Journal of Agricultural Development and Policy, 2024
Volume 34, No. 2, 269-273
https://doi.org/10.63066/23220457.34.2.011

NAAS - 4.34
UGC CARE List Journal

Economics of Basmati Rice Cultivation in Punjab

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ABSTRACT

India witnessed a noticeable surge in basmati rice production attributed to the expansion of cultivation areas, improved yield and increased demand in international market. Present study examined the economic aspects of basmati rice cultivation in Punjab, India. Results revealed that the average size of operational holdings per household was 14.1 acres. Pusa 1509 and Pusa 1121 varieties of basmati rice were majorly grown by farmers. The total variable cost for cultivating basmati rice was estimated at Rs. 18261 per acre and the average market price was valued at Rs. 3450 per quintal. Gross returns and net returns were estimated at Rs. 74520 and Rs. 56259 per acre, respectively. Basmati rice is more profitable from farmers point of view as farmers fetch better prices of their produce due to the high demand in the international market. Therefore, there is a need to promote basmati rice in the state. This will ultimately boost the country's export and will help to boost the Indian economy.

Keywords: Punjab, Basmati, Costs and returns, Economics

JEL Classification: Q12, Q10, Q18

Introduction

Basmati rice holds a distinguished position in the realm of rice cultivation, being native to the Indian subcontinent and nurtured by farmers for over 250 years (Siddiq *et al.,* 2012). It is mainly grown in the north-western Himalayan region of India and is known for its long, aromatic grains that double in size when cooked, creating a fluffy texture and delightful flavour (Malik and Summit, 2019). In India, basmati rice has historically been cultivated in Punjab, Haryana, Western Uttar Pradesh, Himachal Pradesh, Uttarakhand, and the Jammu and Kathua districts of Jammu and Kashmir (Singh and Singh, 2009). The top three Indian basmati cultivating states namely Punjab, Haryana and Uttar Pradesh, contribute about 95 per cent of total basmati cultivation in the country (Ebram *et al.,* 2021).

India stands as the primary producer of basmati rice, accounting for approximately 70 per cent of global production, while the remaining share comes from countries like Pakistan, Philippines and China (Sidhu *et al.,* 2014). Within India, basmati rice constitutes nearly 6 per cent of the total rice production (Kumar, 2019). Punjab and Haryana collectively contribute more than 75 per cent of total basmati rice produced in India (GoI, 2018). During 2016, Punjab produced 2.80 million tonnes of basmati rice, while Haryana yielded 2.34 million tonnes in the same year. The total production of basmati rice in India reached 6.16 million tonnes during the same year (Kumar, 2019). The major basmati rice growing districts of Punjab like Amritsar, Tarn Taran, Sri Muktsar Sahib, Gurdaspur, Kapurthala, Hoshiarpur and Patiala are renowned for basmati rice cultivation with varieties such as Basmati 370, PB 3, PB 1121 and PB 1509.

India is a major exporter of basmati rice at a global level, followed by Pakistan. Over time, traditional basmati rice varieties like Basmati 370, basmati 386, Taraori Basmati, Dehraduni, Ranbir basmati and kernel (Pakistani) have evolved into newer variants like PB 1121 and PB 1509, with the introduction of Pusa 1121 significantly boosting India's basmati export industry (Ebram *et al.,* 2021). Following the launch of Pusa 1121 in 2005 by the Indian Agricultural Research Institute, the Indian basmati export sector experienced a significant surge in its overall export volume. The premium price and strong demand in both domestic and international markets (Bhattacharjee *et al.,* 2022) motivated Indian farmers to extend the area under basmati rice. After the introduction of Pusa 1121, export figures soared from 1 billion USD to 3 billion USD, marking a threefold increase (Bilja and Sirohi, 2019). Middle East countries, Europe and United States are the primary markets that demand a substantial amount of Indian basmati rice (Mahajan *et al.,* 2018; GoI, 2023). Keeping in view the importance of basmati rice for the country at large and the

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state in particular, it is pertinent to examine the economics of basmati rice cultivation in the state to determine whether it is a profitable venture from the farmers' point of view. In the light of the above-mentioned facts, the present study was carried out to analyze the costs and returns of basmati rice cultivation in Punjab state.

Data Sources and Methodology

Primary data pertaining to crop year 2022-23 were collected from basmati rice growers in the state. For the selection of basmati growers, three stage random sampling technique was used. Two districts namely Amritsar and Sri Muktsar Sahib having the highest area under basmati rice were selected purposively at the first stage. At the second stage, two blocks were chosen randomly from each district viz. Amritsar I and Tarsikka from Amritsar district; Malout and Gidderbaha blocks from Sri Muktsar Sahib district. From each selected block two villages were selected randomly. The list of farmers cultivating basmati rice in the selected villages was prepared and 20 farmers cultivating basmati rice were randomly selected from each village. A sample of 160 basmati growers were selected from Sri Muktsar Sahib and Amritsar district randomly, comprising of 20 small (up to 5 acres), 58 semi-medium (5 to 10 acres), 66 medium (10 to 25 acres) and 16 large farmers (above 25 acres). Data were collected for the year 2022-23. Descriptive analysis such as frequencies, per centages, simple averages was computed to fulfil the objectives of the study.

