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Economic Benefits and Constraints in Muskmelon Cultivation in Haryana

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Abstract

The study was conducted in Jhajjar and Karnal districts of Haryana to assess the economic viability of muskmelon cultivation. A total of 80 responses were collected from the selected districts. The overall cost of cultivation was higher in Karnal district Rs.1,71,363.45/ha as compared to Jhajjar district Rs.1,49,600.25/ha due to the intensive use of inputs especially high-quality seed, plastic mulching, and high use of fertilizers, in the former. The muskmelon cultivation is a human labour-intensive enterprise involving both hired and family labour. The gross returns were Rs.2,22,143.03 and Rs.2,72,132.25 per hectare, while the B-C ratio was calculated to be 1.48 and 1.59, in Jhajjar and Karnal districts, respectively. The results concluded that muskmelon cultivation is a beneficial enterprise for farmers in both Jhajjar and Karnal districts. The main constraints faced by farmers were disease and pest attack incidences and unfavorable weather conditions, others being a lack of timely market information.

Keywords: Muskmelon, Economic Analysis, Constraint, Production, Benefit-Cost Ratio

JEL classification: Q12, Q22

Introduction

Muskmelon (*Cucumis melo* L.), a member of the Cucurbitaceae family, is an important *zaid* crop grown in the tropics and is also known as sweet melon, *kharbuj, bachang*, and *chira, chiral, melonegurke, velapalam, sakkartoti* in different parts of India. As per nutritional analysis, muskmelon fruit have an edible portion that is composed of 95.0 per cent water, 0.3 per cent protein, 0.3 per cent minerals, 3.5 per cent carbohydrates, and provides an energy value of 17 kcal. It also contains 11 mg of calcium, 0.02 mg of thiamine, 0.04 mg of riboflavin and 1 mg of ascorbic acid per 100 gm of an edible portion (Gopalan *et al.*, 1984). Muskmelons are widely cultivated throughout India, mainly for use as a dessert fruit.

Muskmelon acreage in the world stood at 1.07 million ha area of which 75 thousand ha area was in India while the global muskmelon production reached 28.6 million tons and 1.47 million tons in India (FAO, 2021). The major producers of muskmelon are China, India, Türkiye, Iran and Kazakhstan (FAO, 2020). India's exports of muskmelon in 2021-22 stood at 4,215.77 metric tons and fetched $3.01 million or Rs.22.67 crore as income showing year-on-year growth of 17.92 per cent in quantity exported and 100 per cent in revenue fetched, with major exports to UAE, Qatar, Oman and Jordan (APEDA, 2022). The states with highest acreage under muskmelon cultivation in India are Uttar Pradesh, Andra Pradesh, Madhya Pradesh, Punjab and Haryana with production levels following the same pattern (GoI, 2023). The districts with the highest acreage under muskmelon in Haryana state are Karnal, Jhajjar, Mewat, and Panipat (GoH, 2022).

The demand for muskmelon in the summer season is very high and muskmelon cultivation can be a source of quick income for farmers due to the short duration crop cycle. The farmers can sow muskmelon crops just after rabi vegetables during January or February and the crop will be ready to harvest in April and throughout May. This gives farmers an attractive enterprise that does not require much input and readily gives a return on investment in a very short period. Muskmelon cultivation is a profitable enterprise for the farmers (Yilmaz et al., 2011; Mohammed, 2011 and Adeoye et al., 2020). The present study aims to analyze the costs and returns associated with the muskmelon cultivation which is crucial for understanding the market dynamics and potential profitability for the crop. By examining the costs incurred by farmers on the basis of their farm size, cost of different inputs like seeds, irrigation, fertilizers, etc. gives a wholesome picture of the muskmelon cultivation. The costs associated with different activities, both human and machine labour gives us proper information and helps the farmers to optimize their resources as per requirements.

