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A study on costs and returns of paddy cultivation in Ambedkar Nagar district of Uttar Pradesh

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Abstract

A study entitled "Costs and Returns of Paddy Cultivation in Ambedkar Nagar district of Uttar Pradesh" was carried out with the goal of determining the worth and significance of the sugarcane crop as well as the income and jobs it creates through its production, disposal. Analyze the main objectives were the cost & income measures of paddy cultivation. With the use of purposive cum random sampling, 100 respondents were chosen from the Ambedkar Nagar block of the Ambedkar Nagar district. Data were gathered using a scheduled programme and personal interviews. For the purpose of presenting the results, tabular and functional analyses were performed. Chosen respondents were divided into 59, 27, and 14 percent from marginal, small, and medium categories. The cost of cultivation per hectare increased with farm size, while revenue showed a substantial inverse connection with holding size, manures, fertilizers, and irrigation were shown to be statistically significant on the majority of farm sizes. Finally, it can be said that Paddy is, in all respects, the best crop for farmers in the Ambedkar Nagar district.

Keywords: Cropping intensity, Cost and Returns

Introduction

For the last several millennia, India has been known as a land of agriculture. Agriculture forms the backbone of Indian economy. Rice, a well-known cereal, is the staple food of hundreds of millions of people in the world. Cultivated rice botanically called O*ryza sativa* was first mentioned in history in 2800 B.C. Pathak *et al.,* 2021) [9]

Rice is one of the chief grains if India. Moreover, this country has the biggest area under rice cultivation. It is in fact the dominant crop of the country. India is one of the leading producers of the crop. It demands a temperature of around 25 degree celsius and above and rainfall of more than 100cm. Rice is the staple food of eastern and southern parts of India (Singh *et al.,* 2013; Deogam *et al.,* 2020) [11, 2]. India has the largest area under the rice accounting for 28.5 per cent of the global rice and India produce 22% of world production. Rice is India's pre-eminent crop, and it is the staple food of the people of the eastern and southern parts of the country (Gulati *et al.,* 2021; Navari, 2000) [4, 7]. In India, the major paddy growing states are Uttar Pradesh, West Bengal, Orrisa, Chhattisgarh, Andhra Pradesh and Karnataka, In Production wise West Bengal, Andhra Pradesh, Uttar Pradesh and Karnataka (Mukherjee *et al.,* 2015) [6].

In 2021-2022, production of rice is estimated at a new record of 130.29 million tonnes. Rice production 2020-21 is estimated at record 121.46 million tonnes. It is higher by 9.01 million tonnes than the last five years' average production of 112.44 million tonnes and has increased significantly by 8.03 million tonnes than the production of 104.41 million tonnes during 2015-16. Rice commends recognition, as a supreme commodity to mankind, because rice is truly life, culture, a tradition and a means of livelihood to millions. It is an important staple food providing 66-70% body calorie intake to the consumers. Nutrient value of rice contains the highest amount of carbohydrate, about 65-70%, 7-8% protein, 2-3% fat and a rich source of minerals and vitamins like phosphorous, manganese, iron, folic acid, thiamine and niacin (Kumar and Singh, 2019) [5].

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The crop is damaged by more than 100 species of insect pests of which about dozen are of significance. However, out of all inputs, pesticides play key role in increasing agriculture production by controlling agriculture pests and diseases. It has been observed that about one third of reliable global output is estimated to be lost due to insect pests, disease and weeds. In India, the value of crop lost due to pest was estimated at Rs.6, 000 crores in 1983 (Atwal, 1986) [1], which reported to have further increased to Rs. 29,000 crores in early 1990's (Dhaliwal and Arora, 1996) [3]. The agrochemical policy group, apex body of 200 crop protection companies has said agriculture produce lost in 2007 due to pest was estimated at Rs.1.40 lakh crores.

Ambedkar Nagar district having sufficient area under paddy crop. No scientific study has been so far conducted in this district. Paddy is an important crop of this district. This crop is helpful in doubling the income of the farmers of the study area. Seeing the above facts under due consideration, this paper has been specifically undertaken with the specific objectives *i.e.,* to work out cost of cultivation and various profit measure of different farms groups.