Results and Discussion

Profile of Farmers

The socio-economic background of farmers significantly influences their choices regarding the adoption of new production technologies/techniques, their capacity to bear risks, investment decisions and more (Kaur *et al.,* 2017). Table 1 provides an overview of the socio-economic characteristics of selected basmati growers. The analysis revealed that the average age of basmati growers was 44 years. A majority of growers had educational qualifications up to matric (65%), while 24.4 per cent of farmers were educated at the senior secondary level and above. Approximately one-tenth of the total farmers were illiterate. The average size of operational holdings per household was 14.1 acres, whereas the average size of operational holdings in Punjab is 8.94 acres (GoP, 2022). Thus, the size of operational holdings of basmati growers is comparably larger than the average holding of Punjab farmers. The average experience of households in farming was 25 years and 1.7 members per household were working in agriculture.

Cropping Pattern and Variety-wise Area under Basmati Rice

Over the last two decades, basmati rice has undergone significant changes in international demand due to increased domestic growth, improved quality and competitive pricing of basmati rice. In the realm of rice cultivation, there have been significant advancements in breeding, such as the creation of hybrids and the doubling of basmati rice yields. A greater per centage of varieties developed in more recent times exhibit superior grain quality (Pal, 2017). The importance of basmati rice in the cropping pattern and variety-wise area under basmati rice is demonstrated in Table 2. Among kharif crops, paddy, basmati rice and kharif fodder are the important ones cultivated in Punjab. Both paddy and basmati rice together occupied about 45 per cent of Net Sown Area (NSA), while kharif fodder occupied merely 0.80 per cent of NSA. The contribution of basmati rice was nearly one-fourth of NSA. Among rabi crops, wheat occupied about 42 per cent of NSA, while rabi fodder occupied about 0.80 per cent. The contribution of other crops such as mustard, pea, potato, zaid maize and vegetables was about 11 per cent of NSA.

As far as variety-wise area under basmati rice is concerned, the highest acreage of basmati rice was observed under Pusa 1509, accounting for 17.7 per cent of NSA and 2.5 acres of land per household, followed by Pusa 1121, comprising 14.2 per cent of NSA and 2 acres of land per household. Other varieties preferred by farmers were Pusa 1718, covering about one-tenth of the area, while Pusa 1692,

Table 1: Socio-economic characteristics of sampled households, Punjab, 2022-23

S. No.	Particulars	Number	Per centage
1.	Average age (years)	44.0	-
2.	Education		
	a) Illiterate	17.0	10.6
	b) Up to matric	104.0	65.0
	c) 10+2 and above	39.0	24.4
3.	Size of operational holdings (acres)	14.1	-
4.	Average experience in farming (years)	25.0	-
5.	Average number of members working in agriculture (households)	1.7	-

Table 2: Cropping pattern and variety wise area under basmati rice of sampled farmers, Punjab, 2022-23

	Particulars	Average area (acres)	% NSA*
A.	**Cropping pattern**		
	Paddy	6.4	21.5
	Basmati rice	7.0	23.5
	Kharif fodder	0.2	0.8
	Wheat	12.6	42.1
	Rabi fodder	0.2	0.8
	Others#	3.4	11.3
B.	**Variety wise area under basmati rice**		
	Pusa 1718	1.5	10.6
	Pusa 1121	2.0	14.2
	Pusa 1692	0.7	5.0
	Pusa 1509	2.5	17.7
	PB 1401	0.2	1.4
	PB-7	0.3	2.1
	Average area	7.2	51.1

*#others include mustard, pea, potato, zaid maize, vegetables; *Net Sown Area*

Pusa 1401 and PB-7 were grown on much lesser areas by farmers. In terms of the average yield of basmati rice, it was about 22 quintals per acre, while it ranged between 19 quintals per acre to 24 quintals per acre for all basmati varieties grown. Among different varieties, the varieties like PB-7, PB 1401, Pusa 1509 and Pusa 1692 had yields around 23 quintals per acre, while Pusa 1121 had the lowest yield of 19 quintals per acre. In total, basmati rice was grown on an average area of 7.2 acres, which accounts for 51.1 per cent of the net sown area and is approximately half the average size of operational land holdings (14.1 acres).