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Data Sources and Methodology

The results of the present study were obtained through the following methodology. The data from the identified areas were collected on a pre-tested interview schedule. The primary data for 2022-23 was collected from 80 farmers through a survey method. Jhajjar district was selected from the western zone of Haryana based on the highest area which was 900 ha and production which was 23,820 MT of muskmelon, whereas, from the eastern zone, Karnal district with 880 ha area and 11,620 MT production (GoH, 2022), was selected. In next stage, four villages from each district were selected based on higher acreage under muskmelon. From Jhajjar district, Dhakla, Chandol, Nilaheri and Surajgarh villages were selected while from Karnal district, Shyamgarh, Rambha, Kunjpura and Gharaunda were selected. In the final stage, ten farmers from each village were selected randomly via chit method, thus making a sample size of total 80 farmers.

The selected respondents were divided into five classes based on their land holding *viz.* marginal (less than 1 ha), small (1-2 ha), semi-medium (2-4 ha), medium (4-10 ha), and large (more than 10 ha) (GoI, 2014). In later stages, for a better understanding of the economics of muskmelon production, respondents were divided into four categories *viz.* marginal (less than 1 ha), small (1-2 ha), medium (2-5 ha) and large (more than 5 ha) farmers based on the size of respondents in each class. To determine the cost and returns structure of the muskmelon crop, of the following concepts, tools, and techniques were used:

Total variable cost: The variable cost includes expenditure on variable inputs such as human labor, machine labor, seeds, manures, fertilizers, pesticides and herbicides, irrigation, application costs, and miscellaneous expenses. Additionally, the total variable cost also accounted for ten per cent per annum[1] for interest in working capital (GoI, 2023) to further enhance the accuracy of the estimation.

Total fixed cost: The fixed costs include components such as land rental value, transportation expenses, management costs, and risk factors. In this analysis, the cost of management and risk factor was specifically considered to be ten per cent of the total variable cost (GoI, 2023).

Gross returns or valuation of output: The output was valued using the selling price of muskmelon sold by the farmer:

$$GI=P \times Q$$

where, GI= Gross Income or Returns; Q = Quantity of muskmelon sold; P = Price on which muskmelon sold

Net return over variable cost: To calculate the net return over variable cost, the variable cost was subtracted from the gross returns.

Net return over variable cost=Gross retuns-Total varaible cost

Net returns over total cost: Net returns refer to the profit or financial gain obtained from agricultural activities after deducting all relevant costs and expenses. Net returns are obtained after deducting the total variable and total fixed cost from the gross returns.

Net returns=Gross returns-Total cost

Cost of production: The cost of production is the total or overall cost incurred for the production of one unit of the produce. Generally, cost of production is represented as the cost incurred for production of one quintal of produce.

Benefit-cost ratio: The benefit-cost ratio is calculated by dividing the gross returns by the total cost. B-C ratio value greater than one indicates positive returns and profitable enterprise while a value less than one suggests inefficiency and loss-making enterprise. The benefit-cost ratio serves as a valuable tool for decision-making, enabling the assessment of the economic merits of the investment.

Garret ranking for constraints in production practice: To analyze the responses and prioritize the constraints, the responses from farmers pertaining to the particular problems were organized in a tabular format. The Garrett ranking technique was then applied to assess the significance of each constraint by giving each constraint a per cent position (Hull, 1922). The per cent position was obtained by using the following formula;

$$\text{Per cent position} = \frac{R_{ij}-0.5}{N_j} \times 100$$

where,

R_{ij} is rank given to i^{th} variable by j^{th} respondent

N_j is number of variables ranked by j^{th} respondent

The Garrett score, on scale of hundred, was obtained from Garrett table (Garrett and Woodworth, 1926) based on per cent position for each constraint from the total sample. The mean of Garret score was obtained and finally the rank was given to each constraint.

