Journal of Experimental Agriculture International

Volume 46, Issue 8, Page 849-854, 2024; Article no.JEAI.121195
ISSN: 2457-0591
(Past name: American Journal of Experimental Agriculture, Past ISSN: 2231-0606)

Economic Analysis of Major Crops in Jammu Division of Union Territory of Jammu and Kashmir, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/jeai/2024/v46i82770

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/121195

Original Research Article

Received: 09/06/2024
Accepted: 14/08/2024
Published: 14/08/2024

ABSTRACT

This micro-economic study focuses on the cost and returns analysis for major crops (wheat, paddy, and maize) in the districts of Jammu, Kathua, and Samba in the Jammu division. Conducted at SKUAST, Jammu during 2023, the study utilized a multistage random sampling method to achieve its objectives. Data was collected from 360 sample farmers, covering aspects such as land-holding

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Cite as: *Sharma, Shaurya, S. P. Singh, Sudhakar Dwivedi, Jyoti Kachroo, S. E. H. Rizvi, J. S. Manhas, and Rakesh Sharma. 2024. "Economic Analysis of Major Crops in Jammu Division of Union Territory of Jammu and Kashmir, India". Journal of Experimental Agriculture International 46 (8):849-54. https://doi.org/10.9734/jeai/2024/v46i82770.*

size, costs, and return structures. The costs associated with crop cultivation varied pointedly across the districts, with Samba incurring ₹14272.57 for Cost A2 and ₹33023.58 for Cost C3 which was the highest of overall costs. Jammu had the highest main-product yield of 25.22 quintals and by-product yield of 32.70 quintals. Jammu also recorded the highest fixed costs (₹13488.30) whereas the highest total cost was in Samba with ₹30021.43. Gross returns were highest in Jammu with ₹68303.22, resulting in net returns of ₹38740.29. Jammu also had the highest benefit-cost ratio of 1:2.30, as well as the highest family labor income and farm business income (₹41755.29 and ₹43060.92, respectively). The rental value of owned land (Cost B2) suggestively impacted final costs, and Jammu district emerged as the most economically favorable for major crop cultivation. Overall, it depicted the possible profitability from cultivation of major crops like wheat, paddy and maize, that may encourage the farming community specially the youngsters to choose agriculture over private sectors, which would ultimately contribute to meet the state demand as well as contribution to SGDP.

Keywords: Micro-economical; wheat; paddy; maize; production; returns.

1. INTRODUCTION

Agriculture is a crucial sector in India's economy, contributing 15% to the nation's GDP. Despite a steady decline in its share over the years, it remains the largest single contributor to GDP and is essential for the country's overall socio-economic development [1]. Agriculture is a fundamental and vital sector in India, providing livelihood and employment to the majority of the population. With a significant number of poor and malnourished people, prioritizing agriculture is essential for reducing poverty and malnutrition and fostering inclusive growth. Boosting agricultural production is crucial to achieving an 8% GDP growth target during the Twelfth Five Year Plan, meeting the rising food demand for over 1 billion people, and supplying raw materials for agro-based industries [2].

The growth rates of Primary sector (comprising Agriculture, Forestry, Fishing and Mining & Quarrying) have been estimated as 3.9 per cent in 2021-22 as against a growth of 2.4 per cent in the previous year. However, Agriculture and allied sectors (Agriculture, Forestry and Fishing) have witnessed modest growth during this period, this can also be observed from the data of Gross Value Added by Economic Activity at Constant (2011-12) Basic Prices which was 6.2% during 2019-20, 4.1% during 2020-2021 and 3.5% during 2021-2022 [3]. There is a considerable increase in the productivity of rice, wheat and maize in India in the recent past. The productivity of rice and wheat was 663.00 and 668.00 kg/ha in 1950-51 and it has increased to 2989.00 and 2239.00 kg/ha, respectively, during 2015-16 [4]. Similarly, the productivity of maize was 628.40 kg/ha in 1950-51 which improved to 2555.68 kg/ha during 2014-15 [5]. The increase in productivity of wheat, paddy and maize is due to the introduction of high-yielding varieties responsive to high doses of fertilizers coupled with an improved package of practices evolved by Agricultural Scientists for various regions.

