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Ravi Tripathi
MBA (Agribusiness) Student
SHUATS Prayagraj, Uttar
Pradesh, India

Pritesh Dwivedi
Assistant Professor Department of
Agricultural Economics SHUATS
Prayagraj, Uttar Pradesh, India

Dr. Rakesh Kumar Mishra
Ph.D., Department of Agricultural
Economics, SHUATS, Prayagraj,
Uttar Pradesh, India

Dr. Akash Rai
Ph.D., Department of Agricultural
Economics, SHUATS, Prayagraj,
Uttar Pradesh, India

Disposal pattern of paddy seed in Shravasti district of Uttar Pradesh

Ravi Tripathi, Pritesh Dwivedi, Dr. Rakesh Kumar Mishra and Dr. Akash Rai

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Abstract
An attempt has been made to study the economics of production and disposal pattern of paddy in Shravasti district of Uttar Pradesh, was undertaken with a sample of 120 paddy growers selected randomly from 4 tehsils of Shravasti district. It was observed from the study that per hectare cost of cultivation of paddy at cost C was the highest in the small group (Rs. 109925) followed by large, (Rs. 104358) and in medium group (Rs. 103741), respectively while it was Rs. 106008 at overall level. The average yield and gross returns per hectare was found to be high in case of medium farmers. The benefit cost ratio of paddy at input cost was 0.99 in small group, 1.15 in medium and 1.16 in large group, while it was 1.10 at overall level. However, the benefit cost ratio at cost 'C' was estimated to 0.51 at small farmer level, where as it was work out to 0.56 and 0.54 for medium and large farmers, respectively indicating that cultivation of paddy crop was economically beneficial at farm business income only. The pattern of disposal indicated that, at the overall level, 47.49 percent of the total produce of paddy was marketable/marketed surplus. The proportion of paddy used for home consumption was accounted to 39.91 percent.

Keywords: Economic analysis, paddy, benefit cost, disposal, marketable, marketed surplus

Introduction
Agriculture was essentially a subsistence farming, rather than business till the beginning of the planning era in India. Agriculture production is only limited to home consumption and very little or no marketable surplus available with the farmers. Now-a-days, agriculture undergoes radical changes and reach top pivotal place in five year plans and also the farmers doing farming as a business rather than a way of living.

Introduction of new technology during the fourth plan has changed the shape of Indian agriculture. From a stagnant stage, it has picked up a speed which accelerated day by day. The large increase in production of food grains after mid-sixties commonly described as "Green Revolution". The production and productivity of major cereals particularly rice and wheat has shown significant increase.

Rice is grown extensively in India on 43.86 million hectare followed by China (30.16 million ha) However, highest production of rice is in China (144.85 million tonnes) followed by India (104.80 million tonnes). This is due to higher productivity of rice in China (6.86 t ha^{-1}) than India (3.77 t ha^{-1}). In the year 2016 – 2017, the area under paddy crop in India was maximum in Uttar Pradesh (5.87 million hectares). In terms of production of paddy, West Bengal ranked first (14.71 million tonnes). In Maharashtra, rice is cultivated on 15.56 lakh ha area in all four regions *viz*., Vidarbha (8.15 lakh ha), Konkan (3.69 lakh ha), Western Maharashtra (3.55 lakh ha) and Marathwada (0.15 lakh ha). The highest productivity of rough rice was in Konkan region (4.25 t ha^{-1}). The rice production in Maharashtra in 1960 was 19.84 lakh tonnes which increased to 52.96 lakh tonnes in 2022. However, the rice productivity in 1960 was 1.53 t ha^{-1} and it has increased to 3.4 t ha^{-1} in 2016 (Anonymous, 2023) [1]. This increase in rice production and productivity was due to cultivation of newly released rice varieties and hybrids grown under recommended package of practices. In Konkan region, paddy is the staple food crop grown extensively. However, across farms due to productivity difference, there is substantial effect on paddy profitability.