Results and discussions

Cost and Returns Structure of Muskmelon Production

The economics of muskmelon cultivation was performed for the year 2022-23 and a brief breakup of major costs is given in Table 1 and Table 2. In Jhajjar district, as shown in Table 2, medium farmers had the highest per-hectare cost of production of Rs.1,53,222.48, followed by marginal farmers at Rs.1,49,587.33, small farmers at Rs.1,48,211.78 and large farmers at Rs.1,47,379.45. In terms of returns, large farmers had the highest gross returns per hectare (Rs.2,49,543.43), followed by medium farmers (Rs.2,22,656.25), small farmers

[1]taken 3.5% for the muskmelon crop having duration of 3-4 months

(Rs.2,10,923.55), and marginal farmers (Rs.2,05,448.9). These differences in gross returns can be attributed to higher productivity on large farms (153.1 qtls per ha) than medium (148.45 qtls per ha), small (143.18 qtls per ha) farms and marginal farms (132.83 qtls per ha) plus prevailing prices in Jhajjar district market during the specific days in the season.

Similarly, in the Karnal district, large-scale farmers incurred the highest per-hectare costs in cultivating muskmelon, totaling Rs.1,77,547.30, followed by small farmers at Rs.1,72,195.50, medium farmers at Rs.1,71,152.28, and marginal farmers incurring the least costs at Rs.1,64,558.78. On average, large farmers in Karnal generated the highest gross returns per ha, totaling Rs. 2,95,620.00, while medium farmers generated Rs. 2,81,111.10, small farmers accrued Rs. 2,58,825.00, and marginal farmers generated Rs.2,52,973.23. The findings are in resonance with Tale (2015). This difference in earnings can be attributed to the higher production levels on large farms (189.50 qtls per ha) relative to medium (185.00 qtls per ha), small (178.50 qtls per ha), and marginal farmers (174.48 qtls per ha), in conjunction with the prevailing market prices.

The study further revealed that, overall, in terms of expenditures, both variable and fixed costs were higher in the Karnal district compared to the Jhajjar district (Table 1). The cost of seed accounted for the highest share among variable costs in both Jhajjar (18.71%) and Karnal (17.25%)

Table 1. Overall cost and returns of muskmelon

S No	Particulars	Jhajjar (Rs.)	Karnal (Rs.)
1	Pre-sowing	11,601.35 (7.75)	11,378.03 (6.64)
2	Sowing	2,556.63 (1.71)	2,570.18 (1.50)
3	Seed	27,987.28 (18.71)	29,567.88 (17.25)
4	Fertilizers & Manures	10,727.65 (7.17)	16,747.25 (9.77)
5	Irrigation	7,501.20 (5.01)	7,608.90 (4.44)
6	Weeding and Plant protection	10,122.73 (6.77)	9,797.43 (5.72)
7	Harvesting	7,185.03 (4.80)	7,576.70 (4.42)
8	Miscellaneous Charges	1,246.10 (0.83)	1,256.58 (0.73)
9	Total Variable	88,812.23 (59.37)	97,448.98 (56.87)
10	Management & Risk Charges	17,762.45 (11.87)	19,489.80 (11.37)
11	Transportation	4,604.65 (3.08)	4,637.98 (2.71)
12	Rental Value of Land	38,420.93 (25.68)	49,786.70 (29.05)
13	Total Cost	1,49,600.25 (100.00)	1,71,363.45 (100)
14	Production (q)	139.33	181.88
15	Gross returns	2,22,143.03	2,72,132.25
16	Returns over variable cost	1,33,330.83	1,74,683.35
17	Net returns	72,542.78	1,00,768.88
18	Cost of production (₹/q)	2684.50	2355.60
19	BC Ratio	1.48	1.59

Value in parentheses depicts percentage share

Table 2. Cost and returns in muskmelon production by different categories of farmers

Category of farmers	Jhajjar			Karnal		
	Total Cost (Rs.)	Gross returns (Rs.)	B-C ratio	Total Cost (Rs.)	Gross returns (Rs.)	B-C ratio
Marginal	1,49,587.33	2,05,448.9	1.37	1,64,558.78	2,52,973.23	1.54
Small	1,48,211.78	2,10,923.55	1.42	1,72,195.50	2,58,825.00	1.50
Medium	1,53,222.48	2,22,656.25	1.45	1,71,152.28	2,81,111.10	1.64
Large	1,47,379.45	2,49,543.43	1.69	1,77,547.30	2,95,620.00	1.67

