10. Depreciation on implements and farm building
11. Irrigation charges
12. Interest on working capital
13. Land revenue, cesses and other taxes
14. Miscellaneous expenses

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 fixed capital assets (excluding land)

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

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>3</sub>: Cost C<sub>2</sub>\* + 10 per cent of Cost C<sub>2</sub>\* to account for managerial input of the farmer (Murthy and Bouramma, 2015).

**RESULTS AND DISCUSSION**

**Cost of Cultivation of Wheat**

The estimates of different costs incurred in wheat cultivation on per hectare and production per quintal basis are given in Table 1 and Fig. 1&2.

Cost of cultivation indicates total expenses incurred on wheat cultivation in one hectare of land. During TE 2003 and TE 2015 direct cost, cost A<sub>1</sub> which covered all expenses paid by the farmer in cash and kind, accounted for ₹ 9552.42/ha and ₹ 21880.43/ha, respectively. Out of pocket cost of farmer, rent paid for leased – in land value included in cost A<sub>2</sub> which showed 125.58 per cent increase during the study period. In TE 2003, cost B<sub>1</sub> was ₹ 11429.35/ha and ₹ 25926.13/ha in TE 2015. Between TE 2003 to TE 2015, cost B<sub>1</sub> showed 126.83 per cent increase which included direct cost plus interest on working capital (excluding land). Cost of cultivation had increased with the increase in level of adoption of new technology (*Viz.* machinery, family and hired labour, seeds and fertilizer) and increased input prices. Actual expenses incurred in cash and kind by the farmer, interest value on owned capital assets, rental land value and value of imputed family labour were included in cost C<sub>2</sub>. Cost C<sub>2</sub> showed 148.37 per cent increase during

**Table 1:** Cost of Cultivation and Cost of Production of Wheat

Sl. No.	Costs	Cost of cultivation (₹/ha)			Cost of production (₹/Quintal)		
		TE 2003	TE 2015	Per cent change	TE 2003	TE 2015	Per cent change
1	Cost A <sub>1</sub>	9552.42	21880.43	129.05	227.83	479.52	110.47
2	Cost A <sub>2</sub>	9841.99	22202.08	125.58	234.04	486.31	107.79
3	Cost B <sub>1</sub>	11429.35	25926.13	126.83	271.62	566.83	108.68
4	Cost B <sub>2</sub>	16126.98	37371.41	131.73	383.62	814.02	112.19
5	Cost C <sub>1</sub>	15596.17	38958.90	149.79	370.04	856.15	131.36
6	Cost C <sub>2</sub>	20293.80	54404.18	148.37	482.05	1103.34	128.88
7	Cost C <sub>3</sub>	22323.18	55444.59	148.37	530.25	1213.67	128.88

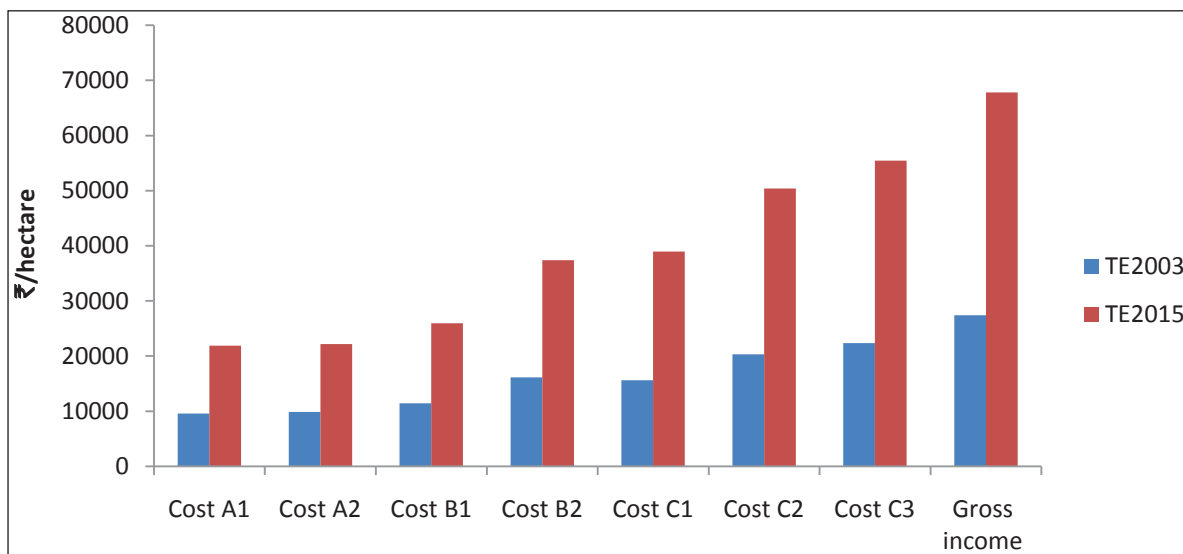


Fig. 1: Cost of cultivation and Income from wheat crop in Rajasthan state during the study period (2000-2015)