Corresponding Author:
Ravi Tripathi
MBA (Agribusiness) Student
SHUATS Prayagraj, Uttar
Pradesh, India

Realizing well the significance of this crop from food security point of view, it becomes pertinent to carry out a detailed study encompassing cost and returns in paddy production, cost benefit analysis, disposal pattern, marketable and marketed surplus. The present study has, therefore, been carried out to look in to these issues in depth. The specific objectives of this research were:

- To study the cost and returns in paddy production.
- To estimate marketable surplus, marketed surplus.

Materials and Methods
The present study is based on primary data to fulfil the objectives. Multistage sampling technique was used for selection of paddy cultivators, tehsil as primary unit, village as secondary unit and paddy cultivators as a final unit were taken for the study.

Paddy is cultivated as a food grain crop on large scale in Raigad district hence, Raigad district was selected purposively and highest area was reported under Mahad, Mangaon, Alibag and Pen tehsil of Raigad district. Hence, these four tehsil were selected purposively for the study. From these four tehsil, 2 villages were selected randomly from each tehsil and the list of commercial paddy cultivators was prepared with the help of talathi and Sarpanch of that particular village. From each selected village, 15 commercial paddy cultivators were selected randomly. Thus, the final sample was consisted of 8 villages and 120 paddy cultivators from Mahad, Mangaon, Alibag and Pen tehsil. The data were obtained from 120 paddy cultivators by personal interview method for the year 2022-2023 in the month of December, 2022. The data were analyzed by adopting simple statistical tools such as arithmetic mean, percentage and ratios.

To study the effect of farm size on productivity and disposal of paddy, the selected sample cultivators were classified according to their size of land under paddy crop. The grouping was done by calculating mean and standard deviation of the area under paddy of the sample cultivators. The mean of sample was 1.4692 and standard deviation was 5.1186. The stratification was carried out as small, medium and large size farms and results were presented accordingly.

Results and data analysis
The results obtained from the present investigation as well as relevant discussion have been summarized under following heads:

Input utilization: Farm labour utilization
The per hectare labour utilization for Kharif paddy cultivation was studied for three group of farmer and the information is presented in Table 1. It is seen from Table 1 that, per hectare labour utilized for Kharif paddy cultivation in the study area was 200.13 man days at overall level.

Out of total labour utilized the per hectare maximum labour were utilized for harvesting 38.27 man days (19.12%) which was followed by post-harvest handling 30.27 man days (15.13%) and transplanting 28.74 man days (14.36%), respectively. The per hectare number of labour utilized for plant protection were found to be 2.41 days (1.20%) and fertilizer application 4.55 days (2.27%) were very less as compare other operations. Similarly, out of per hectare total human labour 37.25 percent labour were supplied by family female followed by 26.39 percent by hired female, 21.64 percent by family male and 14.73 percent by hired male labour.

Utilization of other inputs
Other than the labour work out and it was found that 191.17

man-days, 199.82 and 209.40 man days were employed in small, medium and large group, respectively.

At overall level, per hectare 9.94 bullocks pair days, 7.69 hrs. of machine, 36.12 kg seed, 3.35 tonne manures were utilized, similarly in case of fertilizer urea 190.53 kg, single super phosphate 260 kg and muriate of potash 76 kg were used, respectively. Plant protection chemical like phorate 8.13 kg/ha and monocrotophos 0.61 lit/ha was used in very less quantity used by the farmers.

The group wise input utilization was found to be vary and it was seen from the table that the use of bullock pair and organic manure were in the paddy cultivation was decreasing from small group to large group as against the use of machine hours were found to be increasing from small group to large group., the inputs like seed, fertilizers, manures, pesticides etc. are the key resources in the production of any crop activity. Therefore, per hectare inputs utilization for Kharif paddy cultivation was worked out and information is presented in Table 2.

It is evident from the Table 2 that level the per hectare inputs utilization for Kharif rice in the study area are worked out and it was found that at overall level 72.78 days and 127.35 of human labour days were employed from hired and family labour force. However, the group wise per hectare total labour employed for cultivation of rice in Kharif season.

Cost of cultivation
In Table 3 comparison of cost of cultivation worked out for the small, medium and large farmers, respectively. It is observed from Table 3 that, at the overall level total cost incurred in Kharif paddy cultivation was worked out to be Rs. 106008/ha, while the cost incurred by small farmer Rs. 109925 for one-hectare paddy cultivation was more as compared to other two groups mainly due to the adoption of technology and input utilization by farmers.

