Agri Express: **02** (02), *Article No.* V02I02.19 *E - ISSN No. 2584 - 2498*

AN ECONOMIC ANALYSIS OF VARIETAL DIVERSIFICATION OF PADDY IN BILASPUR DISTRICT OF CHHATTISGARH

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https://doie.org/10.0807/AE.2024925082

ABSTRACT

Varietal diversification of paddy refers to the practice of cultivating different rice varieties within the same field or across a farm. This approach offers several advantages over planting a single variety: Different rice varieties have varying levels of resistance to pests and diseases. By planting a diverse range of varieties, farmers can reduce the overall impact of an outbreak on their crops. Varietal diversification can help farmers to adapt the changing climate by ensuring that at least some of their crops will survive in challenging conditions. A wider range of adaptable rice varieties can help to ensure food security, especially in regions vulnerable to crop failures due to pests, diseases, or climate extremes. Planting a diverse range of rice varieties can create a more complex habitat that attracts beneficial insects and pollinators. Present study was conducted in Masturi and Bilha block of Bilaspur district 100 farmers was selected to fulfil the objective of the study. The dominant paddy varieties work Mahamaya, HMT, and Hybrid (arise 6444 and arise 8433), total cost of cultivation of Swarna variety was rupees 34653.76 Rs., Net return was 63987.87 Rs. and B:C ratio was 1.01. Major source of paddy seed was primary agriculture co-operative society. Major constant in paddy production and seed availability were; more reliance on two varieties, lack of communication services, distance of society was far from the farm, no near market, higher price of seed, lack of information about HYV.

Keywords: Rice, Variety, Economic, Farmer, Market

INTRODUCTION

Agriculture is the backbone of our country and the primary source of livelihood for about 58 percent of India's population. In the changing global scenario, agriculture is considered a time-critical and knowledge-driven system. Modern agricultural technology has significantly increased food production in India and other parts of the world, with the spread of modern high-yielding varieties being a crucial component of this technology.

This high-input model, introduced in the Indian agricultural sector in the late 1960s, was a success story, particularly in the production of superior cereals like rice and wheat. During the triennium ending 1969-70, the area occupied by rice and wheat was 37.68 and 16.62 million hectares, respectively, with high-yielding varieties comprising 11.52 and 29.72 percent of these areas. By the end of 1999-00, the area under these crops had increased to 45.16 and 27.48

million hectares, with high-yielding varieties accounting for 73 and 87.33 percent, respectively. This period also saw a surge in the usage of other associated inputs like fertilizers, plant protection chemicals, and irrigation. However, the sustainability of this high input-oriented agriculture is now under scrutiny (Splitz, 1987; Shiva, 1991; and Pingali et al., 1997) due to plateauing growth rates and associated distributional and ecological problems. The expansion of high-yielding varieties has gradually replaced traditional varieties, narrowing the diversity of cultivated crops. As defined by the Convention on Biological Diversity (1992), agricultural biodiversity refers to the variability among living organisms associated with cultivating crops, rearing animals, and their associated complexes.The State of Chhattisgarh stands 10th in terms of area and 16th in terms of population in India. About 75 percent of the state's population is engaged in agriculture, and 45 percent of the entire arable land is under cultivation. Rice is the principal crop of the state, earning Chhattisgarh the nickname "Rice Bowl of India." Paddy is grown on an area of 40.79 million hectares, with a production of 8825.66 metric tons and a productivity of 2164 kg/ha, as shown in Table 1.1 (Directorate of Agriculture, 2021).

