



An Economic Analysis of Wheat Cultivation in North-Karnataka, 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: 10.9734/IJPSS/2023/v35i203887

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/106756>

Original Research Article

Received: 25/07/2023

Accepted: 28/09/2023

Published: 05/10/2023

ABSTRACT

Wheat is an important cereal crop in India as half of the population depends on wheat for food. The average wheat sown area of the country is 30.38 ha in the last five years from 2017-2022. The present paper was designed to study the cost of cultivation and return structure of wheat cultivation in Karnataka which comes under the peninsular zone where the total wheat cultivating area is 1.60 million ha. The study was undertaken in three major wheat-growing districts of Karnataka i.e., Belagavi, Vijayapura and Dharwad. The multistage random sampling method was followed for the selection of districts and farmers. The primary data was collected from 90 farmers (30 farmers from each district) and analyzed using tabular analysis. The results of the study revealed that per hectare total cost of cultivation of wheat at an aggregate level was ₹ 35,076.37 in which the share of the variable cost was 59.86 per cent and the fixed cost was 40.14 per cent. Among the variable costs, human labour cost was highest (21.95%) per hectare and in fixed cost, the rental value of land (34.63%) was highest. The gross return and net return obtained by the farmer were ₹ 54,786.56 and ₹ 19,710.18 and the return per rupee of expenditure was found to be 1.55 indicating that wheat is a profitable crop enterprise. However, the cost of production per quintal was found ₹

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1,869.60 and the profits obtained were ₹1,008.27 per quintal. Lack of labour and high cost of labour was the major problem in wheat cultivation. Hence, boosting up the mechanization may help to reduce the cost of cultivation. Using custom hiring centres and farmer producer organization approaches would better augment the mechanization in the wheat economy.

Keywords: Cost and returns; wheat; benefit-cost ratio; Karnataka.

1. INTRODUCTION

To assist the poorest people on earth, the major cereal grains must be at the centres of this new revolution. Over the past 50 years, groundbreaking research on our three most important cereal grains viz., maize, rice and wheat which has made a significant contribution to the world's food security. Primarily by increasing the yields of these crops and making them more resistant to pests, diseases, drought and flood tolerant [1]. But more work still has to be done because more than 800 million people still experience chronic hunger and many more suffer from hunger. Agriculture plays a vital role in the Indian economy. The nation is exposed to all 15 significant climates. In addition, 46 of the 60 soil types that can be found on earth are present in India. It cultivates approximately half of its total geographical area, ranking it among the top agricultural land users. It is an important economic sector for the country's long-term and inclusive growth (<https://www.ibef.org/research/case-study/importance-of-India-s-agriculture-economy>).

Wheat is an important cereal grain mostly grown in temperate and subtropical climates around the world. Wheat (*Triticum aestivum* L.) is India's second most significant cereal crop and it plays an essential role in the country's food and nutritional security. Wheat provides around 20 per cent of the calories consumed by nearly 55 per cent of the world's population. Wheat production spans more than 220 million hectares (ha) worldwide, and its gross global trade exceeds that of all other crops combined. India stands first in wheat growing area and second in wheat production next to China in the world. India accounts for around 12.40 per cent of global wheat area while accounting for 11.77 per cent of total global wheat production [2].

India had approximately 30.5 million hectares of land area for cultivation of wheat at the end of year 2022 [3]. Wheat production in India has

increased at a CAGR of 2.59 percent over the last ten years [4]. India is not only the second largest producer but also the second largest consumer of wheat after China in the world. Uttar Pradesh is the leading wheat producer in the country which accounts for 32 per cent of total production. Madhya Pradesh accounts for approximately 18 per cent of total wheat production in the country followed by Punjab (16 Per cent), Haryana (11 Per cent) and Rajasthan (10 Per cent). However, the average wheat productivity in major wheat-growing countries is much lower [5]. China has the highest yield (5.81 tonnes/ha) followed by Ukraine, India and the United States. Regardless of India's productivity being on par with the global average, per day productivity is relatively high (20 kg/day) in comparison to other countries, namely the United States, Uzbekistan, Hungary, Poland, Italy, Bulgaria, and Romania which primarily cultivates winter wheat with a crop cycle of approximately 275 days. It should be emphasized that winter wheat-growing countries do not deal with any other crop during the year. However in India, where spring wheat cultivation happens over a 150 day period, farmers can cultivate up to two separate crops in addition to wheat [6].

