



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(7): 2293-2301
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www.thepharmajournal.com
Received: 22-05-2023
Accepted: 22-06-2023

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An economic study of production and marketing of demand led rice variety in Raipur district of Chhattisgarh

Ankur Jaiswal, Dr. Ajay Tegar and Dr. VK Choudhary

Abstract

The research entitled “An Economic study of production and marketing of demand led rice variety in study area with the specific objective to work out the cost and returns of selected rice variety grown by the farmer in Raipur district of Chhattisgarh, The survey for specified objective was conducted in Aarang and Tilda blocks of Raipur district of Chhattisgarh. Data were collected from 86 rice growers the respondents were selected proportionately the grower was chosen from total 10 villages. (5 villages from each selected blocks) The primary data were collected from the paddy growers through personal interview method with the help of well- prepared questionnaire for the production and marketing year 2022-2023. The data collected were analyzed using simple averages and percentages and presented in tabular form and for cost and returns Cost concepts were used.

The study reveal that Swarna, Mahamaya and Swarna-sub-1 was the most popularized variety in study area and the overall cost of cultivation of Swarna variety was 61,782.62 rs/ha. and the input-output ratio of it was 1:1.81. In the study area overall cost of cultivation of Mahamaya variety of rice was 62191.25 rs/ha with the 1:1.78 input-output ratio. Cost of cultivation of Swarna-sub-1 variety was 60408.92 rs/ha with the 1:1.80 of input-output ratio and BC ratio of Swarna was 0.81:1, for Mahamaya 0.78:1 and for Swarna sub-1 it was 0.80:1.

Keywords: BC ratio, input-output ratio, fixed cost, variable cost, cost of cultivation, gross return, net return

Introduction

India is the second-largest producer of rice in the entire world, after China. Rice is grown extensively in India in an area of about 43.19 million hectares with an annual production of 110.15 MT and an average yield of 2412 kg/hectare (Directorate of Economics and Statistics, DAC&FW, 2021). The state of Chhattisgarh is the 16th most populous and 10th largest in terms of area in India. It is also recognized as a major producer of rice. 43 percent of the state's total arable land is under cultivation, and about 70 percent of the population works in agriculture. One of the main crops is paddy. With a population of more than 2.55 billion, the geographical area is approximately 136 lakh ha, with 46.51 lakh ha of cultivable land and 60.76 lakh ha of forest land. The Indira Gandhi Krishi Vishwavidyalaya, which has its headquarters in Raipur, the state's capital, is the only institution in Chhattisgarh that carries out agricultural research and education. As a result, numerous rice varieties were developed from IGKV, Raipur, including the following: Mahamaya, Poornima, Shyamla, Danteshwari, IndiraSugandhit Dhan-1, Bamleshwari, Samleshwari, Jaldubi, Chandrahasini, Indira Sona, Indira Barani Dhan-1, and Karma mahsuri, Maheshwari, Durgeshwari, Rajeshwari and Indira aerobic-1 (Sarawagi *et al.*, 2016). But only a small number of varieties (SWARNA, SWARNA sub-1, Mahamaya, etc.) are currently in use.

Material and Methods

The survey for specified objective was conducted in Aarang and Tilda blocks of Raipur district of Chhattisgarh. Data were collected from 86 rice growers and 30 stakeholder in rice value chain the respondents were selected proportionately the grower and stakeholder was chosen from total 10 villages (5 villages from each selected blocks). Swarna, Mahamaya and Swarna sub-1 variety has been selected for study on the basis of maximum seed distributed by seed processing unit of Raipur district. The primary data were collected from the paddy growers through personal interview method with the help of well-prepared questionnaire for the production and marketing year 2022-2023. The data collected were analyzed using simple averages and percentages and presented in tabular form were used.

Result and Discussion

Per hectare input cost of swarna variety of rice on the sampled farms of different size groups (Rs/ha)

Table 1 and 2 presents the cost breakdown of cultivating the Swarna variety of rice per hectare. It includes total operating cost, total fixed cost, and overall cultivation cost. The Swarna rice cultivation has an average value of Rs 61782.62 per hectare, with total working cost accounting for 64.99 percent and 35.01 percent total fixed cost for of the total cultivation cost. As farm land holdings increase, the cost of cultivating

Swarna rice rises from Rs 60648.66 to Rs 62550.75 per hectare. Larger farms incur higher expenses in hired human labor and machine labor, attributed to the increased hiring of equipment for field preparation, harvesting, threshing, and marketing. The overall fixed cost gradually increases as land hold size increases. The cost of cultivation shows an upward trend for marginal, small, medium, and large-scale rice producers, as evident in Table 1 and 2.