Materials and Methods
The primary data were collected during 2021-22 by survey method through personal interview with use of pre-structured and pre-tested schedule. Multistage stratified, purposive cum random sampling procedure was used for the selection of district, block, village and respondents. The district Ambedkar Nagar was selected purposively in order to avoid operational inconvenience of the investigator. A list of all the villages falling under Ambedkar Nagar block was prepared and five villages were selected randomly from this list. A separate list of paddy growers of five selected villages was prepared along with their size of holding and stratified into three categories *i.e.,* marginal farmer(below 1 ha), small farmer(1 to 2 ha) and medium farmer(2 to 4 ha and above). From this list a sample of 100 respondents were drawn following the proportionate random selection for different categories.

Cropping Intensity
Cropping intensity index refers to the changes in the cropping intensity of crop compared to a given base year. Cropping intensity is the number of times a crop is planted per year in a given agricultural area. It is the ratio of effective crop area harvested to the physical area.

$$C.\,I. = \frac{\text{Total cropped area}}{\text{Net sown area}} \times 100$$

Measures of cost concepts
The cost concept approach is widely used in India for evaluating crop profitability in production. The cost concepts in brief, are Cost A_1, A_2, B_1, B_2, C_1, C_2, and Cost C_3.

Cost A_1: This cost includes actual expenditure incurred in cash and kind.
1. Value of hired human labour and machinery labour.
2. Value of seed (both forms produced and purchased).
3. Value of manure (owned and purchased).
4. Value of insecticides, pesticides and chemical fertilizer.
5. Deprecation on implements, farm machinery and farm buildings.
6. Irrigation charges.
7. Land revenue, and other taxes.
8. Interest on working capital.
9. Miscellaneous expenses.

Cost A_2: Cost A_1 + rent paid for leased in land.
Cost B_1: Cost A_2 + interest on value of owned fixed capital assets (including land).
Cost B_2: Cost B_1 + rental value of owned land.
Cost C_1: Cost B_1 + imputed value of family labour.
Cost C_2: Cost B_2 + imputed value of family labour.
Cost C_3: Cost C_2 + 10% of C_2 (managerial cost).

Measures of farm profit
Gross Income: Yield in quintal × Price per tonne

Net Income: Gross Income - Cost C

Farm Business Income
Gross Income - Cost A_2 or Net Income + imputed value of family labour

Family labour income
Gross Income - Cost C

Farm investment income
Net Income + Rental value of owned land+ Interest on fixed capital

Benefit-cost ratio
Cost C / Gross Income (Shende and Meshram, 2015; Nirmala and Muthuraman, 2016) [10, 8].

Results and Discussion
Cropping pattern
Cropping pattern presents the area devoted to the various crop during the given period, conventionally in a single year. It indicates the yearly sequence and arrangement ofcrops grown by farmer in a particular area. The cropping patterns followed by the samplefarmsarepresentedintable4.2. It is depicted from table 4.2 that on an average the highest area was covered under paddy. 8.27percent, mustard 4.51 percent, moong 2.80 percent, pigeonpea 2.80 percent, chari 2.13 percent, potato 2.04 percent, bajra1.81 percent, pea1.41 percent, okra 1.29 per cent, brinjal 1.17 percent, barseem 0.93 percent, chilli 0.65 percent of total cropped area on sample farm. Paddy crop was allotted a considerable area by the sample farmer after two major food grain crops i.e. paddy and wheat.

The gross cultivated area was higher (46.85%) in the kharif followed by rabi season (37.78) and less in the zaid season (17.36) on all farm situations. It is also clear from the table4.2 that paddy 26.43percent in the kharif season of total cropped area.

Paddy a staple food grain crop have occupied table 26.43 per cent of gross cropped area which was distributed as 27.76 per cent on medium farms followed by small 25.51 percent, and marginal 25.66 percent, respectively of the total cultivated area.