2. OBJECTIVE OF THE STUDY

- To analyze the cost and returns of wheat cultivation in the study area.

3. MATERIALS AND METHODS

The study was conducted in three districts of Karnataka based on the highest area. In Karnataka state, Belagavi district stands first in area under wheat cultivation (46347 ha) followed by Vijayapura district (46022 ha) and Dharwad district (35874 ha) during the year 2018-21. Two taluks were selected from each district based on the highest area under wheat. Savadatti and Athani taluks from Belagavi district, Sindagi and Indi taluks from Vijayapura district and Navalgund and Kundgol taluks from Dharwad district were selected. Further, 15 wheat

growers were selected randomly from each of the selected taluk. Thus, a total sample of 90 wheat growers were selected for the study. The primary data pertaining to the cost and returns like variable cost (labour, material cost, interest on working capital, marketing cost, etc.) and fixed cost (depreciation, land revenue and interest on working capital) and returns (gross returns and net returns) were collected through personal interview method with the help of a well-structured pre-tested schedule. To analyze the cost and returns of wheat production, tabular method of analysis was used.

4. RESULTS AND DISCUSSION

The economics of wheat production involves analyzing the costs and benefits associated with various factors such as land rent, seed cost, fertilizer, labour, irrigation, and machinery costs. The cost of production varies greatly depending on the location, weather conditions, and the level of technology used [7]. The study covered 30 farmers from each of the selected districts of Karnataka. Costs incurred and returns realized from wheat cultivation by the wheat growers were calculated and are presented in Table 1 and Table 2. It can be observed from Table 1 that in Belagavi district, the total cost of cultivation of wheat was ₹ 40,345.70 per hectare of which 60.92 percent was variable cost and 39.08 per cent was fixed cost. Among the variable costs, the share of human labour was a major component accounted for 21.13 per cent followed by fertilizers and FYM (12.08 Per cent), machine labour (8.73 Per cent), cost of bullock labour (5.02 Per cent), seed (5.59 Per cent), interest on working capital (4.51 Per cent) and plant protection chemicals (3.86 Per cent) respectively. The fixed cost included land revenue, rental value of land, depreciation and interest on fixed capital of which rental value of land accounted the highest (₹ 13,574, 33.64 Per cent). Likewise in the case of Vijayapura district, the average per hectare total cost of cultivation of wheat was ₹ 39,182.82, in that variable cost was ₹ 23,759.45, accounting 60.64 per cent of the total cost of cultivation. Similarly, here as well human labour and FYM & fertilizer costs shared the highest and together accounted for 32.98 percent. The share of the fixed cost in the total cost of cultivation was 39.36 per cent of which 33.92 per cent share of the total fixed cost was

accounted by the rental value of land. In the Dharwad district, the average per hectare total cost of cultivation of wheat was ₹ 25,700.61, in that variable cost accounted for 57 per cent (₹ 14,648.07) of the total cost of cultivation. Among the variable cost, human labour cost accounted for the highest share of 25.01 per cent. The share of the fixed cost in total cost of cultivation was 43 per cent (₹ 11,052.54 per hectare), in which rental value of land cost accounted to 37.27 per cent of the total fixed cost.