Indira Gandhi Krishi Vishwavidyalaya (IGKV) is the only organization conducting research and education in the field of agriculture in Chhattisgarh, with its headquarters in the state's capital, Raipur. This prestigious organization has continuously conducted numerous studies for the benefit of Chhattisgarh's farmers, who are primarily rice growers, to improve their socioeconomic status through the adoption of research findings. Many rice varieties have been developed by IGKV, Raipur, including Mahamaya, Poornima, Shyamla, Danteshwari, Indira Sugandhit Dhan-1, Bamleshwari, Samleshwari, Jaldubi, Chandrahasini, Indira Sona, Indira Barani Dhan-1, Karma Mahsuri, Maheshwari, Durgeshwari, Rajeshwari, and Indira Aerobic-1 (Sarawagi et al., 2016). However, only a few varieties, such as MTU-1010, Swarna, and Mahamaya, are commonly used for production. The Rice Germplasm collection of Indira Gandhi Krishi Vishwavidyalaya, Raipur, is the second largest in the world, surpassed only by the International Rice Research Institute in the Philippines, with a collection of more than 23,250 accessions to date. This makes IGKV the institute with the largest germplasm collection of rice in India. Despite the release of numerous rice varieties by various pioneer organizations for commercial production, only a handful have reached farmers for production purposes.

Materials and Methods

Out of the five divisions of Chhattisgarh, Bilaspur Division was selected purposively for the present study. Bilaspur Division consists of eight districts: Bilaspur, Mungeli, Korba, Janjgir, Champa, Raigarh, Shakti, Sarangarh-Bhilaigarh, and Gaurela-Pendra-Marwahi. Among these districts, Bilaspur District was selected purposively for the study. Out of the total four blocks (Belha, Kota, Takhatpur, Masturi) in Bilaspur District, two blocks, namely Bilha and Masturi, were selected purposively for the present study. Three villages from each block were selected randomly, namely Sipat, Ghoghra, Amgaon, Rishda, Khapri, and Bartoli. The probability proportionate to size sampling technique was applied for the selection of respondents, and a total of 100 respondents were approached for the collection of primary data.

RESULT AND DISCUSSIONS

Table 1 Paddy diversification by using Simpson's index

S. no.	Land holding	Simpson value	Diversity index
1.	Small	0.51	High
2.	Medium	0.36	Moderate
3.	Large	0.45	Moderate
4.	Overall	0.46	High

Table 1, A study on paddy diversification using Simpson's index reveals that farmers with small land holdings have the highest diversity (0.51), while those with medium and large land holdings have lower values (0.36 and 0.45), indicating moderate diversity in paddy varieties. The overall Simpson value is 0.46.