The per hectare returns at overall level from paddy cultivation was found to be Rs. 57008, while return for medium farm was estimated to Rs. 57842 which was higher than other two groups. Per quintal cost for paddy was estimated to Rs. 2864 at overall level. Across different size groups of farms paddy production was observed to be non- profitable. The results are found to similar to the study of Suneetha and Narendra Kumar (2021). However, except small group paddy production was observed to leaving net profit at input cost level. However, the net profit at input cost level was work out to Rs. 52003 at overall level. The similar result was found by Krishna (2022) [3] he worked out the costs and returns of paddy cultivation in Kerala through a sample of 100 farmers.

Yield and returns from Kharif paddy cultivation
Considering the differences in input utilization and cost incurred for cultivation of Kharif paddy by small, medium and large group of farmer the yield and profitability also differed. The comparison regarding profitability of Kharif paddy cultivation for small, medium and large farmer was studied and results are presented in Table 4.

It is observed from Table 4 that, per hectare net returns at Cost-'A' and Cost- 'B' and cost "C" were observed to be negative in small farm level. However, Kharif paddy cultivation is profitable at Cost- 'A' level for medium and large farm size and non- profitable at Cost "B" and cost "C" level. Benefit cost ratio at Cost- 'A' was observed 0.92 for small farm size which showed negative return per hectare, 1.06 and 1.07 for medium and large farmer, respectively indicating positive returns per hectare and at overall level it was 1.02. these results are parallel

with Parshuramkar *et al.* (2020) [6], his study was conducted in Gondia district of Maharashtra. By studying benefit cost ratio at Cost-'B' and Cost-'C' were indicating negative returns per hectare for all groups of farmers and it was estimated to 1: 0.54 on Cost-'C' at overall level.

Table 1: Operation wise labour utilization for paddy cultivation (Days /ha)

Operations	Small					Medium					Large					Overall				
	Male		Female		Total	Male		Female		Total	Male		Female		Total	Male		Female		Total
	H	F	H	F		H	F	H	F		H	F	H	F		H	F	H	F	
Ribbing	1.50	6.67	0.75	7.46	16.38 (8.57)	1.70	6.01	1.33	7.72	16.76 (8.39)	1.85	5.90	2.50	8.13	18.38 (8.78)	1.68	6.19	1.53	7.77	17.17 (8.58)
Manuring	1.25	3.20	1.89	6.31	12.65 (6.62)	1.95	3.45	2.05	6.55	14.00 (7.01)	2.06	3.58	2.11	6.72	14.47 (6.91)	1.75	3.41	2.02	6.53	13.71 (6.85)
Ploughing	3.07	5.70	0.00	0.00	8.77 (4.59)	2.42	3.66	0.00	0.00	6.08 (3.04)	2.56	3.80	0.00	0.00	6.36 (3.04)	2.68	4.39	0.00	0.00	7.07 (3.53)
Seed bed preparation	1.87	2.22	2.10	5.50	11.69 (6.11)	1.50	3.36	1.06	3.23	9.15 (4.58)	1.85	3.40	2.15	4.95	12.35 (5.90)	1.74	2.99	1.77	4.56	11.06 (5.53)
Sowing	0.91	2.10	1.47	3.25	7.73 (4.04)	1.21	1.90	1.00	5.28	9.39 (4.70)	1.68	1.92	1.12	5.30	10.02 (4.79)	1.27	1.97	1.20	4.61	9.05 (4.52)
Puddling	1.87	2.80	0.00	0.00	4.67 (2.44)	2.12	2.85	0.00	0.00	4.97 (2.49)	2.45	2.90	0.00	0.00	5.35 (2.55)	2.15	2.85	0.00	0.00	5.00 (2.50)
Uprooting of seedling	1.09	1.32	2.14	2.47	7.02 (3.67)	1.15	1.25	2.23	2.65	7.28 (3.64)	1.17	1.28	2.18	2.70	7.33 (3.50)	1.14	1.28	2.18	2.61	7.21 (3.60)
Transplanting	3.53	3.97	7.78	12.11	27.39 (14.33)	4.05	4.45	8.90	11.95	29.35 (14.69)	3.95	4.47	8.92	12.13	29.47 (14.07)	3.84	4.30	8.53	12.06	28.74 (14.36)
Weeding	1.26	3.95	6.14	8.11	19.46 (10.18)	1.30	3.98	6.45	8.14	19.87 (9.94)	1.32	4.02	6.87	8.12	20.33 (9.71)	1.29	3.98	6.49	8.12	19.89 (9.94)
Roughing	0.87	1.40	1.36	1.75	5.38 (2.81)	0.90	1.52	1.48	1.80	5.70 (2.85)	1.08	1.71	1.53	1.82	6.14 (2.93)	0.95	1.54	1.46	1.79	5.74 (2.87)
Fertilizer application	0.10	2.59	0.00	1.24	3.93 (2.06)	0.52	2.54	0.16	1.59	4.81 (2.41)	0.65	2.13	0.32	1.80	4.90 (2.34)	0.42	2.42	0.16	1.54	4.55 (2.27)
Plant protection	0.21	0.56	0.00	0.33	1.10 (0.58)	0.31	1.75	0.01	0.87	2.94 (1.47)	0.35	1.80	0.11	0.92	3.18 (1.52)	0.29	1.37	0.04	0.71	2.41 (1.20)
Harvesting	5.30	8.10	10.44	12.50	36.34 (19.01)	5.75	9.88	10.42	12.62	38.67 (19.35)	5.82	9.94	11.40	12.65	39.81 (19.01)	5.62	9.31	10.75	12.59	38.27 (19.12)
Post-harvest handling	4.20	6.28	7.10	11.08	28.66 (14.99)	4.80	7.02	7.18	11.85	30.85 (15.44)	4.92	7.1	7.27	12.02	31.31 (14.95)	4.64	6.80	7.18	11.65	30.27 (15.13)
Total	27.03	50.86	41.17	72.11	191.17 (100)	29.68	53.62	42.27	74.25	199.82 (100)	31.71	53.95	46.48	77.26	209.40 (100)	29.47	52.81	43.31	74.54	200.13 (100)