Overall, the total cost of cultivation of wheat was ₹ 35,076.37 per hectare of which 59.86 per cent was variable cost and 40.14 per cent was fixed cost. The variable cost mainly comprised of human labour, FYM and fertilizer, plant protection chemicals, seed, machine labour, bullock labour and interest on working capital which accounted for ₹ 7,698.55 (21.95%), ₹ 3847.07 (10.97%), ₹ 1,389.57 (3.96%), ₹ 1,808.65 (5.16%), ₹ 2,784.30 (7.94%), ₹ 1,912.48 (5.45%) and ₹ 1,555.18 (4.43%) per hectare respectively. The share of the fixed cost in total cost of cultivation was ₹ 14,081.20 per hectare, accounting for 40.14 per cent. In the fixed cost, major cost was rental value of land, which was ₹ 12,147.33 (34.63 %). It is found that among variable costs, the costs of labour, human labour were the major components of the cost in all the selected districts, because most of the operations like land preparation, spraying and weeding were done by human labours. Among material costs, FYM and fertilizer costs are the major contributors to the cost due to more usage of the inputs by the farmers in the study area. Therefore, cost minimization with a view to get more profit is possible by inducing efficiency in labour utilization. Efficiency in fertilizer use would help the farmers to optimize their returns. Among the fixed costs, rental value of land was found to be the major cost in all the selected districts. Among all the three selected districts, Dharwad district farmers had spent less on total cost of cultivation as compared to other two district farmers. Dharwad district farmers were majorly cultivating wheat under rain fed condition and using traditional varieties. In contrast, other two district farmers were cultivating wheat under irrigated condition and using high yielding varieties. High yielding varieties required more quantity of input hence the cost also increases accordingly [8].

Table 1. Cost of cultivation of wheat in sample districts of Karnataka

SI No	Particulars	Belagavi (n=30)		Vijayapura (n=30)		Dharwad (n=30)		Overall (n=90)	
		Cost	Per cent	Cost	Per cent	Cost	Per cent	Cost	Per cent
I	Variable cost								
a)	Material cost								
	Seed	2253.31	5.59	2118.33	5.41	1054.33	4.10	1808.65	5.16
	FYM and fertilizer	4872.43	12.08	4779.46	12.20	1889.33	7.35	3847.07	10.97
	PPC	1558.33	3.86	1742.73	4.45	867.66	3.38	1389.57	3.96
b)	Labour cost								
	Human labour	8525.33	21.13	8142.00	20.78	6428.33	25.01	7698.55	21.95
	Bullock labour	2026.67	5.02	1974.33	5.04	1736.45	6.76	1912.48	5.45
	Machine labour	3523.33	8.73	3242.66	8.28	1586.93	6.17	2784.30	7.94
	Interest on working capital @8%	1820.58	4.51	1759.94	4.49	1085.04	4.22	1555.18	4.43
	Total variable cost	24,577.99	60.92	23,759.45	60.64	14,648.07	57.00	20995.17	59.86
II	Fixed cost								
	Land revenue	45.66	0.11	40.54	0.10	30.68	0.12	38.96	0.11
	Depreciation	458.66	1.14	441.33	1.13	258.66	1.01	386.21	1.10
	Rental value on land	13,574	33.64	13,289	33.92	9,579	37.27	12,147.33	34.63
	Interest on fixed capital @ 12%	1689.39	4.19	1652.50	4.22	1184.20	4.61	1508.69	4.30
	Total fixed cost	15,767.71	39.08	15,423.37	39.36	11,052.54	43.00	14081.20	40.14
III	Total cost of cultivation	40,345.70	100	39,182.82	100.00	25,700.61	100.00	35,076.37	100.00

Table 2. Cost and returns of wheat cultivation in sample districts of Karnataka

Sl. No.	Particulars	Belagavi (n=30)	Vijayapura (n=30)	Dharwad (n=30)	Overall (n=90)
1	Total cost of cultivation (₹ /ha)	40,345.70	39,182.82	25,700.61	35,076.38
2	Value of Main Product (₹ /ha)	63,654.12	51,896.24	30,408.11	48,652.82
3	Value of by-product (₹ /ha)	5,750.25	5,050.49	7,600.46	6,133.73
4	Gross returns (₹ /ha)	69,404.37	56,946.73	38,008.57	54,786.56
5	Net returns (₹ /ha)	29,058.67	17,763.91	12,307.96	19,710.18
6	Yield (qtl/ha)	25.12	20.48	12.30	19.30
7	Cost of production (₹ /qtl)	1,606.11	1,913.22	2,089.48	1,869.60
8	Profit (₹ /qtl)	1,156.79	867.37	1,000.64	1,008.27
9	Benefit-Cost Ratio (BCR)	1.72	1.45	1.47	1.55