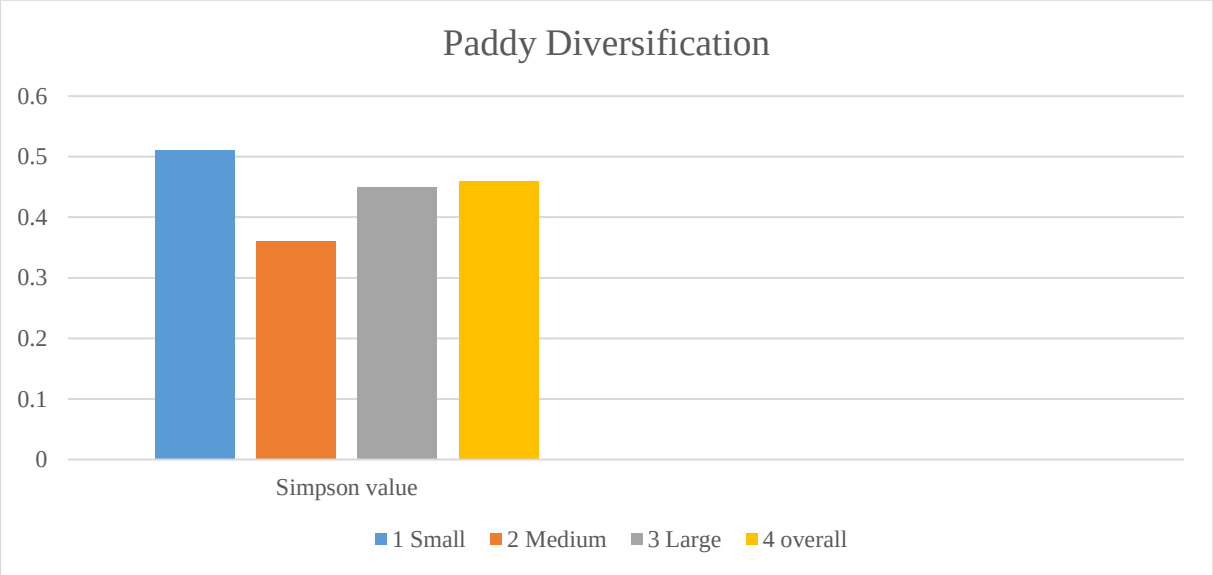

Fig. 1 Paddy diversification by using Simpson's index

Table 2 Cost of Cultivation of Swarna Variety of paddy

S. No.	Particular	Marginal	Small	Medium	Large	Overall
	Hired human labour	2784.34 (9.53)	2954.27 (9.76)	7584.61 (20.18)	9462.18 (22.88)	5696.35 (15.59)
	Own bullock labour	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	Hired bullock labour	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	Own machinery	3347.79 (11.46)	2971.68 (9.82)	5005.78 (13.32)	7386.38 (17.86)	4677.91 (13.11)

		Hired machinery charge and machine labour	3976.32 (13.61)	4178.49 (13.80)	3944.49 (10.49)	2430.26 (5.88)	3632.39 (10.95)
1	Cost A1	Manure charges	1794.64 (6.14)	1935.80 (6.49)	2054.28 (5.47)	2187.48 (5.29)	1993.05 (5.82)
		Fertilizer charges	6054.82 (20.72)	6398.59 (21.13)	6493.39 (17.28)	6738.38 (16.29)	6421.30 (18.86)
		Plant protection	5738.62 (19.64)	5984.39 (19.17)	6052.94 (16.10)	6293.93 (15.22)	6017.47 (17.68)
		Seed cost	2685.78 (9.19)	2784.89 (9.20)	2895.46 (7.70)	2974.59 (7.19)	2835.18 (8.32)
		Irrigation charge	1018.65 (3.49)	1056.65 (3.49)	1197.74 (3.19)	1298.58 (3.14)	1142.91 (3.33)
		Miscellaneous expenses	505.75 (1.73)	684.63 (2.26)	753.37 (2.00)	787.83 (1.91)	682.90 (1.98)
		Interest on working capital @3%	1180.17 (4.04)	1200.35 (3.96)	1400.13 (0.51)	1507.18 (3.64)	1321.96 (3.84)
		Depreciation on farm implements @ 10%	118.14 (0.40)	113.37 (0.37)	191.72 (0.51)	272.93 (0.66)	174.04 (0.49)
		Land revenue	13.00 (0.04)	13.00 (0.04)	13.00 (0.04)	13.00 (0.04)	13.00 (0.04)
		Total cost A1	29218.02 (100.0)	30276.11 (100.0)	37586.91 (100.0)	41352.72 (100.0)	34608.44 (100.0)
2	Cost A2	**Cost A1+ rent paid for leased in**	29218.02	30276.11	37586.91	41352.72	34608.44
3	Cost B1	Cost A1+ interest on value of owned capital assets@7%	29452.37	30484.12	37937.32	41869.76	34935.89
4	Cost B2	Cost B1 + rental value of owned land	51952.37	52984.12	60437.32	64369.76	57435.89
5	Cost C1	Cost B1+imputed value of family labour	37536.90	38574.64	43620.60	45163.05	41223.80
6	Cost C2	Cost B2+imputed value of family labour	60036.90	61074.64	66120.60	67663.05	63723.80
7	Cost C3	Cost C2+10% of cost C2 taking as managerial allowances	66040.59	67182.11	72732.66	74429.36	70096.18

Table 2, The Swarna variety of paddy costs are categorized into various costs, including hired human labor, bullock labor, machinery, manure, fertilizer charges, and seed. For marginal land holdings, the total cost is Rs. 29,218.02, with hired human labor and fertilizer charges being the major components. For small land holdings, it increases to Rs. 30,276.11, with hired human labor and fertilizer charges remaining the main costs.