India is the world's second-largest producer of wheat, following China. Over the past two decades, India has contributed 12.5% of the global wheat production, with its output increasing tenfold in the last five years. Despite this, India represents less than 1% of the global wheat trade [6]. Again, in case of rice India is the second-largest producer in the world, after China. In the 2022-2023 crop year, India produced over 135 million metric tons of milled rice, compared to China's 146 million metric tons. India is also the world's largest exporter of rice, shipping Basmati and non-Basmati varieties to many countries [7]. Rice exports vitally benefit India's economy and support millions of farmers. India ranks 7th globally in maize production and 4th in the total area dedicated to maize cultivation. India's maize production constitutes about 2% of the world's total, with its cultivation area covering roughly 4% of the global total. However, India's maize productivity, at 3.07 metric tons per hectare, is lower than that of other major maize-producing countries [8].

Although there is a considerable increase in the productivity of these major crops (wheat, rice and maize) in the country but there are still certain areas, where the productivity of these crops is very low. Productivity in such areas fluctuates pointedly from region to region due to various factors such as soil type, soil fertility, rainfall pattern, flood, water logging and climatic conditions. In spite of the overall increase in productivity at the national level, there is a lack of

detailed studies focusing on the specific regions where productivity remains low. Limited research has been conducted to comprehensively analyze the underlying causes of these productivity disparities within different regions of India, particularly in areas like Jammu, Kathua, and Samba districts. Understanding these region-specific challenges and identifying effective strategies to address them is crucial for further improving agricultural productivity and ensuring food security in these underperforming areas.

1.1 Objectives

The core objectives of the present research were to empirically analyze the aspects of productivity of major crops (viz. wheat, paddy and maize) in Jammu, Kathua and Samba districts of Union territory of Jammu and Kashmir. Additionally, analyzing the component wise cost and returns from cultivation of these major crops in the study area and exploring the factors affecting the cultivation of the major crops in the study area were also done.

1.2 Hypotheses

Based on the objectives, the hypotheses that there are imperative variations in the component-wise costs and returns cultivation of these major crops in the study area, influenced by different socio-economic and environmental factors; and the adoption of improved cultivation practices consequently yields better production have been formulated.

2. MATERIALS AND METHODS

This study was conducted at Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu (UT of Jammu & Kashmir), covering the districts of Jammu, Kathua, and Samba during 2023. The research relied exclusively on primary data, collected using a multistage random sampling method from 360 farmers across the three districts (3 districts * 2 blocks per district * 3 villages per block * 20 farmers per village = 360 farmers). Data was gathered through personal interviews with a structured questionnaire designed to capture detailed information on socio-economic profiles, landholding sizes, cropping patterns (including types of crops such as wheat, paddy, maize, and others, and the area utilized for each crop), input usage (seeds, fertilizers, pesticides, irrigation, etc.), and yields. The survey also covered costs associated with cultivation (land preparation, sowing, weeding, harvesting, etc.) and returns from agriculture (sales revenue, market prices, etc.). The questionnaire included both closed-ended and open-ended questions to collect quantitative data and qualitative insights. All cost concepts (as provided by CACP) and returns were calculated using MS-Excel 2019, with the values representing average costs (in ₹) for each farm combinedly for three crops across the three districts.

3. RESULTS AND DISCUSSION

3.1 Economics of Major Crops in Jammu, Kathua and Samba Districts

The economic analysis of major crops (wheat, rice, and maize) in the three districts of Jammu, Kathua, and Samba involved several cost concepts (Table 1), each contributing to the overall cost of cultivation. Further detailed description of each cost component (A1, A2, B1, B2, C1, C2, and C3) and their respective values for the districts were as follows- Cost A1 included expenses on hired labour (₹3329.67 in Jammu, ₹3473.33 in Kathua, and ₹3361.67 in Samba), machine labour (₹1070.00, ₹1048.33, and ₹1101.67, respectively), irrigation (₹525.00, ₹541.67, and ₹500.67, respectively), manure (₹2488.67, ₹2467.00, and ₹2609.33, respectively), seeds (₹1312.67, ₹1251.67, and ₹1407.33, respectively), fertilizers (NPK) (₹2394.00, ₹2476.00, and ₹2466.67, respectively), plant protection chemicals (₹502.00, ₹451.67, and ₹411.33, respectively), interest on working capital (₹1437.63, ₹1328.60, and ₹1451.90, respectively), and depreciation charges (₹963.33, ₹969.00, and ₹962.00, respectively). The total Cost A1 summed up to ₹14022.96 in Jammu, ₹14007.27 in Kathua, and ₹14272.57 in Samba.