In Table 2, the details of per hectare cost, yields and returns are presented. The average yield of wheat in the Belagavi district was 25.12 quintals per hectare. The returns structure of wheat revealed that gross returns were ₹ 69,404.37 per quintal and the net returns were ₹ 29,058.67 per quintal. The cost of production was ₹ 1,606.11 per quintal, associated with a profit of ₹ 1,156.79 per quintal. The benefit-cost ratio (BCR) was 1.72. The average yield of wheat in the Vijayapura district was 20.48 quintals per hectare. The gross returns obtained were ₹ 56,946.73 and net returns were ₹ 17,763.91. The cost of production was ₹ 1,913.22 per quintal and the profits obtained were ₹ 867.37 per quintal. The BCR was 1.45. In the Dharwad district, average yield of wheat was 12.30 quintal per hectare. The gross returns obtained were ₹ 38,008.57 and net returns were ₹ 2,307.96. The cost of production was ₹ 2089.48 per quintal and the profits obtained were ₹ 1000.64 per quintal. The BCR was 1.47. The average yield of wheat in the study area was 19.30 quintal per hectare. The gross returns obtained were ₹ 54,786.56 and net returns were ₹ 19,710.18. The cost of production was ₹ 1,869.60 per quintal and the profits obtained were ₹ 1,008.27 per quintal. The BCR was 1.55.

With respect to returns, farmers of Belagavi and Vijayapura district have huge difference over the farmers of Dharwad district as evidenced by higher gross and net returns obtained by farmers of Belagavi and Vijayapura district (₹ 69,404 & ₹ 29,058 and ₹ 56,946 & ₹ 17,763 respectively) in comparison with the farmers of Dharwad district (₹ 38,008 and ₹ 12,308 respectively). The cumulative effect was reflected in higher benefit cost ratio in Belagavi and Vijayapura district (1.72 and 1.45) as compared to Dharwad district (1.47). These differences mainly occurred due to differences in yield and cost of cultivation of respective districts. At the overall scenario, gross returns in wheat cultivation was ₹ 54,786 per hectare and net returns was ₹ 19,710 per hectare in the study area. Cost of cultivation was around ₹ 35,076 per hectare. Cost of production was around ₹ 1,869 per hectare. The study conducted by Joy et al. [9] indicated that cost of cultivation of wheat was around ₹ 34,992. The results of present study are in conformity with the findings of Joy.

5. CONCLUSION

The results concluded that among variable costs, the costs of human labour were the major

components of the cost in all the selected districts because most of the operations like land preparation, spraying and weeding was done by human labours. Among all the three selected districts, Dharwad district farmers had spent less on total cost of cultivation as compared to other two district farmers. Dharwad district farmers were majorly cultivating wheat under rain-fed conditions and using traditional varieties. In contrarily, the other two district farmers were cultivating wheat under irrigated conditions and using high-yielding varieties. High yielding varieties require more quantity of input hence the cost also increases accordingly. The farmers of Belagavi and Vijayapura district are evidenced by higher gross and net returns in comparison with the farmers of Dharwad district. The cumulative effect was reflected in higher benefit cost ratio in Belagavi and Vijayapura district (1.72 and 1.45) as compared to Dharwad district (1.47). These differences mainly occurred due to differences in yield and cost of cultivation of respective districts. Lack of labour and high cost of labour was the major problem in wheat cultivation. Hence, boosting up the mechanization may help to reduce the cost of cultivation. Using custom hiring centres and farmer producer organization approaches would better augment the mechanization in the wheat economy [10].

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:
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