Table 1: Cropping pattern under different size group of sample farms (ha)

Sl. No.	Crop grown under different Seasons	Size Group of Farms			Overall Average
		Marginal (59)	Small (27)	Medium (14)	
A	Kharif	0.49 (43.36)	1.37 (46.60)	3.32 (49.55)	1.12 (46.85)
1	Paddy	0.29 (25.66)	0.75 (25.51)	1.86 (27.76)	0.63 (26.43)
2	Sugarcane	0.07 (6.19)	0.26 (8.84)	0.62 (9.25)	0.20 (8.27)
3	Maize	0.06 (5.31)	0.17 (5.78)	0.40 (5.97)	0.14 (5.72)
4	Pigeon Pea	0.03 (2.65)	0.09 (3.06)	0.18 (2.69)	0.07 (2.80)
5	Bajra	0.02 (1.77)	0.05 (1.70)	0.13 (1.94)	0.04 (1.81)
6	Brinjal	0.01 (0.88)	0.03 (1.02)	0.10 (1.49)	0.03 (1.17)
7	Chilli	0.01 (0.88)	0.02 (068)	0.03 (0.45)	0.02 (0.65)
B	Rabi	0.39 (34.51)	1.02 (34.69)	2.52 (37.61)	0.86 (35.78)
1	Wheat	0.28 (24.78)	0.75 (25.51)	1.86 (27.76)	0.63 (26.19)
2	Mustard	0.05 (4.42)	0.12 (4.08)	0.33 (4.96)	0.11 (4.51)
3	Potato	0.02 (1.77)	0.06 (2.04)	0.15 (2.24)	0.05 (2.04)
4	Barseem	0.01 (0.88)	0.03 (1.02)	0.06 (0.90)	0.02 (0.93)
5	Pea	0.02 (1.77)	0.04 (1.36)	0.08 (1.19)	0.03 (1.41)
6	Garlic	0.01 (0.88)	0.02 (0.68)	0.04 (060)	0.02 (0.70)
C	Zaid	0.25 (22.12)	0.55 (18.71)	0.86 (12.84)	0.42 (17.36)
1	Mentha	0.16 (14.16)	0.35 (11.90)	0.56 (8.36)	0.27 (11.14)
2	Chari	0.04 (3.54)	0.06 (2.04)	0.08 (1.19)	0.05 (2.13)
3	Moong	0.03 (2.65)	0.10 (3.40)	0.16 (2.39)	0.07 (2.80)
4	Okra	0.02 (1.77)	0.04 (1.36)	0.06 (0.90)	0.03 (1.29)
Grand Total(A+B+C)	1.13 (100.00)	2.94 (100.00)	6.70 (100.00)	2.3985 (100.00)	