Table 1: Total variable cost of Swarna variety of rice (Rs/ha)

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1.	Family human labour	10897.56 (10.97)	7248.52 (11.77)	4627.89 (7.42)	2269.54 (3.63)	6260.878 (10.20)
2.	Hired human labour	2873.48 (4.74)	5486.24 (8.91)	7674.47 (12.31)	9648.62 (15.43)	6420.703 (10.35)
3.	Total labour	13771.04 (22.71)	12734.76 (20.68)	12302.36 (19.73)	11918.16 (19.05)	12681.58 (20.54)
4.	Bullock labour	1762 (2.91)	1241 (2.02)	459 (0.74)	0 (0.00)	865.5 (1.41)
5.	Machine charge	4758.63 (7.85)	5468.35 (8.88)	5864.23 (9.41)	6123.46 (9.79)	5553.668 (8.98)
6.	Manure and fertilizer cost	7456.35 (12.29)	8964.12 (14.56)	9641.23 (15.46)	10246.39 (16.38)	9077.023 (14.67)
7.	Plant protection	5986.48 (9.87)	6153.45 (9.99)	6695.45 (10.74)	6849.56 (10.95)	6421.235 (10.39)
8.	Seed cost	3228.55 (5.32)	3265.25 (5.30)	3588.65 (5.76)	3602.23 (5.76)	3421.17 (5.54)
9.	Irrigation charge	918.65 (1.51)	957.34 (1.55)	986.43 (1.58)	994.26 (1.59)	964.17 (1.56)
10.	Interest on working capital @3%	1136.451 (1.87)	1163.528 (1.89)	1186.121 (1.90)	1192.022 (1.91)	1169.53 (1.89)
	Total variable cost	39018.15 (64.33)	39947.8 (64.86)	40723.47 (65.32)	40926.08 (65.43)	40153.88 (64.99)

Table 2: Total fixed cost of Swarna variety of rice (Rs/ha)

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Rental value on owned land	20000 (32.98)	20000 (32.47)	20000 (32.08)	20000 (31.97)	20000 (32.38)
2	Land revenue	12 (0.02)	12 (0.02)	12 (0.02)	12 (0.02)	12 (0.02)
3	Depreciation @10%	203.43 (0.34)	212.39 (0.34)	193.34 (0.31)	197.97 (0.32)	201.78 (0.33)
4	Interest on fixed capital @7%	1415.08 (2.33)	1415.70 (2.30)	1414.37 (2.27)	1414.69 (2.26)	1414.96 (2.29)
	Total fixed cost	21630.51 (35.67)	21640.1 (35.14)	21619.72 (34.68)	21624.67 (34.57)	21628.75 (35.01)
	Total cost (TVC+TFC)	60648.66 (100)	61587.9 (100)	62343.19 (100)	62550.75 (100)	61782.62 (100)

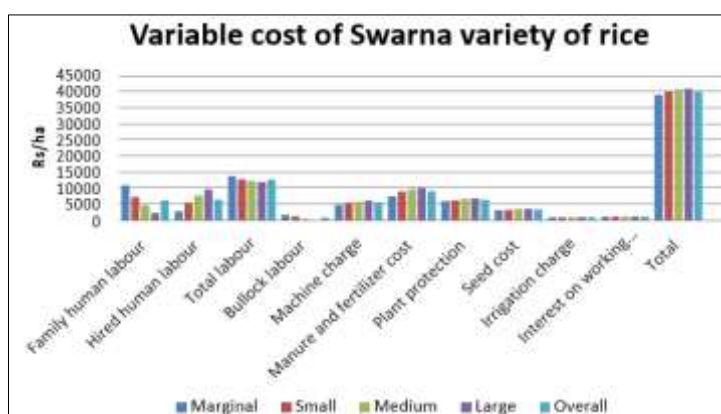


Fig 1: Indicating variable cost of Swarna variety of rice

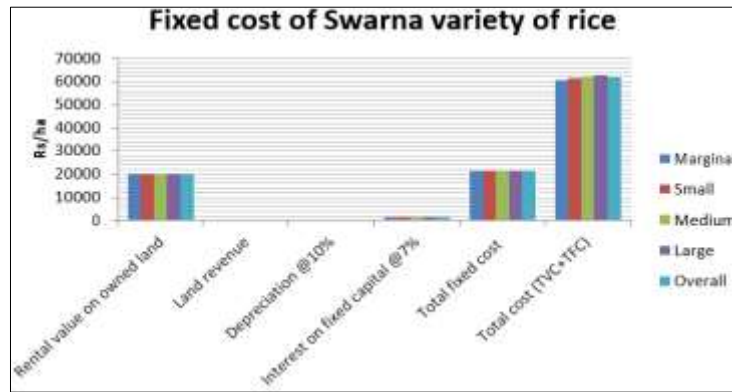


Fig 2: indicating the fixed cost of Swarna variety of rice

Cost and returns of Swarna Variety of Rice

Table 3 presents the cost and returns associated with the cultivation of the Swarna variety of rice. The table includes information on the cost of cultivation, production, and product value. The total cost of cultivating the Swarna rice variety was determined to be Rs 61782.62 per hectare. In terms of production, the Swarna variety yielded 53.63 quintals per hectare for the main product and 76.15 quintals per hectare

for the byproduct. Among the selected families in the research region, large rice producers achieved the highest yield. The overall gross return for the selected families in the research region was calculated to be Rs 1,12,128 per hectare. The gross return varied across different farm sizes, with marginal, small, medium, and large farms earning Rs 1,03,273.9, Rs 1,09,993.4, Rs 1,15,339.2, and Rs 1,19,905.5 per hectare, respectively.

