Economic Dimensions of Mustard Cultivation under Sprinkler Irrigation in Southern Haryana

Abstract

In the present paper an attempt has been made to study the economic analysis of mustard crop grown under sprinkler irrigation system in southern Haryana. Multistage random sampling technique was used for the selection of sample farmers. At the first stage, Bhiwani and Rewari districts were chosen based on the high rate of adoption of sprinkler irrigation system. From each district then, two blocks i.e., Tosham and Loharu from Bhiwani district and Khol at Rewari and Nahar blocks from Rewari district were selected purposively. Further, two villages from each block and fifteen farmers from each village were taken for study. The primary data from 120 farmers were collected by personal interviews with the help of a specially designed schedule. Information regarding cost and returns of mustard crop were gathered from sampled farmers for the year 2021-22 and the net return was worked out accordingly. The total variable cost incurred for cultivation of mustard accounted for ₹28767.98 and ₹33178.23 in Rewari and Bhiwani districts, respectively. Total cost incurred was ₹66243.33 and ₹70321.22 in Rewari and Bhiwani district, respectively. Farmers got higher net returns in Rewari district (₹22902.23) as compared to Bhiwani district (₹19364.07). The B:C ratio over total cost in Rewari, Bhiwani and overall were 1.34, 1.27 and 1.30, respectively.

Keywords: B:C ratio - Economic analysis – Mustard - Net return - Sprinkler irrigation system

Introduction

Oilseeds occupy a very important position in the agricultural economy of the country. They constitute an important group of commercial crops in India. The oil extracted from oilseeds form an important part in our diet and is used as raw material for manufacturing a large number of items such as paints, varnishes, hydrogenated oil, soaps and lubricants etc. Oil cakes which is residual after the oil is extracted from the oilseeds form a very important cattle-feed and manure.

Indian vegetable oil economy is world's fourth largest after USA, China and Brazil. Next to food grains, oilseeds play the second most important role in area and production in the Indian agricultural economy. Total oilseeds production in the country during 2021-22 is estimated at 37.70 million tonnes with an area of 291.67 lakh hectares which is higher by 1.75 million tonnes than the production of 35.95 million tonnes during 2020-21. The country produces groundnut, soybean, sunflower, sesamum, niger seed, mustard and safflower oilseeds. The state of Rajasthan in India had the highest production volume of oilseeds of over 7.9 million metric tons in fiscal year 2021. This was followed by Maharashtra with over 6.7 million metric tons of oilseed production in that year. Other leading producers are Madhya Pradesh, Maharashtra, Gujarat and Haryana.

Irrigation is most critical input for enhancing productivity as well as crop intensity of the crops (Vaidyanathan *et al.*, 1994) and therefore expansion of irrigation has been key strategy

in the development of agriculture sector in the country. Water is becoming a scarce input particularly in semi-arid regions owing to climate change, persistent drought, increased water demand on irrigated surface, excessive growth of population and socio-economic development (Kharrou *et al.*, 2011, Buttar *et al.*, 2006). Besides, water unavailability throughout the growing season is a threat for agricultural productivity and food security (Li *et al.*, 2010), as it creates extreme pressure on ground water resources. To cope with this, efficient utilization of available water resources is necessary to minimize this loss of irrigation. In this study sprinkler irrigation system is chosen for efficient water management. It is a scientific tool for judicious use of irrigation water promoting water conservation technology. The conveyance and distribution losses are reduced to minimal under this system resulting in greater water use efficiency. The sprinkler method of irrigation saves water by 30-60 per cent and can irrigate much more area than surface irrigation. It also eliminates channels and land levelling and more land is available for crop production. By adopting this system, cultivation of water intensive remunerative crops can be extended to a larger area for higher yield. Farmers also maintain moisture and temperature to protect crops from severe cold/frost in winter season by applying light irrigation to crops. Moreover, this technology helps in removal of insect eggs and dust materials from plants, which helps in keeping insect population below threshold level and increases photosynthesis activity.

Keeping in mind all the things, this study was planned with the objective to study the economic analysis of mustard cultivation under sprinkler irrigation system.