(Figures in parentheses indicate the percentage to the total cropped area.)
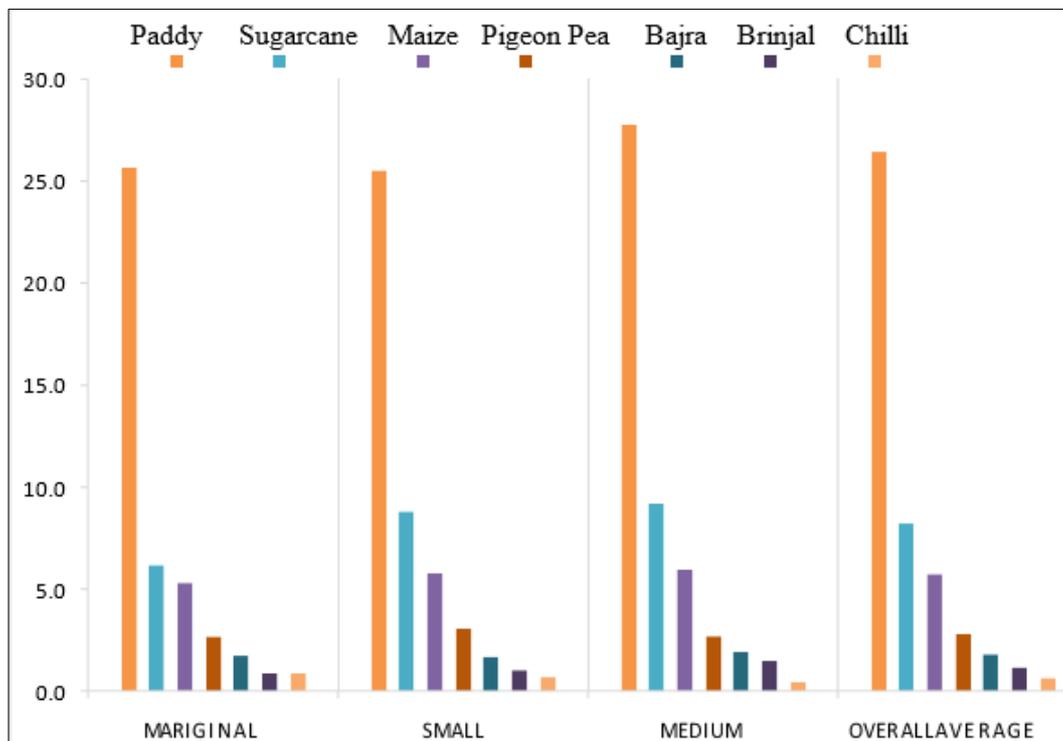
Fig 1: Cropping Pattern of Kharif Season (in %)

Cropping intensity
The details of cropping intensity are given in the table 4.1.3

Table 2: Cropping intensity of different size group of sample farms

Sl. No.	Size groups of farm	No. of Farmers	Net Cultivated Area (ha.)	Gross Cropped Area (ha.)	Cropping Intensity (%)
1	Marginal	59	0.51	1.13	221.57
2	Small	27	1.42	2.94	207.04
3	Medium	14	3.41	6.70	196.48
	Over All	100	1.16	2.40	206.77

*Indicate overall average of cropping intensity
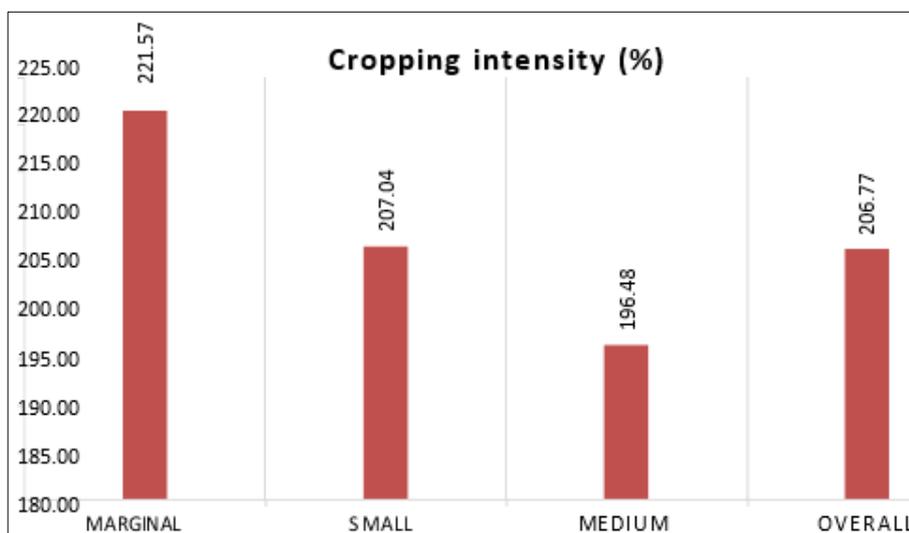
Fig 2: Cropping intensity of different size group of sample farms

Table4.3 reveals that the overall average cropping intensity on sample farms was to 206.77 percent which was found highest on marginal farms 221.57 percent followed by small 207.04 percent, and medium 196.48 percent respectively. Cropping intensity was inversely related to size of farms.