Operational Cost and Returns of Basmati Rice Cultivation

The operational cost of basmati rice cultivation per acre is portrayed in Table 3, which includes expenses such as land preparation, nursery raising, transplanting, fertilizers, plant protection chemicals, harvesting, miscellaneous costs and interest on working capital. Each input includes the expense of labour used for that particular operation. The total operational cost of cultivating basmati rice was estimated at Rs. 18,261 per acre. Land preparation accounted for around one-fifth of the total operational cost, but in value terms, the cost was Rs. 3,565 per acre, emphasizing the initial investment required to prepare the land for cultivation. Nursery raising incurred various expenses, including seed cost, fertilizers, agrochemicals and labour, collectively estimated at Rs. 1,852 per acre. Among the different operational cost components, the highest expenditure was incurred on transplanting, which accounted for nearly one-fourth (23.4% to be more precise) of the total operational cost; transplanting is more labour-intensive. About one-third of the total expenditure was allocated to fertilizer application and plant protection chemicals. The cost of harvesting was estimated at Rs. 1,655 per acre, while miscellaneous costs, covering extra labour and machinery repair, amounted to Rs. 925 per acre. The interest on working capital (calculated at 5% per annum) for three months was estimated at Rs. 222 per acre.

Returns on Basmati Rice Cultivation

The profitability of any crop grown by farmers depend on both the yield obtained during harvesting and the price received for the produce at the time of marketing. Due to superior quality and taste, basmati rice fetches a higher price compared to non-basmati rice in both international and domestic markets (Kaur *et al.,* 2016; Malik and Summit, 2019). The information regarding net returns of basmati rice cultivation is presented in Table 4. The average price realized by basmati growers stood at Rs. 3,450 per quintal and the

Table 4: Returns on basmati rice cultivation in Punjab, 2022-23

Particulars	Value
Variable costs (Rs/acre)	18261
Price (Rs/q)	3450
Yield (q/acre)	21.6
Gross returns (Rs/acre)	74520
Net returns (Rs/acre)	56259

Table 3: Operational costs of basmati rice cultivation in Punjab, 2022-23

Sr No.	Particulars	Cost (Rs./acre)	Share (%)
1.	Land preparation	3565	19.5
2.	Nursery raising		
	a) Seed	775	4.2
	b) Fertilizer	471	2.6
	c) Agrochemicals	606	3.3
3.	Transplanting	4279	23.4
4.	Fertilizer application		
	a) Urea	522	2.9
	b) DAP	650	3.6
	c) Muriate of Potash	340	1.9
	d) Zinc Sulphate	400	2.2
5.	Plant protection chemicals		
	a) Insecticide	1910	10.4
	b) Fungicide	1323	7.2
	c) Herbicide	618	3.4
6.	Harvesting	1655	9.1
7.	Miscellaneous (extra labour, machinery repair, etc.)	925	5.1
8.	Interest on working capital @ 5% per annum for 3 months	222	1.2
	Total	**18261**	**100.0**

Note: Labour cost is included in the operational costs

average productivity of basmati rice was 22 quintals per acre. Gross returns and net returns were estimated at Rs. 76,590 and Rs. 58,329 per acre, respectively. The benefit-cost ratio was calculated at 4.07:1, clearly indicating that basmati rice cultivation remained a profitable venture for farmers during the study period.

Conclusion and Policy Implications

India leads globally in the production of basmati rice, constituting roughly 70 per cent of the total output. In India, Punjab emerges as a significant contributor to basmati rice production. It is concluded that the middle-aged farmers prefer basmati rice cultivation in Punjab, as the majority of farmers in the study area have studied up to matric level. The average size of operational holdings per household of selected basmati growers was comparatively higher (14.1 acres) than the state's average landholding (8.9 acres), which clearly indicates that the majority of large farmers prefer to grow basmati crop in the study area. The major proportion of the area is allocated under Pusa 1509 and Pusa 1121 varieties of basmati rice. The total operational cost of basmati rice cultivation was estimated at Rs. 18,261 per acre. Among different operational cost components, land preparation and transplanting contributed higher to the total operational cost, together accounted for 43 per cent. The average price realized by basmati growers stood at Rs. 3,450 per quintal. Gross returns and net returns were estimated at Rs. 76,590 and Rs. 56,329 per acre, respectively. Basmati rice is more profitable from farmers point of view as farmers fetch better prices of their produce due to the high demand in the international market. Therefore, there is a need to promote basmati rice in the state. This will ultimately boost the country's export and will help to boost the Indian economy.

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Received: October 08, 2024 Accepted: November 25, 2024

APPENDIX

Table 1A: Average yield of different basmati rice varieties, sampled farmers, Punjab, 2022-23

Variety	Average yield (qtls/acre)
Pusa 1718	20.8
Pusa 1121	19.1
Pusa 1692	24
Pusa 1509	23.7
PB 1401	23.1
PB-7	23
Average	22.2