districts. This finding is in coherence with Saediman et al. (2020). The overall cost of production per hectare of growing muskmelon in Karnal district was Rs.1,71,363.45 as compared to Jhajjar district which was Rs.1,49,600.25. This difference is due to the high costs of rent for land in Karnal district (Rs.49,786.70) and lower rates in Jhajjar district (Rs.38,420.93). Farmers also adopt more resource-intensive practices like plastic mulching and excessive fertilizers in Karnal district among others. In addition to this, the gross income was higher in Karnal at Rs.2,72,132.25 per hectare as against Rs.2,22,143.03 per hectare in Jhajjar district. The disparity can be explained by the higher productivity of muskmelon in Karnal district at 181.88 qtls per ha against 139.33 qtls per ha for Jhajjar.

The difference in production levels of the two districts can be attributed to adverse weather conditions, including erratic rains and a lower temperature than optimum of 50-75 mm overall rainfall and 24-29° C temperature during the ripening stage of the crop in Jhajjar district. These conditions led to lower quantities and reduced quality of muskmelon fruit in Jhajjar district during the study period. In Karnal district, more farmers were using plastic mulch as compared to Jhajjar district where farmers usually used crop straw or no mulch at all which reduced their productivity. This finding is in coherence with the study conducted by Rao et al. (2017) on watermelon. The B-C ratio was highest for large farmers in both Jhajjar (1.69) and Karnal (1.67) districts which is in coherence with the findings of Khobarkar et al. (2016) and Adil et al. (2007).

The overall benefit-cost ratio (1.59 in Karnal and 1.48 in Jhajjar district) indicated the profitability of muskmelon cultivation in both districts which aligns with the study conducted by Saediman et al. (2020) and Tale (2015) on melons and Toluwase and Owoeye (2017) on watermelon. It was also revealed in the study that there were differences in irrigation practices, with farmers in the Jhajjar district relying on diesel engines while farmers in the Karnal district used tube wells.

Human and Machine Labour Use Pattern

The tables 3 and 4 show the breakdown of human and machine labour cost for Muskmelon cultivation for Jhajjar and Karnal district, respectively. The highest cost was incurred on hired machinery (Rs.28,930.75/ha in Jhajjar and Rs.28,220.95/ha in Karnal), particularly in preparatory tillage (Rs.18,281.25/ha in Jhajjar and Rs.17,249.00/ha in Karnal), followed by marketing activities. The maximum human labour cost in Jhajjar district was for harvesting (Rs.17,960.95) followed by weeding (Rs.17,003.75) and sowing (Rs.6,339.08) activities. The similar trend was observed in Karnal district as well, harvest costing Rs.19,000.00 followed by weeding activities (Rs.15,808)

Table 3. Human labour cost in production of muskmelon in Jhajjar and Karnal districts (Rs./ha)

S No	Particulars	Jhajjar			Karnal		
		Owned	Hired	Total	Owned	Hired	Total
1	Preparatory tillage	-	-	-	-	-	-
2	Seedbed preparation	-	-	-	-	-	-
3	Sowing	2,080.00	4,271.58	6,339.08	2,080.00	4,352.83	6,432.83
4	Weeding & earthing up	5,822.50	11,181.25	17,003.75	4,626.75	11,181.25	15,808.00
5	Fertiliser application	-	-	844.58	-	-	982.83
7	Application of chemicals	-	-	-	-	-	-
8	Harvesting	9,851.58	8,109.38	17,960.95	10,469.70	8,530.33	19,000.00
9	Marketing (field to market)	2,784.38	669.38	3,453.75	2,698.88	789.63	3,488.50
10	Total	22,717.50	22,040.00	45,602.08	19,875.33	24,854.00	45,712.13

Table 4. Machine labour cost in production of muskmelon in Jhajjar and Karnal districts (Rs./ha)