Cost and return
The cost and return have been summarized in this part on the sample farms. Beside the estimate of total costs, on the basis of six cost concept i.e., Cost A_1/A_2, cost B_1, cost B_2,cost C_1, C_2 and cost C_3, have been worked out for estimation of cost. Similarly, the various measures of farm profits, such as net income, family labour income, farm investment income, farm business income, input-output ratio for paddy crop have also been worked out. The costs and returns generated by paddy crop are displayed in table1and 2.

(a.) Per hectare costs of cultivation of paddy crop:
Per hectare costs incurred on the various input factor in paddy production was worked out and are given in table 1.
The table1 indicate that, costs of cultivation was highest on medium farms (Rs.46447.67), followed by small farms (Rs.42890.46) and marginal farms (Rs.40638.23), respectively. The overall average costs of cultivation was observed (Rs.42059.65) on sample farms.
The major component of the cost were human labour (24.19 per cent), Machinery charge (13.28percent), manure & fertilizers (11.38percent), rental value of owned land(14.27 per cent), seed cost (9.82 percent), irrigation charge (11.71percent) and plant protection (2.13percent) respectively of the total costs of cultivation. Per hectare cost of cultivation was found of positive trend with farm size.

Table 3: Per hectare costs of different inputs used in Paddy production (Rs.)

S. No.	Particulars	Size Group of Farms			Overall Average
		Marginal	**Small**	**Medium**	
1.	Human Labour	9763.77 (24.03)	10210.63 (23.81)	11825.88 (25.46)	10173.12 (24.19)
	a. Family Labour	4465.52 (10.99)	2984.35 (6.96)	2241.85 (4.83)	3754.29 (8.93)
	b. Hired Labour	5298.25 13.04)	7226.28 (16.85)	9584.03 (20.63)	6418.83 (15.26)
2.	Machinery Charges/Tractor Charges	5184.30 (12.76)	5973.52 (13.93)	6524.46 (14.05)	5585.01 (13.28)
3.	Seed Cost	3951.66 (9.72)	4189.67 (9.77)	4758.12 (10.24)	4128.83 (9.82)
4.	Manures and Fertilizers	4647.85 (11.44)	4915.42 (1146)	5132.74 (11.05)	4787.98 (11.38)
5.	Irrigation	4875.24 (12.00)	4972.21 (11.59)	5032.52 (10.83)	4923.44 (11.71)
6.	Plant Protection	862.73 (2.12)	922.47 (2.15)	976.85 (2.10)	894.84 (2.13)
7.	Total working capital	24820.03 (61.08)	28199.57 (65.75)	32008.72 (68.91)	26738.92 (63.57)
8.	Interest on working capital@4%	992.80 (2.44)	1127.98 (2.63)	1280.35 (2.76)	1069.56 (2.54)
9.	Rental value of owned land	6000.00 (14.76)	6000.00 (13.99)	6000.00 (12.92)	6000.00 (14.27)
10.	Interest on fixed capital	665.49 (1.64)	679.42 (1.58)	694.24 (1.49)	673.28 (1.60)
11.	Sub-Total	36943.85 (90.91)	38991.32 (90.91)	42225.15 (90.91)	38236.05 (90.91)
12.	ManagerialCost@10%ofsub-total	3694.38 (9.09)	3899.13 (9.09)	4222.52 (9.09)	3823.60 (9.09)
	Grand Total	40638.23 (100.00)	42890.46 (100.00)	46447.67 (100.00)	42059.65 (100.00)

(Figure in parenthesis indicate percentage to the total cost)