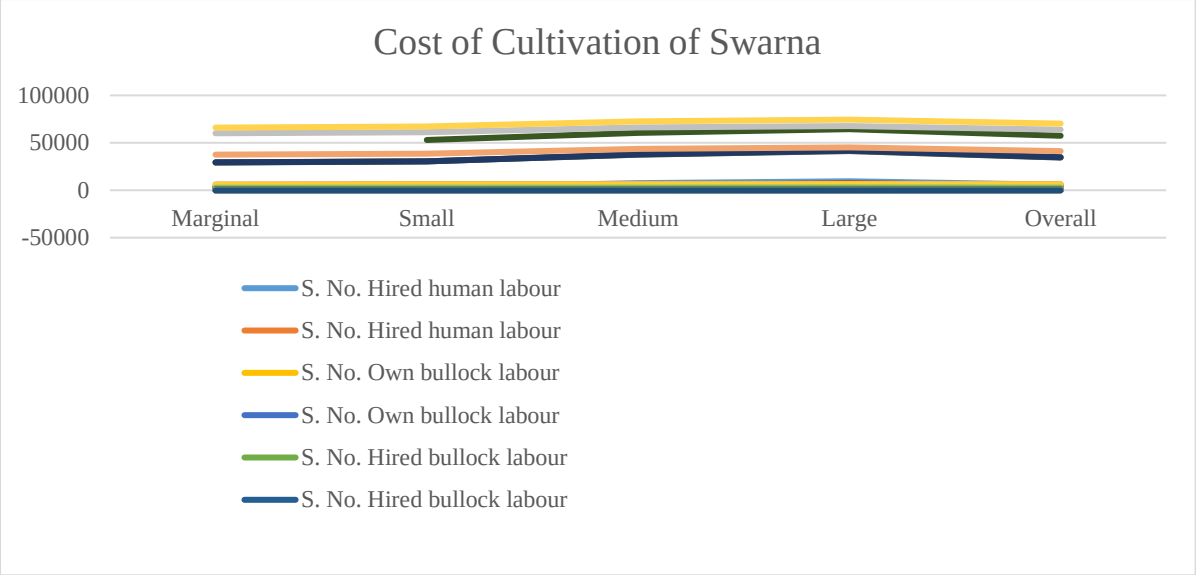

Fig. 2 Cost of Cultivation of Swarna Variety of paddy

Table 3 Costs, Returns and B:C ratio of Swarna variety

S. no.	Particular	Marginal	Small	Medium	Large	Total
1	Main Product (Q/Ha.)	46.5	47.2	48.9	49.6	48.97
2	By Product (1.42)	66.03	67.02	70.90	71.92	69.95
3	Value as per MSP (2023-24) @ 2500 Rs. /Q	116250	118000	119000	121000	119333.33
4	Value of by product @ 110 Rs. /Q.	7263.3	7372.64	7592.2	7719.8	7486.98
5	Gross Income	123513.3	125372.64	130049.55	131911.2	129111.13
7	Total Cost C2	60036.90	61074.64	66120.60	67663.05	63723.80
8	Gross Income	123513.3	125372.64	130049.55	131911.2	129111.13
9	Net Income	63476.40	64298.00	63928.95	64248.15	63987.87
10	Input – Output Ratio	2.06	2.05	1.97	1.95	2.01
11	B C Ratio	1.06	1.05	0.97	0.95	1.01

