

Cost and Return Analysis for Important *Kharif* **Season Crops in Uttar Pradesh**

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ABSTRACT

The data on cost of cultivation and returns of major crops were collected from Directorate of Economics & Statistics, Ministry of Agriculture and Farmers Welafare, Govt. of India for the year 2017-18. The share of labour power is higher in paddy, maize and groundnut while it is lesser in other pulse crops. In percentage term, the share of labour expenditure in total cost C_3 is highest that is 33.52% on an average in all important crops. In pulses, the share of irrigation expenditure is negligible in total cost, while, in maize and paddy, it is significant. The average expenditure on variable cost in selected seasonal *kharif* crops is 60.62% and on fixed cost is 30.29% of total cost C_3 . The net return (on C_2 cost) is negative in most of the selected crops in *kharif* season and it is positive in Arhar and sesamum. The average net return in all the selected *kharif* season crops is negative. The Benefit cost ratio at C_2 is 0.84, 0.85, 0.89, 1.08, 0.89, 0.66, 1.07, 0.76 and 0.88 for Maize, Bajra, Paddy, Arhar, Moong, Urad, Sesamum, groundnut and overall selected *kharif* season crops, respectively. The B:C ratio, in sugarcane cultivation is 1.6, which is quite higher in relation to selected crops of *kharif* in Uttar Pradesh in 2017-18. The variation in returns from different crops will lead to unequal distribution of resources among farmers. Thus, suitable purchase methods should be adopted for providing remunerative prices to the farmers.

Keywords: Cost, Return, foodgrains, kharif season, Uttar Pradesh

The state of Uttar Pradesh is surrounded by Uttarakhand, Himachal Pradesh, Haryana and Delhi in the North and West; Rajasthan, Madhya Pradesh and Chhattisgarh in the South-West and South; and Jharkhand and Bihar in the East. This is the fourth largest as well as the most populous state in the country occupying 7.33% of the total area of the country with 199.8 million people as per Census 2011 accounting for 16.5% of India's total population. The state's agricultural growth has been lower than the all-India average in most years. In the period between 2005–06 and 2018–19, the agricultural growth rate was 3.0% per annum (at 2011–12 constant prices) while the all-India average rate of growth was 3.6% per annum . However, agricultural growth in Uttar Pradesh has been relatively less volatile than that experienced at the all-India level in the past two decade (Gulathi *et al.* 2021). UP is blessed with the fertile Indo-Gangetic plains and, given the size of the state's geographical area, it is a significant contributor to the food security of the nation. About 28% of India's wheat and12% of rice is produced by the state. Sugarcane is also produced in large quantities, accounting for 44% of the country's total production. However, farm distress is prevalent in

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the state. There is large variation in the agricultural performance in different regions of the state. Western UP is the most progressive region in terms of its contribution to value of output from agriculture and allied activities while Bundelkhand lags far behind. (Gulathi *et al.* 2021). Various crops are grown in Uttar Pradesh in Kharif and Rabi season in a year. The economics of different crops decides the income of farmers and development of the region of UP (Darling, 1925; NSSO, 2005b; Reddy and Mishra, 2009; Deshpande and Arora, 2010). Thus, this study makes a comparative analysis of cost and returns of important foodgrains crops and also analyse the sugarcane in Uttar Pradesh.

MATERIALS AND METHODS

The analysis is based on secondary data. The data on cost of cultivation and returns were collected from Directorate of Economics & Statistics, MoA & FW, GOI for year 2017-18 from other research studies. The cost of cultivation and return analysis is made for important cereals and pulse crops of UP as Maize (*Zea mays*), Bajra (*Pennisetum glaucum*), Paddy (*Oryza sativa*), Arhar or or Red gram (*Cajanus cajan*), Moong (*Phaseolus aureus*), Urad or Black gram (*Phaseolus mungo*), Sesamum (*Sesamum indicum*) and groundnut Arhar (*Arachis hypogaea*). These cost and return analysis is also compared with sugarcane (*Saccharum officinarum*) as this also very important crops in UP. The explanation of different cost concepts that were used is as follows:

- Cost A₁: All variable cost including land revenue, depreciation and Interest on working capital and excluding the family labour cost
- **Cost A₂:** Cost A₁ + Rent paid for the leased land.
- **Cost B**₁: Cost A₁ + Interest on value of owned capital assets (excluding Land).
- **Cost B**₂: Cost B₁ + imputed rental value of owned land + Rent paid for leased land.
- **Cost** C₁: Cost B₁ + Imputed value of family labour.
- **Cost** C₂: Cost B₂ + Imputed value of family labour.
- **Cost** C₃: Cost C₂ + 10% of cost C₂ to account for managerial remuneration to the farmer.