Cost A2 was identical to Cost A1 in all districts since it included Cost A1 plus rent paid for leased-in land, which was zero in each district. Cost B1 added interest on fixed capital (excluding land) to Cost A1, resulting in a total of ₹15328.59 in Jammu, ₹15237.07 in Kathua, and ₹15523.43 in Samba. Cost B2 included the estimated rental value of owned land added to Cost B1, leading to a higher total of ₹26547.93 in Jammu, ₹25845.07 in Kathua, and ₹26504.77 in Samba. Cost C1 incorporated the imputed value of family labor into Cost B1, with a total of ₹18343.59 in Jammu, ₹18272.27 in Kathua, and ₹19040.10 in Samba. Cost C2 added the imputed value of family labor to Cost B2, yielding to a final amount of ₹29562.93 in Jammu, ₹28880.27 in Kathua, and ₹30021.43 in Samba.

Lastly, Cost C3 included a management cost (10% of Cost C2), resulting in the highest overall costs of ₹32519.22 in Jammu, ₹31768.29 in Kathua, and ₹33023.58 in Samba.

Among the cost components given in Table 1, Cost B2 stands out as the highest in all three districts due to the inclusion of the estimated rental value of owned land. This suggestively impacted the final cost of cultivation (Cost C3), reflecting a major change in the total cost. The values for Cost B2 were ₹26547.93 in Jammu, ₹25845.07 in Kathua, and ₹26504.77 in Samba. This substantial cost highlighted the importance of land value in the overall economics of crop production overshadowing other costs such as hired labor, fertilizers, and machinery which were similar to the results revealed by Singh et al. [9] and Singh et al. [10], however this still represents a substantial input cost that can impact the profitability of major crop farming as found in the research done by Sharma et al. [11].

3.2 Cost and Returns of Major Crops in Jammu, Kathua and Samba Districts

The economic evaluation of major crops (wheat, paddy, and maize) in the districts of Jammu, Kathua, and Samba revealed some notable variations in production, costs, and returns (Table 2). The production data showed that Jammu had the highest main product yield at 25.22 quintals (q), followed by Kathua at 23.72 q, and Samba at 23.02 q. For by-products, Jammu again lead with 32.70 q, while Kathua and Samba produced 30.53 q and 31.37 q, respectively.

Table 1. Concept-wise cost of cultivation for major crops across all three districts

S. No.	Particulars	Jammu	Kathua	Samba
1	**Cost A1**			
a)	Hired labour	3329.67	3473.33	3361.67
b)	Machine labour	1070.00	1048.33	1101.67
c)	Irrigation	525.00	541.67	500.67
d)	Manure	2488.67	2467.00	2609.33
e)	Seed	1312.67	1251.67	1407.33
f)	Fertilizers (NPK)	2394.00	2476.00	2466.67
g)	Plant protection chemicals	502.00	451.67	411.33
h)	Interest on working capital	1437.63	1328.60	1451.90
i)	Depreciation charges	963.33	969.00	962.00
	Total Cost-A1	14022.96	14007.27	14272.57
2	**Cost-A2**			
a)	Cost-A1	14022.96	14007.27	14272.57
b)	Rent paid for leased-in land	0.00	0.00	0.00
	Total Cost-A2	14022.96	14007.27	14272.57
3	**Cost-B1**			
a)	Cost A1	14022.96	14007.27	14272.57
b)	Interest on fixed capital (excluding land)	1305.63	1229.80	1250.87
	Total Cost-B1	15328.59	15237.07	15523.43
4	**Cost-B2**			
a)	Cost B1	15328.59	15237.07	15523.43
b)	Land revenue	0.00	0.00	0.00
c)	Estimated rental value	11219.33	10608.00	10981.33
	Total Cost-B2	26547.93	25845.07	26504.77
5	**Cost C1**			
a)	Cost B1	15328.59	15237.07	15523.43
b)	Imputed value of family labour	3015.00	3035.20	3516.67
	Total Cost-C1	18343.59	18272.27	19040.10
6	**Cost C2**			
a)	Cost B2	26547.93	25845.07	26504.77
b)	Imputed value of family labour	3015.00	3035.20	3516.67
	Total Cost C2	29562.93	28880.27	30021.43
7	**Cost C3**			
a)	Cost of management (10% of Cost-C2)	2956.29	2888.03	3002.14
	Total Cost-C3	32519.22	31768.29	33023.58