Table 3, shows the costs, returns, and benefit-cost (B:C) ratio of the Swarna variety of paddy. The total cost of cultivation (C2) is categorized into variable costs, such as hired human labor, bullock labor, machinery charges, manure charges, fertilizer charges, and seed cost, and fixed costs. The gross income from the paddy crop is calculated by multiplying the yield by the market price of paddy, and the value of the byproduct, likely straw, is also included. The B:C ratio, a profitability measure in agriculture, is calculated by dividing the gross income by the total cost of cultivation (C2). A B:C ratio greater than 1 indicates profitability, while a ratio less than 1 indicates a lack of profitability. The gross income from paddy cultivation increases with increasing land holding size, and the total cost of cultivation (C2) also increases with increasing land holding size. The B:C ratio is relatively stable across all land holding sizes, ranging from 2.62 to 2.77, suggesting that paddy cultivation is profitable for all land holding sizes in this study.

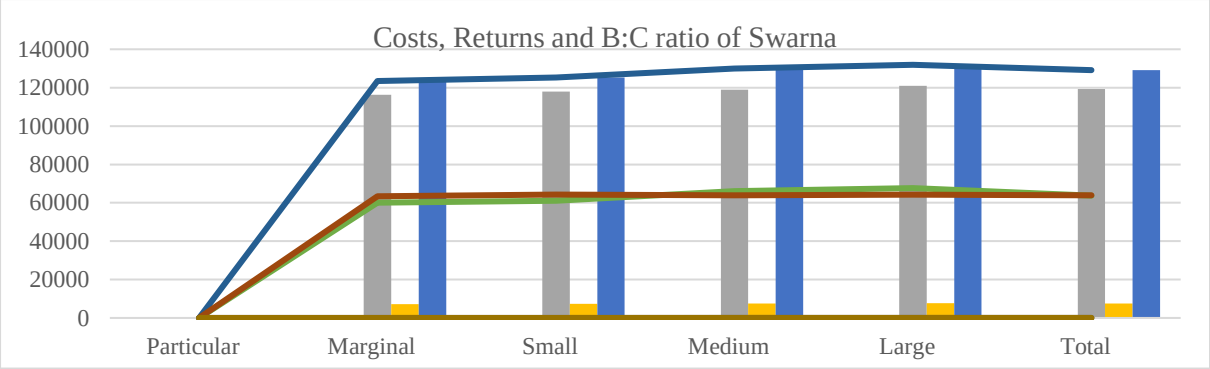

Fig. 3 Costs, Returns and B:C ratio of Swarna variety

CONCLUSION

The values of land holding and the diversity index using Simpson's index are presented. Land holdings are categorized into small, medium, and large, with Simpson's index serving as a measure of diversity, where a higher value indicates lower diversity. Small land holdings have the highest diversity (0.51), indicating a wider variety of paddy species planted, while large land holdings have lower diversity (0.45). This suggests that farmers with smaller land holdings may be practicing more diverse paddy cultivation in the Bilaspur district.

Production increases with farm size, and the marginal cost per unit (Q/Ha) generally decreases as farm size increases, indicating economies of scale. For example, the main product yield (Q/Ha) increases from 46.5 for small farms to 49.6 for large farms. While the total cost (C2) increases with farm size, it does so at a slower rate than production, suggesting that larger farms may have a cost advantage. Net income follows a similar trend to production, increasing with farm size, with larger farms having a higher net income (Rs. 109,731.35) compared to smaller farms (Rs. 106,116.90). The benefit-cost (B:C) ratio is around 1.7 for all farm sizes, indicating the return on investment for every rupee spent. A ratio greater than 1 indicates profitability. The table shows a B:C ratio of around 1.7 for all farm sizes, suggesting that cultivating Swarna paddy is profitable. Overall, while larger farms tend to have higher overall costs, they also achieve higher yields and net income. The consistent B:C ratio across farm sizes indicates that profitability is not significantly impacted by farm size for Swarna paddy cultivation.

Acknowledgment

The authors express their gratitude to the authorities of IGKV, Raipur, for their encouragement and provision of facilities to carry out this work.

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