- **Gross Return:** Total value of produce (Main product and by product) multiplied by prevalent market prices
- Net Return: Gross return Total cost of cultivation (Cost C₂ or cost C₃)
- B:C Ratio: Gross Return/Total cost

RESULTS AND DISCUSSION

The analysis of cost of cultivation and returns from different *Kharif* season crops in Uttar Pradesh revealed that paddy has the highest expenditure on human labour, followed by maize (Table 1). The expenditure on fertilizers in case of paddy and maize is higher both in absolute term and in percentage basis.

Table 1: Cost of cultivation of cereals

Particulars	Maize	Bajra	Paddy
Human Labour	16762.10	12819.18	21342.52
Animal Labour	220.43	22.39	55.38
Machine Labour	6315.69	5429.87	5470.43
Seed	3623.68	1069.45	4371.56
Fertilizer & Manure	2598.05	959.57	4201.59
Insecticides	95.88	100.08	236.39
Irrigation Charges	2562.83	977.69	6614.60
Miscellaneous	8.91	217.56	9.3
Interest on Working	692.86	449.83	1027.28
Capital			
Variable cost	32880.43	22045.62	43329.05
Fixed Costs	14545.48	12418.18	18052.58
Rental Value of Owned	10581.44	8757.73	13331.72
Land			
Rent Paid For Leased-	230.72	893.93	5.86
in-Land			
Land Revenue, Taxes,	3.24	4.58	3.68
Cesses			
Depreciation on	653.01	453.22	744.07
Implements & Farm			
Building			
Interest on Fixed	3077.07	2308.72	3967.25
Capital			
Total Cost (C_2)	47425.91	34463.80	61381.63
Total cost (C_3)	52168.50	37910.18	67519.79
Cost of production	1544.87	1230.33	1175.92
$(\mathbf{F}/\text{quintal})$ at C_2			
Cost of production	1699.36	1353.36	1293.51
$(\mathbf{F}/\text{quintal})$ at C ₃			
Returns (₹/ha)			
Yield (Qtl./Hectare)	26.02	21.56	37.06

Gross return (₹/ha)	39673.07	29149.13	54476.73
Net Return (₹/ha) on	-7752.84	-5314.67	-6904.90
C ₂ Cost			
Net Return (₹/ha) on	-12495.43	-8761.05	-13043.06
$C_3 cost$			
B:C ratio at C ₂ cost	0.84	0.85	0.89
B:C ratio at C_3 cost	0.76	0.77	0.81

Source: Directorate of Economics & Statistics, MoA & FW, GoI (2017-18).

The expenditure on human labour is lowest in case of Sesamum Table 2). Among all *kharif* crops, the share of expenditure on seed is highest in groundnut (Table 3), that is 13.79% of total cost (C_3) while, it is lowest in Sesamum (Fig. 1).

Table 2: Cost of cultivation of pulses

Particulars	Arhar	Moong	Urad
Human Labour	13907.91	11317.58	8012.47
Animal Labour	42.07	1728.96	319.87
Machine Labour	4038.10	5681.43	4351.91
Seed	2053.79	1242.64	1129.16
Fertilizer & Manure	231.18	64.31	17.29
Insecticides	293.27	502.08	596.71
Irrigation Charges	1305.08	0.00	59.77
Miscellaneous	190.14	18.84	69.48
Interest on Working Capital	395.49	398.21	295.89
Variable cost	22457.03	20954.05	14852.55
Fixed Costs	20844.84	7761.84	5818.09
Rental Value of Owned	15485.48	6432.92	4434.71
Land			
Rent Paid For Leased-in-	0.00	0.00	0.00
Land			
Land Revenue, Taxes,	16.61	8.63	6.37
Cesses			
Depreciation on	1334.52	353.60	192.58
Implements & Farm			
Building			
Interest on Fixed Capital	4008.23	966.69	1184.43
Total Cost (C_2)	43301.87	28715.89	20670.64
Total cost (C_3)	47632.06	31587.48	22737.70
Cost of production	4272.86	5452.05	5820.65
(₹/quintal) at C_2			
Cost of production	4700.15	5997.26	6159.45
$(\mathbf{Z}/\text{quintal})$ at C_3			
Returns (₹/ha)			
Yield (Qtl./Hectare)	8.44	4.84	3.35
Gross return (₹/ha)	46782.80	25544.41	13732.12
Net Return (₹/ha) on	3480.93	-3171.48	-6938.52
C ₂ Cost			

Net Return (₹/ha) on	-849.26	-6043.07	-9005.58
C ₃ cost			
B:C ratio at $C_2 cost$	1.08	0.89	0.66
B:C ratio at C_3 cost	0.98	0.81	0.60

Source: Directorate of Economics & Statistics, MoA & FW, GoI (2017-18).