Table 3: Per hectare yield, value of output and cost of production per quintal

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Cost of production (rs/q.)	1241.27	1173.55	1126.14	1081.81	1155.69
2	Main Product (q/ha)	48.86	52.48	55.36	57.82	53.63
3	Value of Main Product @2040 rs/q (upto 37 q/ha) @1700 rs/q	95642	101796	106692	110874	103751
4	By Product (q/ha)	69.38	74.52	78.61	82.10	76.15
5	Value of By Product@110rs/q	7631.93	8197.37	8647.23	9031.48	8377.00
6	Gross income	103273.90	109993.4	115339.2	119905.5	112128

Table 4: Input- Output ratio & BC ratio of Swarna variety of rice

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Total cost	60648.66	61587.9	62343.19	62550.75	61782.62
2	Gross income	103273.9	109993.4	115339.2	119905.5	112128
3	Net income	42625.27	48405.48	52996.04	57354.73	50345.38
4	Input-Output ratio	1.70	1.78	1.85	1.91	1.81
5	BC ratio	0.70	0.78	0.85	0.91	0.81

Table 5: Total variable cost of Mahamaya Variety of rice (Rs/ha)

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Family human labour	10754.56	7189.52	4927.89	2106.78	6244.688
		(17.75)	(11.67)	(7.93)	(3.27)	(10.16)
2	Hired human labour	2679.46	5175.43	7749.63	9865.64	6367.54
		(4.42)	(8.40)	(12.48)	(15.30)	(10.15)
	Total labour	13434.02	12364.95	12677.52	11972.42	12612.23
		(22.17)	(20.08)	(20.41)	(18.57)	(20.31)
3	Bullock labour	1689	1345	0	0	758.5
		(2.79)	(2.18)	(0)	(0)	(1.24)
4	Machine charge	4689.54	5446.27	5746.43	6453.89	5584.033
		(7.74)	(8.84)	(9.25)	(10.01)	(8.96)
5	Manure and fertilizer cost	7789.46	9061.45	9641.23	11542.56	9508.675
		(12.85)	(14.71)	(15.52)	(17.90)	(15.25)
6	Plant protection	5986.48	6153.45	6695.45	6849.56	6421.235
		(9.88)	(9.99)	(10.78)	(10.63)	(10.32)
7	Seed cost	3326.54	3456.46	3590.42	3786.84	3540.065
		(5.49)	(5.61)	(5.78)	(5.87)	(5.69)
8	Irrigation charge	922.46	943.12	954.21	989.76	952.3875
		(1.52)	(1.53)	(1.54)	(1.54)	(1.53)
9	Interest on working capital @ 3%	1140.134	1179.381	1183.781	1235.001	1184.574
		(1.88)	(1.91)	(1.91)	(1.92)	(1.90)
	Total	38977.63	39950.08	40489.04	42830.03	40561.70
		(64.31)	(64.87)	(65.19)	(66.44)	(65.20)

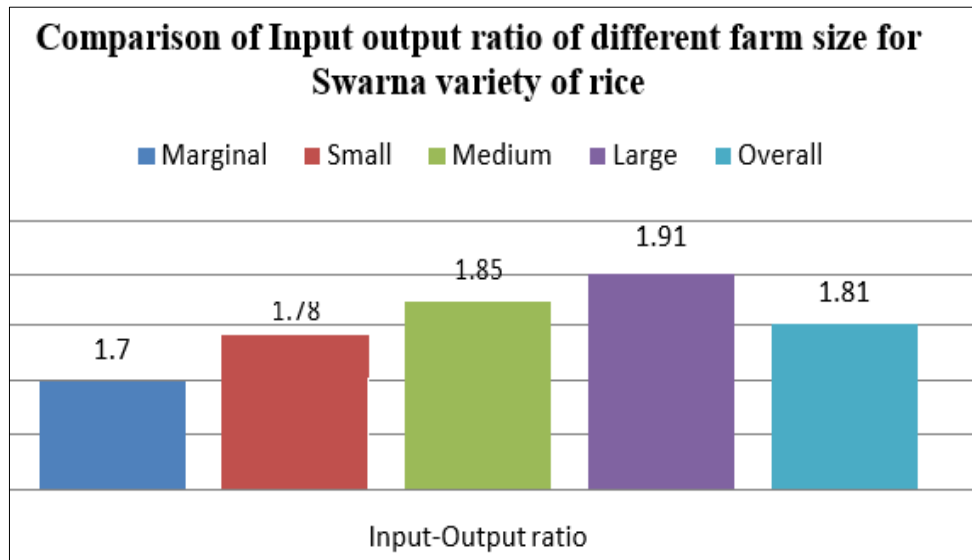


Fig 3: Indicating the Input – Output ratio of different farm size group for Swarna variety of rice