Table 2: Per hectare physical input utilization for cultivation

Sr. No.	Inputs	Small	Medium	Large	Total
1	**Human Labour**				
	Hired Labour				
A	Male	27.03	29.68	31.71	29.47
	Female	41.17	42.27	46.48	43.31
	Sub total	68.20	71.95	78.19	72.78
	Family Labour				
B	Male	50.86	53.62	53.95	52.81
	Female	72.11	74.25	77.26	74.54
	Sub total	122.97	127.87	131.21	127.35
	Total human labour (A+B)	191.17	199.82	209.40	200.13
2	Bullock pair (days)	12.45	9.12	8.25	9.94
3	Machine (hrs.)	5.12	8.83	9.13	7.69
4	Seed material (kg)	33.89	36.09	38.39	36.12
5	Organic manures FYM (t)	5.06	2.88	2.12	3.35
	Fertilizers (kg)				
6	Urea	176.00	185.00	210.60	190.53
	Single super phosphate	210.00	280.00	290.00	260.00
	Muriate of potash	70.00	78.00	80.00	76.00
	Plant protection				
7	Phorate 10% (kg)	7.05	8.13	9.21	8.13
	Monocrotophos (lit)	0.54	0.61	0.68	0.61

Production and disposal pattern
The level of production and disposal pattern determines the marketing of paddy. To know the quantity of paddy production and part of that used to have consumption and other purpose, the group-wise production and disposal was studied and result are presented in Table 5.