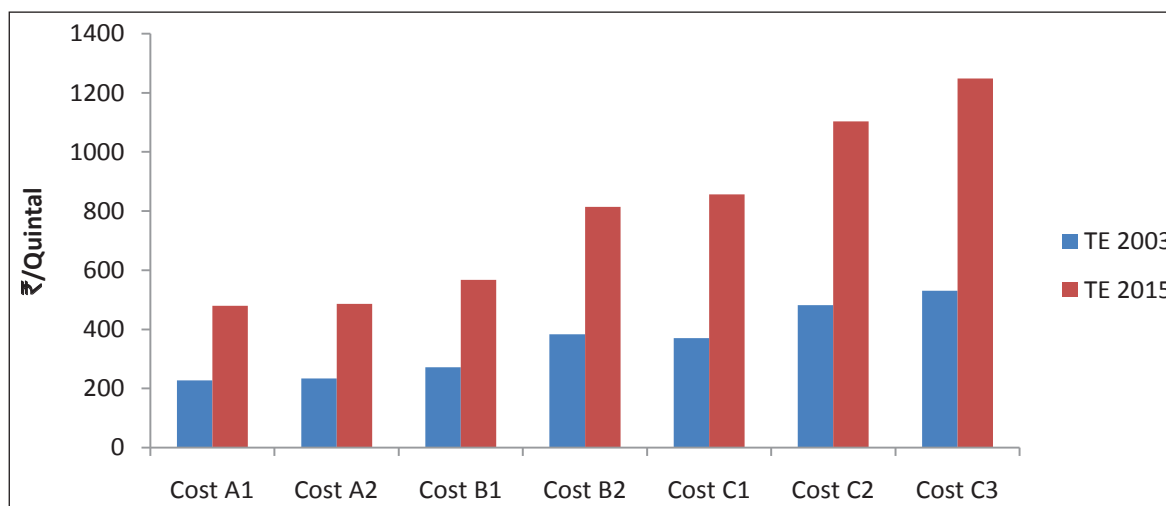


Fig. 2: Cost of production from wheat crop in Rajasthan state during the study period (2000-2015)

the study period. Total cost, cost  $C_3$  covered all the component of cost  $C_2$  and plus 10 per cent of cost  $C_2$  on account of managerial functions performed by farmer. It increased from ₹ 22323.18 per hectare to ₹ 55444.59 per hectare *i.e.*, 148.37 per cent during the study period.

Cost of production per quintal was calculated by using material cost, rent cost, wage cost, interest cost and normal profit of the entrepreneur as per different cost concepts. Table 1 revealed that ₹ 227.83 in TE 2003 and

₹ 479.52 in TE 2015 were spent as cash expenses (cost  $A_1$ ) for producing one quintal of wheat. The cost of production found to increase from ₹ 530.25 per quintal in TE 2003 to ₹ 1213.67 per quintal in TE 2015 if all the imputed and actual cost were considered for hired and owned resources together (Fig. 2).

### Income from wheat cultivation

Gross and net income per hectare from wheat cultivation to the producer farmer are shown in Table 2.

**Table 2:** Gross and Net Income per Hectare from Wheat Cultivation

Sl. No.	Items	TE 2003	TE 2015	Per cent change
1	Value of Main Product (₹/ha)	21875.74	54395.22	148.65
2	Value of By product (₹/ha)	5502.27	13401.30	143.55
3	Gross income (₹/ha)	27378.01	67796.52	147.63
4	Net income over Cost A <sub>2</sub> (₹/ha)	17536.02	45594.44	160.00
5	Net income over Cost C <sub>2</sub> (₹/ha)	2084.21	17392.34	734.48

Due to use of improved technology in wheat (timely sowing, quality seed and use of machinery etc.) gross income increased from ₹ 27378.01/ha to ₹ 67796.52/ha between TE 2003 to TE 2015 which showed 147.63 per cent increase in gross returns. Gross income attributed to main product value and by product value. Main product value increased from ₹ 21875.74 per hectare to ₹ 54395.22 per hectare along with 148.65 per cent increase in main product value during the study period. Value of by product increased from ₹ 5502.27 to ₹ 13401.30 per hectare which showed 143.55 per cent increase between TE 2003 to TE 2015. During TE 2003 to TE 2015 net income over cost A<sub>2</sub> showed 160.00 per cent increase and net income over cost C<sub>2</sub> showed 734.48 per cent increase. Net income of farmer at cost A<sub>2</sub> and at cost C<sub>2</sub> showed that farmers' income was increasing during the

study period. Similar result reported by (Ahirwar *et al.* 2014) wheat cultivation in Vindhyan Plateau of Madhya Pradesh.