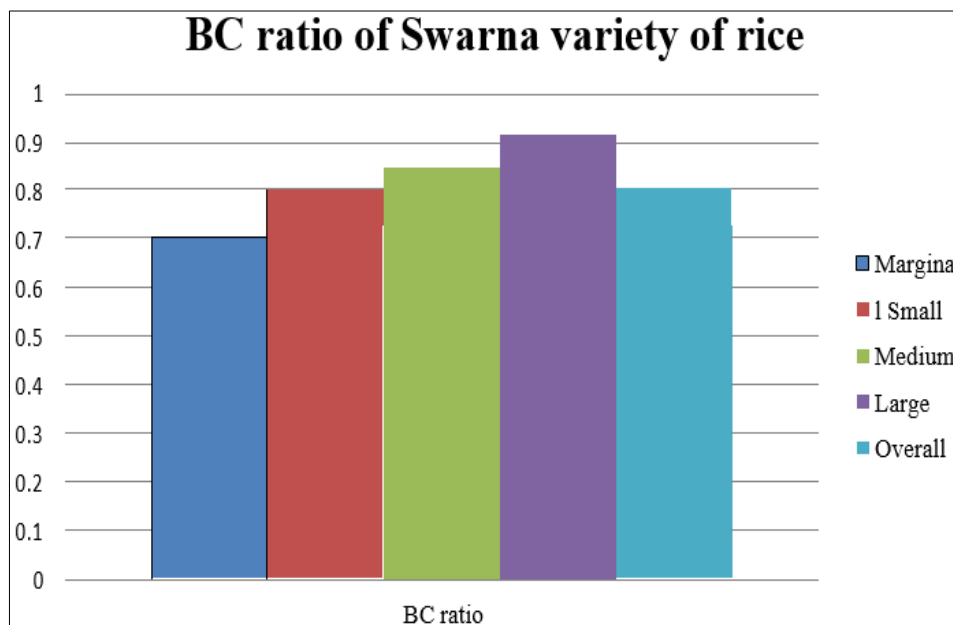


Fig 4: Indicating the BC ratio of Swarna variety of rice

Among the sampled households in the research region producing the Swarna variety of rice, the input-output ratio was found to be 1.81. It is important to note that the input-output ratio represents the relationship between the inputs (such as costs or resources) and outputs (Such as yield or production).

In this case, the input-output ratio was highest for large group rice producers, indicating that they achieved a relatively higher output in comparison to the inputs they invested. On the other hand, the input-output ratio was lowest for marginal rice growers, suggesting that their output was relatively lower in relation to the inputs they utilized.

Hectare input cost of Mahamaya variety of rice on the sampled farms of different size groups (Rs/ha)

The cost analysis of cultivating the Mahamaya rice variety is presented in Table 5 and 6 measuring the expenses in Rs/ha. The evaluation includes total working cost, total fixed cost,

and total cost. For the Mahamaya rice variety, the total cost of cultivation amounts to Rs 62,191.25. Among the total cost, the total working cost constitutes 65.20 percent, while the total fixed cost contributes 34.80 percent to the overall cultivation cost. As the size of farm land holdings increases, the cost of cultivating the Mahamaya rice variety varies from Rs 60,604.99 per hectare to Rs 64,466.13 per hectare. This demonstrates a rising trend in cultivation costs with larger farm sizes. Additionally, there is an increasing trend in hired human labor costs as farm land holdings increase. The cost of machine labor also rises with the growing size of agricultural land holdings, primarily due to the increased utilization of implements for field preparation, harvesting, threshing, and marketing of rice produced by farmers. Regarding the total fixed cost, it also increases in a slightly manner, indicating an overall increasing tendency. Table 5 and 6 further confirm that the cost of cultivation for marginal, small, medium, and large rice producers exhibits an increasing trend.

Table 6: Total cost of Mahamaya variety of rice (Rs/ha)

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Rental valu on owned land (rs/ha)	20000	20000	20000	20000	20000
		(33.00)	(32.47)	(32.30)	(31.02)	(32.18)
2	Land revenue	12	12	12	12	12
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
3	Depreciation @10%	200.47	211.53	189.45	208.65	202.53
		(0.33)	(0.34)	(0.31)	(0.32)	(0.33)
4	Interest on fixed capital @ 7%	1414.87	1415.64	1414.10	1415.44	1415.01
		(2.33)	(2.30)	(2.28)	(2.20)	(2.28)
	Total fixed cost (rs/ha)	21627.35	21639.18	21615.56	21636.1	21629.55
		(35.69)	(35.13)	(34.81)	(33.56)	(34.80)
	Totalcost (TVC+TFC) (rs/ha)	60604.99	61589.26	62104.60	64466.13	62191.25
		(100)	(100)	(100)	(100)	(100)