MATERIALS AND METHODS

Multistage sampling design was adopted in selection of districts, blocks, villages and mustard growers. In the first stage, Bhiwani and Rewari districts of Haryana state were selected purposively for the study, on the basis of high rate of adoption of sprinklers due to scarcity of water. From each district, two blocks with highest number of sprinklers were purposively chosen for study. From the selected blocks in each district, a list of all the villages in a block where sprinkler irrigation system was used by the farmers was prepared separately and two villages from each block was selected randomly for further sampling. A total of 120 mustard growers were selected for study. For collection of information from farmers, a well-structured interview schedule was prepared after detailed discussion with farmers and scientists working in the department of university. The relevant information pertaining to cropping pattern, source of irrigation, inputs used, output attained, prices of inputs and output as well as factors which constrains the production of mustard for the year 2021-22 was extracted through interaction with selected farmers. The analytical techniques like average, percentage, costs, returns, Benefit-Cost ratio (B:C ratio) etc. were employed to draw valid inferences from the study.

Analytical tools

To achieve the study's goals, the collected data was analyzed using various formulas and statistical tools:

- Gross return = Main product value + By product value
- Return over variable cost = Gross return – Total variable cost
- Return over total cost (Net return) = Gross return – Total cost

- B:C Ratio = Gross return/Total cost
- Cost of production per quintal without by-product = Total cost/Main product quantity in quintals
- Cost of production per quintal with by-product =

$$Total\ cost * \frac{Gross\ return - Value\ of\ by\ product}{Main\ quantity * Value\ of\ gross\ return}$$

Results and Discussion

Comparative economic dimensions of mustard cultivation under sprinkler irrigation in selected districts were done on per hectare basis. Result pertaining to cost details of mustard in Rewari and Bhiwani district is shown in table 1. The results shows that total cost spent in growing mustard in Bhiwani district (₹70321.22/ha) is higher than the cost incurred in Rewari district (₹66243.33/ha). Total variable cost constituted for 47.18 per cent (₹33178.23/ha) and 43.42 per cent (₹28767.98/ha), in Bhiwani and Rewari district, respectively of total cost incurred in the cultivation of mustard. The overall average for both the districts for variable cost and total cost observed to be ₹30973.10 and ₹68282.30. Overall average of principal components of variable cost in decreasing order are harvesting cost, preparatory tillage, threshing and total fertilizer investment contributing 7.84, 7.48, 5.70 and 5.61 per cent, respectively of the total cost. While in fixed cost these were rental value of land, management charges, risk factor and transportation charges contributing 43.40, 4.53, 4.53, and 2.15 per cent, respectively.

Returns from mustard cultivation in Bhiwani and Rewari district shown in the table 1 shows that yield of mustard obtained to be 18.44 and 18.18 quintal per hectare respectively. Whereas, gross return received in Bhiwani district were found to be ₹89685.29 and in Rewari it was obtained ₹89145.56 per hectare. While, net returns in Rewari district (₹22902.23/ha) were estimated to be higher compared to Bhiwani district (₹19364.07/ha). The benefit cost ratio (B:C ratio) for Rewari and Bhiwani district were recorded to be 1.34 and 1.27, respectively.

The results obtained in the study are similar to the study conducted by Thakur S. (2010), Sunita (2012), Parmar *et al.* (2016), Sonvanee and Pathak (2016), Kumar et al., (2017), Sahu *et al.*, (2018) and Pawar *et al.*, (2020).