Table 3: Cost of cultivation of oilseeds

Particulars	Sesamum	Groundnut	Sugarcane
Human Labour	7939.79	16693.93	41082.96
Animal Labour	0	944.28	710.42
Machine Labour	3066.72	5754.76	3530.33
Seed	391.19	6805.28	8135.65
Fertilizer & Manure	38.89	394.07	4958.41
Insecticides	42.71	796.40	1867.88
Irrigation Charges	0	780.10	9299.28
Miscellaneous	0.75	373.22	1.74
Interest on Working	163.98	676.06	3685.89
Capital			
Variable cost	11644.03	33218.10	73272.56
Fixed Costs	8140.62	11645.89	52364.40
Rental Value of	6943.83	9508.00	38756.12
Owned Land			
Rent Paid For Leased-	0.00	0.00	13.96
in-Land			
Land Revenue, Taxes,	3.72	7.51	16.16
Cesses			
Depreciation on	250.24	406.15	1891.09
Implements & Farm			
Building			
Interest on Fixed	942.83	1724.23	11687.07
Capital			
Total Cost (C_2)	19784.65	44864.06	125636.96
Total cost (C_3)	21763.12	49350.466	138200.7
Cost of production	7081.71	4091.09	199.05
$(\mathbf{F}/\text{quintal})$ at C_2			
Cost of production	7789.88	4500.20	218.96
$(\mathbf{R}/\text{quintal})$ at C ₃			
Returns (₹/ha)			
Yield (Qtl./Hectare)	2.83	10.65	602.42
Gross return (₹/ha)	21116.96	34005.67	201028.6
Net Return (₹/ha) on	1332.31	-10858.39	75391.64
$C_2 Cost$			
Net Return (₹/ha) on	-646.16	-15344.80	62827.94
$C_3 cost$			
B:C ratio at $C_2 cost$	1.07	0.76	1.60
B:C ratio at $C_3 cost$	0.97	0.69	1.45

Source: Directorate of Economics & Statistics, MoA & FW, GoI (2017-18)





Fig. 1: Expenditure in different inputs under different crops (₹/ha)

The expenditure on fertilizers is small and below 1 percent of total cost in pulses and groundnut. The expenditure on irrigation in paddy is highest that is 9.80% of total cost C3, while it is very low in pulses. In selected important crops, second major expenditure is machine power that is ₹ 5013.61 (13.54%) followed by expenditure on seed.

The average expenditure percent on variable cost in selected seasonal kharif crops is 60.62 and on fixed cost is 30.29% of total cost C₃. As a part of fixed cost, the rental value of land has major share and which is ₹ 9434.48 per hectare or 23.34 % of total cost.

Economic returns from *kharif* crops

The per hectare net return on cost C_2 is -752.84, -5314.67, -6904.90, 3480.93, -3171.48, -6938.52, 1332.31 and -10858.39, respectively and the benefit cost ratio is 0.84, 0.85, 0.89, 1.08, 0.89, 0.66, 1.07, 0.76 and 0.88 for Maize, Bajra, Paddy, Arhar, Moong, Urad, Sesamum and groundnut crops, respectively. In relation to the annual crop sugarcane, the total cost C_2 (₹/ha), gross return (₹/ha), net return (₹/ha) and B:C is 125636.96, 201028.6, 75391.64 and 1.60, respectively. Thus, it is found that benefit cost ratio in most crops is below one or near to one. However in sugarcane cultivation, the B:C ratio is comparatively high in relation to seasonal crops. The cultivation of sugarcane is depended on availability of sugarcane mill and demand for sugarcane. If there is demand for sugarcane and available infrastructure, the resources will be shifted in cultivation of sugarcane by the farmers as there is higher return in cultivation of sugarcane. The B:C ratio, in sugarcane cultivation is 1.6, which is quite higher in relation to selected crops of *kharif* in Uttar Pradesh in 2017-18. It is also suggested in report of Pushpa et al. (2017) that all the major crops viz., paddy, wheat and sugarcane were profitable for the farmers, but sugarcane was the most profitable crop when compared to the other crops, because the per quintal cost of production as well as the per hectare return were more economical than wheat and paddy crops. The findings are also in conformity with the study of Rajkumar (2007). The marketing network also needs to be developed for better returns (Varma 2019).

CONCLUSION

The returns from crop cultivation are essential not only for the survival of the farmers but also to facilitate reinvestment in agriculture. If the flow of income from crop cultivation is not regular and is inadequate, farmers may not be able to repay their debts which would lead to increased indebtedness. The production of pulse crops by resource poor farmers is more suitable, as it involves low cost compared to other kharif crops. The promotion of pulses should be enhanced by ensuring remunerative prices and opening of sale counters directly by the farmers.

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