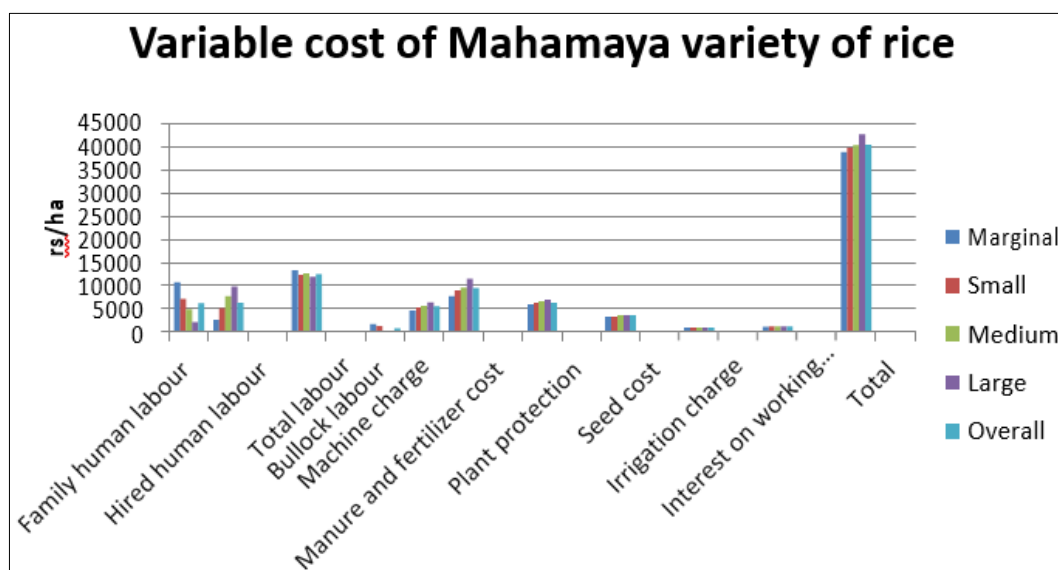


Fig 5: Indicating total variable costs of Mahamaya variety of rice

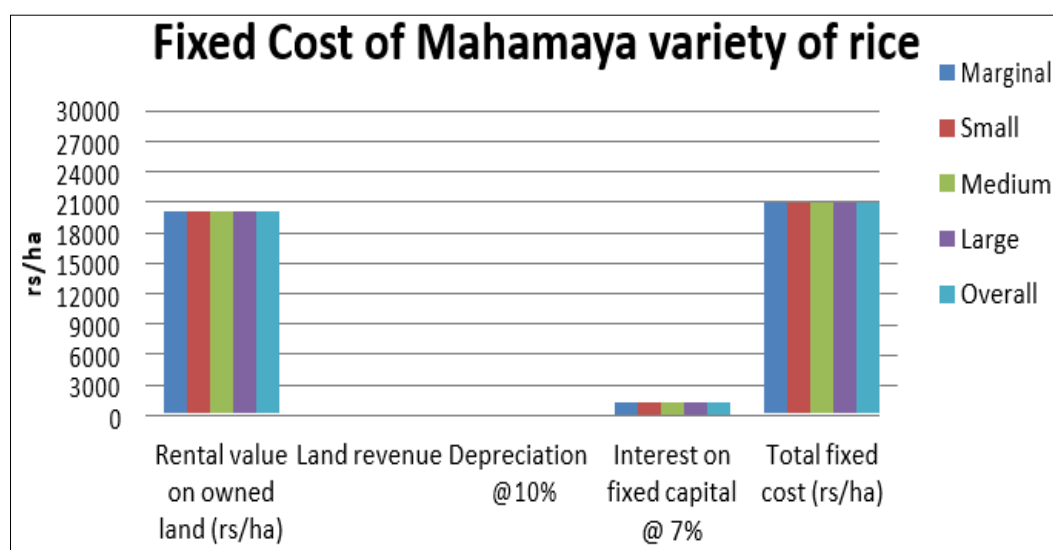


Fig 6: Indicating Total cost of cultivation of Mahamaya variety of rice

Cost and returns of Mahamaya Variety of Rice

Table 7 depicts the cost and returns of the Mahamaya rice variety. The cost of cultivation, production (including the yield of the main product and the yield of the byproduct), and product value (including both the main product and the byproduct) are all determined. The total cost of cultivation was found to be Rs 62,191.25 per hectare. The overall output of the Mahamaya rice variety was determined to be

52.3 quintals per hectare for the main product and 73.743 quintals per hectare for the byproduct, with large rice producers achieving the highest yield. The overall gross return was determined to be Rs 1,11,131.7 per hectare among the tested families in the research area, with a range of Rs 99,479.33 Rs 1,07,475.7, Rs 1,15,648, and Rs 1,21,923.9 per hectare for marginal, small, medium, and large farms, respectively.

Table 7: Per hectare yield, value of output and cost of production per quintal

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Cost of production (rs/q.)	1307.83	1221.28	1137.23	1114.94	1195.32
2	Main Product (q./ha)	46.34	50.43	54.61	57.82	52.30
3	Value of Main Product (rs) @2040 rs/q (upto 37q) @1700 rs/q	92292	99654	107178	112956	103020
4	By Product (q/ha)	65.33	71.10	77.00	81.52	73.74
5	Value of By Product @110 rs/q	7187.33	7821.69	8470.01	8967.88	8111.73
6	Gross income	99479.33	107475.70	115648	121923.90	111131.70

Table 8: Input-Output ratio and BC ratio of Mahamaya variety of rice

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Total cost	60604.99	61589.26	62104.6	64466.13	62191.25
2	Gross income	99479.33	107475.7	115648	121923.9	111131.7
3	Net income	38874.35	45886.43	53543.41	57457.75	48940.48
4	Input-Output ratio	1.64	1.74	1.86	1.89	1.78
5	BC ratio	0.64	0.74	0.86	0.89	0.78