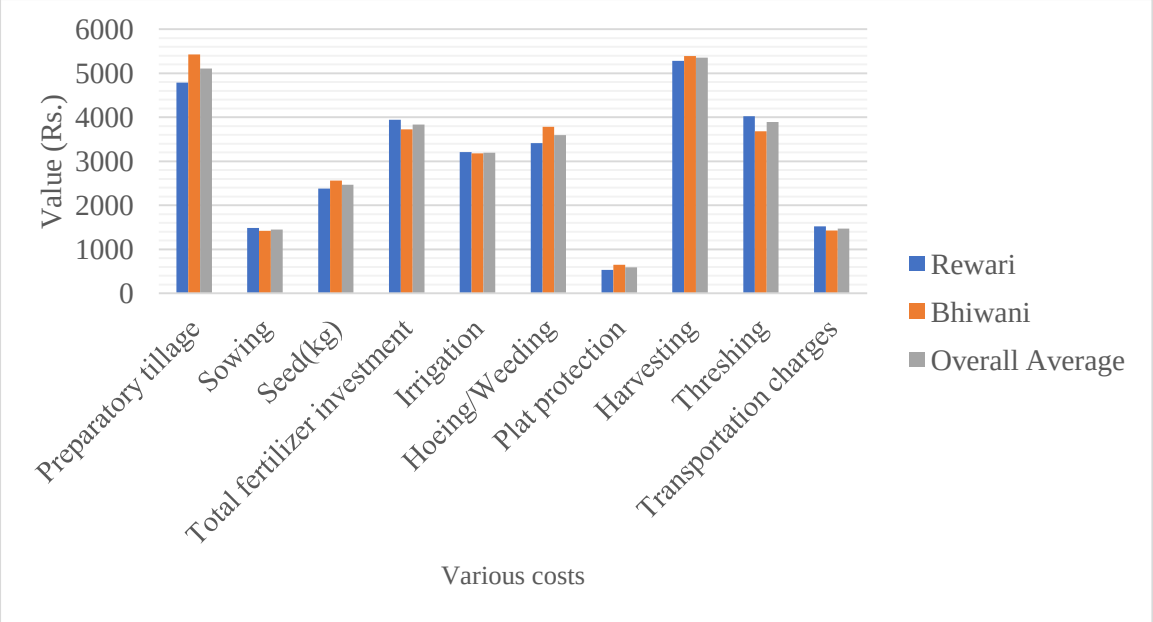

Fig. 1: Share of various costs in mustard cultivation in southern Haryana

Conclusion

It is concluded that sprinkler irrigation system is found to be efficient irrigation system in the study area. The per hectare gross return, net return, and B:C ratio of mustard cultivation were found to be ₹89685.29, ₹19364.07 and 1.27, respectively in Bhiwani district whereas, ₹89145.56, ₹22902.23, and 1.34 in Rewari district, respectively. The study also revealed that B:C ratio is greater than one in both the districts which indicates sprinkler irrigation system to be economically feasible. So, it is suggested that this method of irrigation should be promoted in water scarce regions as much as possible.

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Table 1 Comparative economic analysis of mustard crop grown under sprinkler irrigation system in southern Haryana (₹/ha)

Sr. No.	Particulars	Rewari district			Bhiwani district			Overall Average		
		No./Qty	Value	Per cent	No./Qty	Value	Per cent	No./Qty	Value	Per cent
1	Preparatory tillage	4.52	4790.32	7.23	4.68	5426.47	7.71	4.60	5108.40	7.48
2	Pre sowing irrigation		1235.29	1.86		1183.87	1.68		1209.58	1.77
3	Sowing		1483.87	2.24		1422.79	2.02		1453.33	2.12
4	Seed (kg)	3.02	2380.24	3.59	3.20	2561.02	3.64	3.11	2470.63	3.61
5	Total Fertilizer Investment	242.32	3944.25	5.95	227.91	3729.56	5.30	235.11	3836.91	5.61
6	Irrigation	2.77	3208.06	4.84	2.52	3178.67	4.52	2.64	3193.37	4.67
7	Hoeing/Weeding	1.24	3412.83	5.15	1.68	3784.08	5.38	1.46	3598.46	5.26
8	Plant Protection	0.33	537.50	0.81	0.75	647.72	0.92	0.54	592.61	0.86
9	Harvesting		5282.25	7.97		5389.70	7.66		5353.98	7.84
10	Threshing		4024.19	6.07		3683.82	5.23		3894.01	5.70
11	Interest on working capital @7%		1882.01	2.84		2170.53	3.08		2026.27	2.96
12	Total Variable Cost		28767.98	43.42		33178.23	47.18		30973.10	45.36
13	Management Charges		2876.79	4.34		3317.82	4.71		3097.31	4.53
14	Risk factor		2876.79	4.34		3317.82	4.71		3097.31	4.53
15	Transportation charges		1520.16	2.29		1426.47	2.02		1473.32	2.15
16	Rental value of land		30201.61	45.59		29080.88	41.35		29641.20	43.40
17	Total costs		66243.33	100		70321.22	100		68282.30	100

18	Production (Qtl)									
	Main	18.18	84835.08		18.44	85751.47		18.31	85293.30	
	By-product		4310.48			3933.82			4122.15	
19	Gross return		89145.56			89685.29			89415.40	
20	Return over variable cost		60377.58			56507.06			58442.30	
21	Net return		22902.23			19364.07			21133.20	
22	Cost of production									
	With by-product		3312.16			3586.38			3550.67	
	Without by-product		3643.74			3813.51			3728.63	
23	B:C Ratio		1.34			1.27			1.30	