(b.) Per hectare costs and income from the production of paddy crop
The table 2 revealed that, on an average cost A_1/A_2, costB_1, costB_2, cost C_1, costC_2andcostC_3cametoRs.27808.48, Rs.28481.76, Rs.34481.76, Rs.32236.05, Rs.38236.05 and Rs. 42059. 65, respectively.
On an average, gross income was recorded Rs. 102968.77 and net income came to Rs.60909.12.On medium farms, gross income was highest, which was recorded Rs.110807.30,

followed by small farms Rs.104607.40 and lowest on marginal farms i.e.,Rs. 100358.90, respectively. The net income was highest on medium farms Rs. 64359.63, followed by small farms Rs. 61716.94 and marginal farms Rs. 59720.67.On an average family labour income, farm business income and farm investment income were observed to Rs. 68487.01, Rs. 75160.29 and Rs. 71406.00, respectively. Family labour income was highest on medium farms followed by small and marginal farms & farm investment income was

highest on medium farms followed by small farm and marginal farms and farm business income was highest on medium farms, followed by small farms and marginal farms. On an average, cost of production per quintal and yield per hectare were estimated to Rs. 781.30per quintal and 53.80quintal, respectively. On an average input output ratio regarding costs C_3, C_2, C_1, B_2, B_1, and A_2/A_1 were recorded 1:2.45, 1:2.69,1:3.19,1:2.99,1:3.62 and 1:3.70,respectively.

On the basis of cost A_1 input output ratio was highest on marginal farms (1:3.89), followed by small (1:3.57) and medium (1:3.33), respectively. It may be concluded the costs of cultivation on different size group of farm increases with an increase in farm size. But net return per hectare was found of negative trend with farm size. It was because of less increase in yield against the increased input factors at increasing size of farm.

Table 2: Per hectare costs and income measures from paddy production on various costs concept (Rs.)

S. No.	Particulars	Size group of farms			Overall Average
		Marginal	Small	Medium	
1.	Cost A_1/A_2	25812.83	29327.55	33289.07	27808.48
2.	CostB_1	26478.33	30006.97	33983.30	28481.76
3.	CostB_2	32478.33	36006.97	39983.30	34481.76
4.	Cost C_1	30943.85	32991.32	36225.15	32236.05
5.	Cost C_2	36943.85	38991.32	42225.15	38236.05
6.	Cost C_3	40638.23	42890.46	46447.67	42059.65
7.	Yield (qtl/ha.)				
a.	Main Product	52.87	54.21	56.95	53.80
b.	By Product	71.24	73.76	75.43	72.51
8.	Gross Income	100358.90	104607.40	110807.30	102968.77
a.	Main Product	92522.50	96493.80	102510.00	94993.00
b.	By Product	7836.40	8113.60	8297.30	7975.77
9.	Net return overC_3	59720.67	61716.94	64359.63	60909.12
10.	Family Labour Income	67880.57	68600.43	70824.00	68487.01
11.	Farm Business Income	74546.07	75279.85	77518.23	75160.29
12.	Farm Investment Income	70080.55	72295.50	75276.38	71406.00
13.	Cost of production (Rs./Qtl.)	768.64	791.19	815.59	781.30
14.	Input-Output Ratio				
a.	On the basis of Cost A_1	1:3.89	1:3.57	1:3.33	1:3.70
b.	On the basis of CostB_1	1:3.79	1:3.49	1:3.26	1:3.62
c.	On the basis of CostB_2	1:3.09	1:2.91	1:2.77	1:2.99
d.	On the basis of Cost C_1	1:3.24	1:3.17	1:3.06	1:3.19
e.	On the basis of Cost C_2	1:2.72	1:2.68	1:2.62	1:2.69
f.	On the basis of Cost C_3	1:2.47	1:2.44	1:2.39	1:2.45
15.	B:CRatio	1.47:1	1.44:1	1.39:1	1.45:1

Conclusion
From above discussion, concluded that highest area was covered by paddy and followed by wheat and mentha in cropping pattern. The cropping intensity was found highest on marginal farms followed by small and medium farms and it came to 221.57, 207.04 and 196.48 percent respectively. The cropping intensity decreased with increase in size group of farms.

Cost of cultivation of paddy crop indicates that it is an input responsive crop. On an overall average, cost of cultivation per hectare of paddy crop came to Rs. 42059.65. The net income, family labour income, farm business income and farm investment income were found Rs. 60909.12, 68487.01, 75160.29 and 71406.00, respectively from paddy crop.

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