S No	Particulars	Jhajjar			Karnal		
		Owned	Hired	Total	Owned	Hired	Total
1	Preparatory tillage	4,746.88	18,281.25	23,028.13	5,779.13	17,249.00	23,028.13
2	Seedbed preparation	981.25	3,731.25	4,712.50	1,494.83	3,217.70	4,712.50
3	Sowing	-	-	-	-	-	-
4	Weeding & earthing up	-	-	-	-	-	-
5	Fertiliser application	-	-	-	-	-	-
7	Application of chemicals	1,218.75	1,968.75	3,187.50	1,439.00	2,466.08	3,905.08
8	Harvesting	-	-	-	-	-	-
9	Marketing (field to market)	2,852.50	4,949.50	7,802.00	2,998.95	5,288.20	8,287.13
10	Total	9,799.38	28,930.75	38,730.13	11,711.88	28,220.95	39,932.83

and sowing (Rs.6432.83). In both the districts, harvesting was done mainly by family labour, whereas weeding and sowing of seed were done majorly by hired labour. In both the districts, higher human labour cost indicates that the muskmelon cultivation is a human labour-intensive enterprise.

Constraints Faced by Farmers in Production of Muskmelon

The constraints faced by the farmers in the production of muskmelon is given in Table 5. The biggest problem faced by the muskmelon producers was recorded to be the pest and disease attack incidences followed by unfavorable weather conditions during the ripening season like low temperature and high rainfall. Farmers also faced problems regarding the lack of proper pest and disease management knowledge as well as not updated package practices as given by CCS HAU, Hisar (2013) . Other problems faced by muskmelon producers were recorded to be the high cost of hybrid seeds and unavailability of high-quality seed at proper time as they rely mostly on private seed producers which charge high prices that small and marginal farmers were not able to afford. Some other minor concerns faced by very few farmers were the lack of unavailability of labour during the peak time of crop activities like sowing, weeding, and harvesting, and high labour cost during these periods. These findings are similar to the ones found in studies conducted by Khobarkar et al (2016) on muskmelon in the Akola district of Maharashtra and Kumar et al (2019) on vegetable production in Haryana.

Conclusion and Policy Implications

The overall cost of production per hectare of growing muskmelon was higher in the Karnal district (Rs.1,71,363.45/ ha) as compared to the Jhajjar district (Rs.1,49,600.25/ha) which may be attributed to intensive use of inputs especially high-quality seed, plastic mulching, high use of fertilizers. The muskmelon cultivation is a human labour-intensive enterprise and involves both hired as well as family labour. The net returns from muskmelon cultivation in Jhajjar and Karnal districts were Rs.2,22,143.03 and Rs.2,72,132.25 per hectare, respectively, while net returns were Rs.72,542.78 and Rs.1,00,768.88 per hectare, respectively. The B-C ratio in Karnal district was 1.59 while in Jhajjar district it was found to be 1.48. These results concluded that muskmelon cultivation is a beneficial enterprise for farmers in both the districts of Jhajjar and Karnal. The different problems like pest and disease attack incidences, higher cost of quality

Table 5. Constraints in the production of muskmelon in Jhajjar and Karnal districts

S No	Constraints	Garret Score	
		Mean Score	Rank
1	Incidence of pests and diseases attack	65.07	1
2	Non-favourable weather conditions	64.89	2
3	Lack of adequate technical knowledge regarding pests and diseases	64.29	3
4	Lack of adequate technical knowledge (Agronomic practices for muskmelon cultivation)	58.23	4
5	High cost of quality hybrid seed	54.74	5
6	High cost of plant protection measures	51.72	6
7	Non-availability of quality seed	49.58	7

seeds faced by farmers in the production of muskmelon also hinder in the high productivity. However, there is a need to focus on increasing area and productivity in different districts of Haryana by providing extension services for training on the adoption of efficient agronomic practices like seed rate required, pests and diseases management, etc. In order to further enhance the productivity of the muskmelon crop, it is essential to ensure timely availability of high-quality seeds and other necessary inputs at affordable prices for muskmelon growers. Production of high-quality and diseases and pests resistant seeds by public agencies can reduce costs for farmers and provide them with affordable seeds, supporting their cultivation activities and easing their financial burden. Farmers lack proper and timely information on the crop insurance scheme, *Mukhyamantri Bagwani Beema Yojana* by Govt. of Haryana.