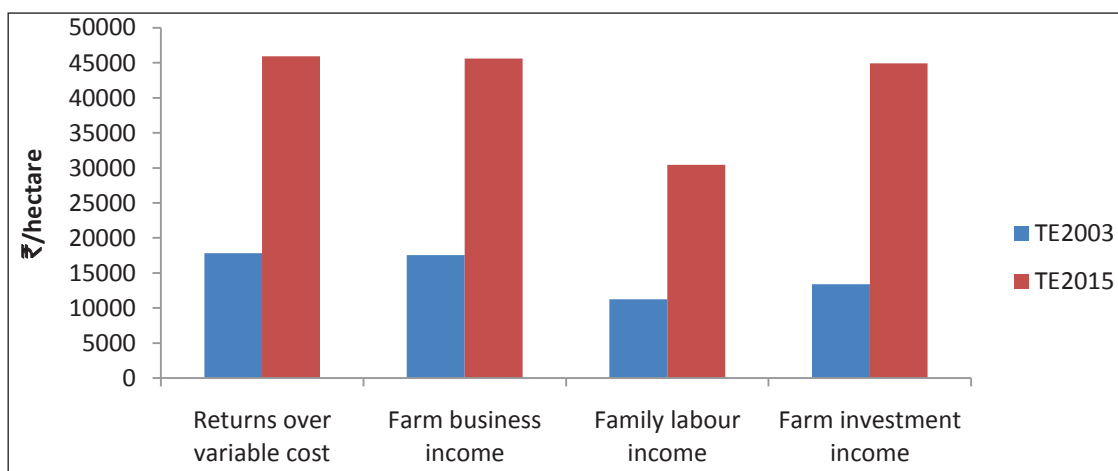
**Income measures of wheat cultivation**

Income measures comparison of wheat cultivation in Rajasthan is given in Table 3 and Fig. 3. Income measures states correct income expenditure statement of the crop and reveals its profitability to the farmer.

**Table 3:** Return from Cultivation of Wheat Crop (₹/ha)

Sl. No.	Particulars	TE 2003	TE 2015	Per cent change
1	Returns over variable cost	17825.59	45916.09	157.58
2	Farm business income	17536.02	45594.44	160.00
3	Family labour income	11251.03	30425.11	170.42
4	Farm investment income	13369.20	44921.76	236.00
5	Return per rupee (Cost A <sub>2</sub> )	2.78	3.05	9.71

Return over variable cost (seed, fertilizer, manure and irrigation charges etc.) increased from ₹ 17825.59/ha to ₹ 45916.09/ha during the study period. Farm business income was positive and showed increment of 160.00 per cent over the study years which included returns over fixed capital including owned land and family labour. The family labour income per hectare from



**Fig. 3:** Return from cultivation of wheat crop in Rajasthan state during the study period (2000-2015)

wheat cultivation increased from ₹ 11251.03 in TE 2003 to ₹ 30425.11 in TE 2015. The farm investment income *i.e.* return to fixed capital including land showed increasing trend with 236.00 per cent increase during the study years. During the study period, return per rupee invested at ( $A_2$  cost) increased from 2.78 in TE 2003 to 3.05 in TE 2015 which showed 9.71 percent increase. Thus, on all kind of parameters the wheat crop was profitable to the farmers. Similar finding were observed by Kumar *et al.* (2011) in Andhra Pradesh state in wheat crop.

## CONCLUSION

Total cost per hectare at cost  $C_2$  was found to be ₹ 20293.80 in TE 2003 and ₹ 50404.18 in TE 2013, it showed 148.37 per cent increase. Cost  $C_1$  had the highest percentage change of 149.79 per cent over the period. Cost  $A_1$  and cost  $A_2$  showed 129.05 and 125.58 per cent increase, respectively during TE 2003 to TE 2015. Gross income from wheat increased from ₹ 27378.01/hectare to ₹ 67796.52/hectare between TE 2003 to TE 2015 with 147.63 per cent increase in gross return. While net income over cost  $A_2$  and cost  $C_2$  increased during study period. It was found that during the study period return per rupee invested ( $A_2$  cost) increased from 2.78 to 3.05 between TE 2003 to TE 2015 with 9.71 per cent increase in wheat crop. Similar result found by (Ayalewand Sekar, 2015). Profitability of coarse cereals production in India.

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