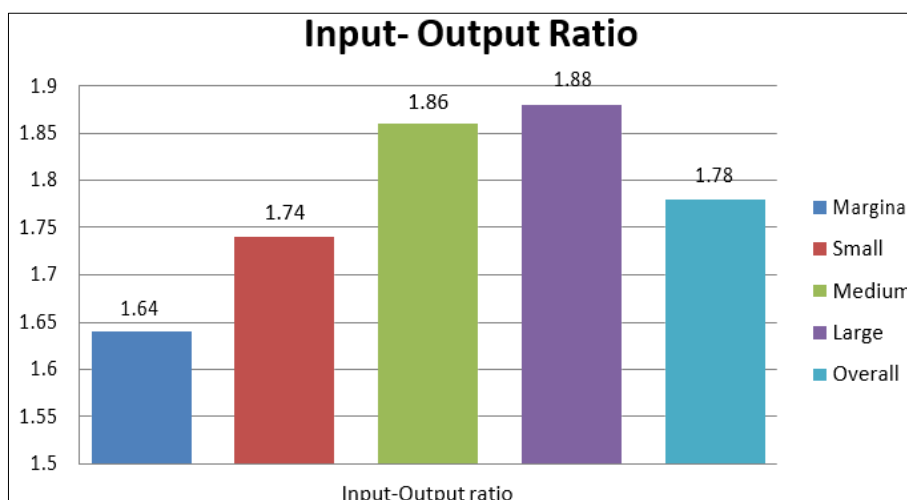


Fig 7: indicating the Input / output ratio as per different farming group

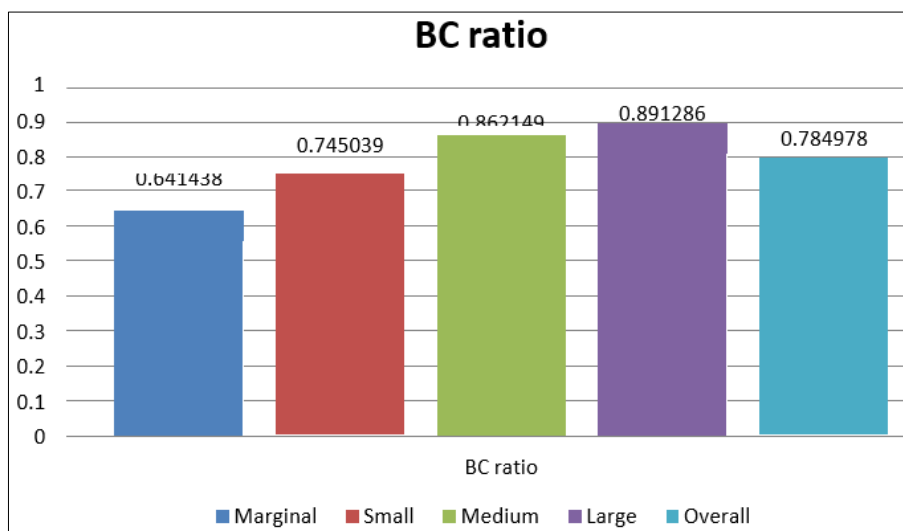


Fig 8: indicating the BC ratio of Mahamaya variety of rice

The overall sampled households producing the Mahamaya variety of rice had an input- output ratio of 1.78. Among the sampled households in the research region, Large rice growers achieved the highest input-output ratio, while Marginal rice growers attained the lowest input- output ratio.

Per hectare input cost of Swarna sub-1 variety of rice on the sampled farms of different size groups (Rs/ha)

Table 9 and 10 presents the costs associated with cultivating

the Swarna sub-1 rice variety, expressed in Rs/ha. The analysis includes total working costs, total fixed costs, and the overall cost. The cultivation of the Swarna sub-1 rice variety incurred a total cost of Rs 60408.92/ha. Among this, the total working costs accounted for 64.19 percent, while the total fixed costs represented 35.81 percent of the total cultivation cost for the Swarna sub-1 rice variety. As agricultural land holdings increase, the cost of cultivating the Swarna sub-1 rice variety rises from Rs 59494.51 to Rs 61661.53/ha. The

table demonstrates an upward trend in cultivation costs with larger farm sizes, along with an increasing trend in labor costs as the size of farm land holdings grows. It was also observed that machine labor costs increase with the expansion of agricultural land holdings, likely due to the increased use of

machinery for field preparation, harvesting, threshing, and the sale of rice produce. The overall fixed costs gradually increase, primarily due to depreciation costs. Table 9 and 10 further illustrates the rising trend in cultivation costs for marginal, small, medium, and large-scale rice producers.

Table 9: Total variable cost of Swarna sub-1 variety of rice (Rs/ha)

S. No.	Particulars	Marginal	Small	Medium	Large	Overall
1	Family human labour	10986.53	7456.32	5075.12	2235.64	6438.403
		(18.47)	(12.48)	(8.35)	(3.63)	(10.63)
2	Hired human labour	2586.43	5249.78	8045.26	9865.64	6436.778
		(4.35)	(8.79)	(13.24)	(16.00)	(10.59)
	Total labour	13572.96	12706.1	13120.38	12101.28	12875.18
		(22.81)	(21.27)	(21.60)	(19.63)	(21.33)
3	Bullock labour	1687	839.42	0	0	631.605
		(2.84)	(1.41)	(0)	(0)	(1.06)
4	Machine charge	4867.74	5248.15	5678.26	6251.48	5511.408
		(8.18)	(8.79)	(9.35)	(10.14)	(9.11)
5	Manure and fertilizer cost	7789.46	9061.45	9641.23	11056.24	9387.095
		(13.09)	(15.17)	(15.87)	(17.93)	(15.52)
6	Plant protection	5741.25	5896.42	6225.23	6348.42	6052.83
		(9.65)	(9.87)	(10.25)	(10.30)	(10.02)
7	Seed cost	3246.48	3386.89	3489.42	3586.43	3427.305
		(5.46)	(5.67)	(5.74)	(5.82)	(5.67)
8	Irrigation charge	954.12	966.34	976.24	984.17	970.21
		(1.60)	(1.62)	(1.61)	(1.60)	(1.61)
9	Interest on working capital @3%	1140.42	1153.00	1177.61	1200.97	1168.00
		(1.92)	(1.93)	(1.94)	(1.95)	(1.93)
	Total	37859.01	38104.77	39130.76	40032.43	38781.74
		(63.63)	(63.79)	(64.42)	(64.92)	(64.19)