References

Adeoye A S, Jatto K A, Abegunrin O O, Eniola O, and Oke O O 2020. Economic analysis of watermelon production in Ibarapa central local government area of Oyo State, Nigeria. *Journal of Agriculture and Food Environment*, **7**: 35-44.

Adil S A, Chattha M W, Bakhsh K, and Hassan S 2007. Profitability analysis of summer vegetables by farm size. *Pakistan Journal of Agricultural Sciences,* **44**: 184-188.

APEDA 2022. Exports data of India. Retrieved on May 20, 2023, from Agricultural and Processed Food Products Export Development Authority website: https://agriexchange.apeda.gov.in/indexp/Product_description.aspx?hscode=08071910.

CCS HAU, Hisar 2013. *Fruit, Flower and Vegetables: Production and Protection (Package of Practices)* (No. 51/200613/1000/151013). Hisar, India: Publication Cell, Extension Education Directorate.

FAO 2020. FAOSTAT Report. Retrieved May 20, 2023, from Food and Agriculture Organization website: https://www.fao.org/faostat/en/#data.

FAO 2021. FAOSTAT Report. Retrieved May 20, 2023, from Food and Agriculture Organization website: https://www.fao.org/faostat/en/#data.

Garrett H E, and Woodworth R S 1926. *Statistics in Psychology and Education.* Longmans, Green and Co. Chicago.

GoH 2022. Data and Production Report. Retrieved May 20, 2023, from Dept of Horticulture website: https://hortharyana.gov.in.

GoI 2014. *Agriculture Census 2010-11*. New Delhi: Ministry of Agriculture and Farmers' Welfare.

GoI 2023. *Economics and Statistics*. Ministry of Agriculture and Farmers Welfare. Government of India. Retrieved May 14, 2023, from Directorate of Economics and Statistics, MoAFW website: http://eands.dacnet.nic.in/Cost_Concept.

Gopalan C, Ramasastri B V, and Balasubramanian S C 1984. *Nutritive Value of Indian Foods*. National Institute of Nutrition. Hyderabad.

Hull C L 1922. The computation of the Pearson r from ranked data. *Journal of Applied Psychology*, **6**: 385-390.

Khobarkar V, Tale, N, Ingole D N, and Nage G V 2016. Economics of marketing of muskmelon in Akola district. *Indian Journal of Economics and Development*, **12**: 151-153.

Kumar A, Sumit, Yadav M K, and Rohilla A K 2019. Constraints faced by the farmers in production and marketing of vegetables in Haryana. *Indian Journal of Agricultural Sciences*, **89**(1), 153-160

Mohammed B T 2011. Socio-economic analysis of melon production in Ifelodun local government area, Kwara State, Nigeria. *Journal of Development and Agricultural Economics*, **3**: 362- 367.

Rao K V R, Bajpai A, Gangwar S, Chourasia L, and Soni K 2017. Effect of mulching on growth, yield and economics of watermelon (*Citrullus lanatus* Thunb). *Environment & Ecology*, **35**(3d): 2437-2441.

Saediman H, Ode Alwi L A, Rianse I S, Adha Taridala S A, Salahuddin S, Indarsyih Y, and Astuti R W 2020. Comparative profitability of melon and watermelon production in South Konawe district of southeast Sulawesi. *WSEAS Transactions on Business and Economics,* **17**: 933-939.

Tale N S 2015. *Economics of production and marketing of muskmelon in Akola district*. M.Sc. Thesis, submitted to Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola.

Toluwase S O W and Owoeye R S 2017. Cost-benefit analysis of watermelon production in Ekiti state, Nigeria. *Russian Journal of Agriculture and Socio-Economic Studies*, **6**: 307-314.

Yilmaz H, Demircan V, and Kurtluk S 2011. An economic analysis of open-field melon (Cucumis melo L.) production in Cankiri Province of Turkey. *Bulgarian Journal of Agricultural Science*, **17**, 484-490.

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