Table 3: Comparison of cost of cultivation across size of farms (Figure in Rs./ha)

Sr. No.	Item of cost	Small	Medium	Large	Overall
1	**Hired Labour**				
A	Male	7460	8192	8752	8135
B	Female	10745	11032	12131	11303
	Total	18206	19224	20883	19438
2	Bullock pair (days)	9960	7296	6600	7952
3	Machine (hrs)	3072	5298	5478	4616
4	Seed material (kg)	1525	1624	1731	1627
5	Manures -FYM (tonnes)	19355	11284	8091	12910
	Fertilizers (kg)				
6	Urea	1056	1110	1264	1143
	Single super phosphate	1680	2240	2320	2080
	Muriate of potash	1190	1326	1360	1292
	Total	3926	4676	4944	4515
	Plant Protection				
7	Phorate 10% (kg)	529	610	691	610
	Monocrotophos (lit)	297	336	374	336
	Total	826	945	1065	945
8	Input cost	56869	50347	48792	52003
9	Interest on working capital @ 6% for 6 months	3412	3021	2928	3120
10	Land revenue	175	175	175	175
11	Depreciation on implements and machinery	749	810	1015	858
12	Cost 'A'	61205	54353	52909	56156
13	Rental value of land (1/6 of gross product)	9409	9640	9455	9501
14	Interest on fixed capital @ 10%	766	535	2060	1120
15	Cost 'B'	71380	64528	64424	66777
	Family Labour				
16	Male	14037	14799	14890	14576
	Female	18821	19379	20165	19455
17	Supervision charges @10% of input cost	5687	5035	4879	5200
18	Cost 'C'	109925	103741	104358	106008
	Yield and Gross Return				
19	Main product	45455	46439	45516	45803
	By product	10998	11403	11213	11204
	Gross returns	56453	57842	56728	57008
	Cost per quintal	3055	2665	2873	2864
	Net Return at				
20	Input cost	-416	7495	7936	5005
	Total cost	-53472	-45899	-47630	-49000
	BC ratio at input cost	0.99	1.15	1.16	1.10

Production pattern
The major determinant of the producer's surplus is the production level. Table 5 shows group-wise production pattern of the paddy in the study area. The Table 5 revealed that, at the overall level productivity per hectare was found ranging from 32.77q from Karjat- 7 variety to 35.73 q for Kolam variety. The level of productivity in the case of Jaya, Ratna, Suvarna, Karjat-7, Kolam and Komal was 33.01, 34.35, 32.93, 32.77, 35.73 and 32.85 q, respectively. The productivity of Kolam variety on medium farms (36.29 q/ha) was higher than large group farms. On account of productivity per ha of paddy on small, medium and large farms were 32.53 q, 34.65 q and 32.42 q, respectively. The overall average of production of paddy was 33.61 q/ha.

Disposal pattern of paddy
The pattern of disposal indicated that, at the overall level, 47.49 percent of the total produce was marketable/ marketed surplus. The proportion of produce used for home consumption was 39.91 percent. The paddy given on gift accounted for 2.33 percent. While loss of paddy was 2.50 percent, retention for seed was 4.66 percent and wages in kind having 3.12 percent share to total production. It was observed that the marketable/marketed surplus of paddy was increased with increase in size of holding. It was 3.58 q, 12.95 q and 36.75 q in small, medium and large group, respectively, at overall level, it was found that 13.95 q. The marketable/ marketed surplus in study area was substantial. These result are similar to the result of Kumar and Mruthyunjaya (2020) [4] in his study on "Marketed surplus of different crops across farm size in Haryana" revealed that percentage of marketed surplus was higher in the case of cash crops, like cotton, oilseed and paddy.

It is observed from Table 7 that, the major constraint in marketing was non-availability of storage facility (90.83%) followed by high milling charges (83.33%). It was observed in study area that farmers were rarely sold their produce to commission agent as a problem of high commission charges (76.67%). 75.83 percent farmers opined that market price less than MSP, poor roads/ loss in transport of paddy (70.83%), high cost of transportation (59.17%), high loading and unloading charges and market fees (55%) and high cost of bagging (50%). Inadequate market information constraint was reported by 70 percent farmers, which has inverse trend with the size of area under paddy (Shelke *et al.,* 2022) [7].