Table 10: Total fixed cost of Swarna sub-1 variety of rice

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Rental value on owned land	20000	20000	20000	20000	20000
		(33.62)	(33.48)	(32.93)	(32.44)	(33.11)
2	Land revenue	12	12	12	12	12
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
3	Depreciation @ 10%	208.0959	203.8381	187.2122	202.1103	200.3142
		(0.35)	(0.34)	(0.31)	(0.33)	(0.33)
4	Interest on fixed capital @7%	1415.407	1415.109	1413.945	1414.988	1414.862
		(2.32)	(2.37)	(2.33)	(2.29)	(2.34)
5	Total fixed cost	21635.5	21630.95	21613.16	21629.1	21627.18
		(36.37)	(36.21)	(35.58)	(35.08)	(35.81)
	Total cost (TVC+TFC)	59494.51	59735.72	60743.92	61661.53	60408.92
		(100)	(100)	(100)	(100)	(100)

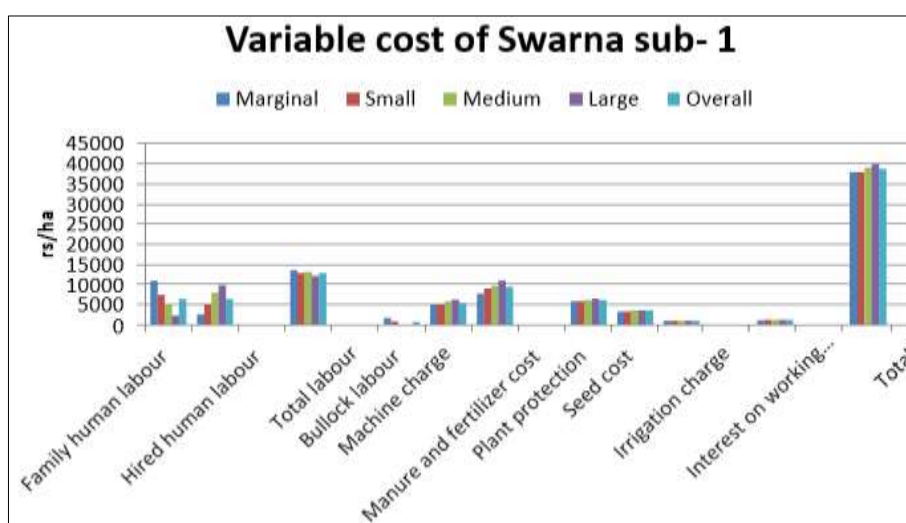


Fig 9: Indicating the total variable cost of Swarna sub-1 variety of rice

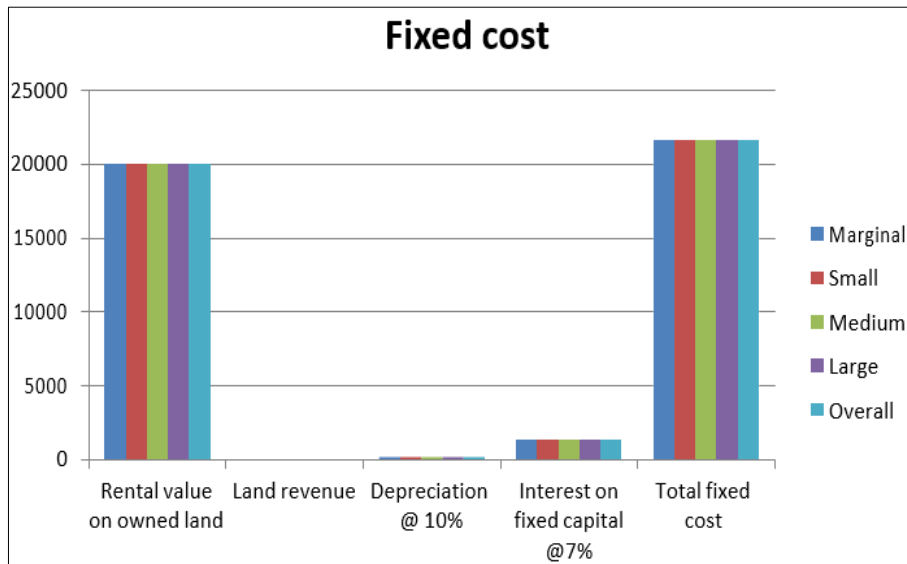


Fig 10: Indicates the fixed cost of Swarna sub -1 variety of rice

Cost and returns of Swarna sub- 1 Variety of Rice

Table 11 presents the cost and returns of the Swarna sub-1 rice variety. The table includes the cost of cultivation, production (including the yield of the main product and the yield of the byproduct), and the value of the products (including both the main product and the byproduct). The total cost of cultivation was determined to be Rs 60408.92 per hectare. The overall yield of the Swarna sub-1 rice variety was found to be 52.15 quintals per hectare for the main product and 69.83 quintals per hectare for the byproduct, with the highest yield observed among large-

scale rice producers. Among the selected families in the research region, the overall gross return per hectare was calculated to be Rs 1,08,921.3. The specific values for marginal, small, medium, and large farms were recorded as Rs 1,04,417.1, Rs 1,05,522.5, Rs 1,11,636 and Rs 1,14,109.4 respectively. Among the sampled households in the research region, the overall Input-Output ratio for farming the Swarna sub-1 rice variety was found to be 1.80. It was observed that the Input-Output ratio was highest among large rice producers and lowest among marginal rice growers within the sampled households