Table 2. Economics of major crops from all three districts

Particulars	Jammu	Kathua	Samba
Production			
Main product (q)	25.22	23.72	23.02
By-product (q)	32.70	30.53	31.37
Cost			
Total fixed cost	13488.30	12806.80	13194.20
Total variable cost	16074.63	16073.47	16827.23
Total cost	29562.93	28880.27	30021.43
Returns			
Gross returns	68303.22	62963.57	61342.03
Net returns	38740.29	34083.30	31320.60
Benefit cost ratio	2.30	2.16	2.02
Family labour income	41755.29	37118.50	34837.27
Farm business income	43060.92	38348.30	36088.13

After examining the cost components given in Table 2, total fixed costs were highest in Jammu at ₹13488.30, when compared to ₹12806.80 in Kathua and ₹13194.20 in Samba. Whereas the total variable costs were highest in Samba at ₹16827.23, followed closely by Jammu at ₹16074.63, and Kathua at ₹16073.47. This resulted in total costs of ₹29562.93 for Jammu, ₹28880.27 for Kathua, and ₹30021.43 for Samba. In terms of returns, Jammu achieved a highest gross return of ₹68303.22, with Kathua and Samba reaching ₹62963.57 and ₹61342.03, respectively. Net returns, calculated as gross returns minus total costs, were also highest in Jammu at ₹38740.29, followed by Kathua at ₹34083.30, and Samba at ₹31320.60. The benefit-cost ratio, which measures profitability, was highest in Jammu at 1:2.30, indicating that for every rupee spent, Jammu farmers received ₹2.30 in return whereas Kathua had a benefit-cost ratio of 1:2.16, and Samba had the lowest at 1:2.02.

Furthermore, family labour income, which represented the returns to family labour after accounting for all costs except family labour, was found to be highest in Jammu at ₹41755.29. Kathua followed with ₹37118.50, and Samba was at ₹34837.27. Similarly, farm business income, representing the returns over variable costs, showed Jammu leading at ₹43060.92, followed by Kathua at ₹38348.30, and Samba at ₹36088.13. Overall, Jammu district demonstrated the highest returns from the cultivation of wheat, paddy, and maize, with superior figures in gross returns, net returns, benefit-cost ratio, family labour income, and farm business income. This indicated that Jammu was the most profitable district among the three districts for cultivating these crops which was similar to the earlier works of Sharma et al. [11] where Jammu district was found to be positively contributing towards the production of these major crops.

4. CONCLUSIONS AND RECOMMENDATIONS

In major crop cultivation across the districts of Jammu, Kathua, and Samba, the considerable factor for affecting the total cost was the estimated rental value of the land. The cost of cultivation of available resources and the profit that can be generated by producing the major crops were precisely described. This factor's dominance suggested that any strategies to minimize the total cost of major crop cultivation, maximize the yields and profitability, should prioritize on reduction of the land rental value or optimizing land use. Effective strategies for cultivation cost reduction might include optimizing fertilizer use through precision farming techniques or exploring alternative, cost-effective fertilization methods. Policies regarding the upliftment of farmers like- Integrated Watershed Management Programs (IWMP) and Mission for Integrated Development of Horticulture (MIDH) to improve water management and promote high-value crops, financial support which includes subsidies on inputs and low-interest loans, infrastructure development that enhances rural connectivity and cold storage facilities, reducing post-harvest losses, research and extension services, such as KVKs, which promote climate-resilient agriculture, while market access initiatives encourage organic farming and FPOs for better pricing and value addition will empower women and youth, meanwhile employment schemes like MGNREGA will provide additional income, ensuring food security and socio-economic improvement for hill farming communities.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

ACKNOWLEDGEMENTS

The authors are highly thankful to the Head, Division of Agricultural Economics and ABM for the necessary facilities like materials and the site for conducting research as well as the ceaseless encouragement and wherewithal cannot be overlooked because this manuscript could not have been completed without her administration.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/121195