Table 4: Profitability in paddy cultivation

Sr. No.	Particulars	Small	Medium	Large	Overall
1.	**Yield/ha**				
	Main Produce	32.38	34.65	32.42	33.15
	By produce	43.99	45.61	44.85	44.82
	Gross returns (Rs.)	56453	57842	56728	57008
2.	**Cost of Cultivation (Rs)**				
	Cost A	61205	54353	52909	56156
	Cost B	71380	64528	64424	66777
	Cost C	109925	103741	104358	106008
3	**Net Return at Rs**				
	Cost A	-4752	3489	3819	852
	Cost B	-14927	-6686	-7696	-9770
	Cost C	-53472	-45899	-47630	-49000
4	**B:C ratio**				
	Cost A	0.92	1.06	1.07	1.02
	Cost B	0.79	0.90	0.88	0.85
	Cost C	0.51	0.56	0.54	0.54

Table 6: Disposal pattern of paddy   (Quintals/ Farm) (n=120)

Sr. No	Particulars	Groups			Overall
		Small (n=38)	Medium (n=62)	Large (n=20)	
1.	Production Quantity consumed on farm	12.63 (100)	25.60 (100)	49.45 (100)	25.47 (100)
2	Retention for home consumption	7.05(55.81)	9.84 (38.44)	7.04 (14.24)	8.49 (39.91)
3	Gift to relatives	0.24 (1.88)	0.58 (2.28)	1.65 (3.34)	0.65 (2.33)
4	Wages in kind	0.47 (3.75)	0.67 (2.81)	1.73 (3.49)	0.78 (3.12)
5	Losses	0.42 (3.35)	0.59 (2.30)	0.74 (1.49)	0.56 (2.50)
6	Retention for seed	0.87 (6.88)	0.97(3.80)	1.55 (3.13)	1.04 (4.66)
7	Total farm consumption	9.05 (71.6)	12.65 (49.43)	12.70 (25.69)	11.52 (52.51)
8	Marketable/Marketed surplus	3.58 (28.34)	12.95 (50.57)	36.75 (74.31)	13.95 (47.49)

(Figures in the parentheses are percentages to total)

Table 7: Constraints faced by the farmers in production and marketing of paddy (n=120)

Sr. No.	Constraints	Small (n=38)	Medium (n=62)	Large (n=20)	Overall
	Production				
1.	Non-availability of labours in time and high labour charges	34 (89.47)	53 (85.48)	19 (95.00)	106 (88.33)
2.	High prices of plant protection chemicals	30 (78.95)	29 (46.77)	13 (65.00)	72 (60.00)
3.	High prices of fertilizers	29 (76.32)	43 (69.35)	14 (70.00)	86 (71.67)
4.	Non-availability of sufficient credit in time	25 (65.79)	38 (61.29)	8 (40.00)	71 (59.17)
	Marketing				
1.	High cost of bagging	24 (63.16)	22 (35.48)	14 (70.00)	60 (50.00)
2.	High commission charges	26 (68.42)	48 (77.42)	18 (90.00)	92 (76.67)
3.	High milling charges	34 (89.47)	50 (80.65)	16 (80.00)	100 (83.33)
4.	High cost of transportation	29 (76.32)	29 (46.77)	13 (65.00)	71 (59.17)
5.	Poor roads/ loss in transport of paddy	27 (71.05)	45 (72.58)	13 (65.00)	85 (70.83)
6.	Market price less than MSP	25 (65.79)	52 (83.87)	14 (70.00)	91 (75.83)
7.	High loading and unloading charges and market fees	19 (50.00)	36 (58.06)	11 (55.00)	66 (55.00)
8.	Inadequate market information	15 (39.47)	52 (83.87)	17 (85.00)	84 (70.00)
9.	Non-availability of storage facility	30 (78.95)	6 (96.77)	19 (95.00)	109 (90.83)

(Figures in the parentheses indicate percentage to number of cultivators in the group)

Conclusion

The per farm family labour utilization was more than hired. The group wise input utilization was varying and the use of bullock pair and organic manure were in the paddy cultivation was decreasing from small size farm to large size farm as against the use of machine hours were found to be increasing from small farm to large farm size. The per hectare cost and returns of paddy cultivation was Rs. 104121 and Rs. 57008, respectively leaving net returns was Rs. -47519 and B:C ratio was 0.55 at overall level it was too low. Across the different groups of paddy cultivators B:C ratio at input cost was more than 1 revealed that farmers were in profit leaving farm business income except small group. The study of per farm disposal pattern of paddy indicated that the quantity retained for consumption of farm was high in all group. The major constraint in marketing was non-availability of storage facility (90.83%) followed by high milling charges (83.33%).

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