Table 11: Cost and return of Swarna sub-1 variety of rice

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Cost of production (rs/q.)	1193.23	1184.52	1136.25	1123.98	1159.49
2	Main Product (q/ha)	49.86	50.43	53.46	54.86	52.15
3	Value of the main product @ 2040 rs/q (upto 37 q/ ha) 1700 rs/ha	97342	98311	103462	105842	2040
4	By Product	64.31	65.55	74.30	75.15	69.83
5	Value by Product @ 110rs/q	7075.13	7211.49	8174.03	8267.40	7682.01
6	Gross income	104417.1	105522.50	111636	114109.40	108921.30

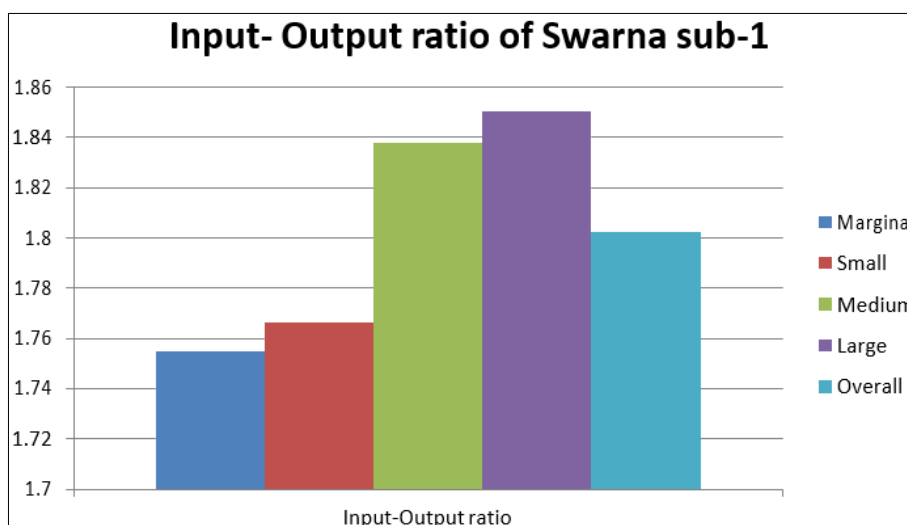


Fig 11: Indicating the Input – Output ratio of Swarna sub-1 variety of rice

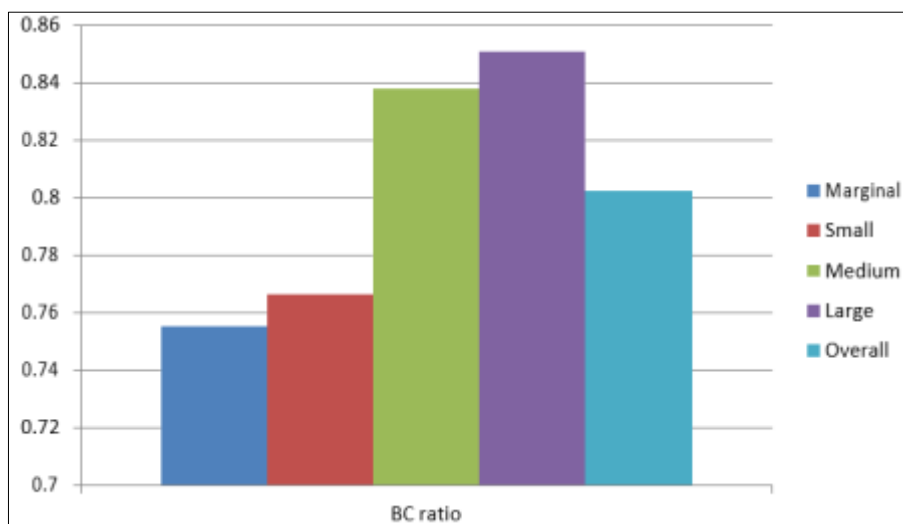


Fig 12: Indicating the BC ratio of Swarna sub-1 variety of rice

Per ha overall cost and return of all selected rice variety

Table 12: Input-Output ratio and BC ratio of Swarna sub-1 variety of rice

S.no.	Particulars	Marginal	Small	Medium	Large	Overall
1	Total cost	59494.51	59735.72	60743.92	61661.53	60408.92
2	Gross income	104417.1	105522.5	111636	114109.4	108921.3
3	Net income	44922.62	45786.77	50892.12	52447.87	48512.35
4	Input-Output ratio	1.75	1.76	1.83	1.85	1.80
5	BC ratio	0.75	0.76	0.83	0.85	0.80

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Table 13: Per hectare overall cost and return of selected rice variety

S. no	Particular	Swarna	Mahamaya	Swarna sub-1
1	Gross income	112128	111131.70	108921.30
2	Total cost	61782.62	62191.25	60408.92
3	Net income	50345.38	48940.48	48512.35
4	Input-Output ratio	1.81	1.78	1.80
5	BC ratio	0.81	0.78	0.80

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