Biological Forum – An International Journal **15(10): 314-317(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

An Economic Analysis of Sweet Corn (*Zea mays* L.) Cultivation in Sonepat District of Haryana

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(Received: 24 July 2023; Revised: 22 August 2023; Accepted: 20 September 2023; Published: 15 October 2023)
(Published by Research Trend)

ABSTRACT: The present study was conducted in order to estimate the costs and returns in sweet corn production and to identify the constraints in it. The selection of Sonepat was done based on highest acreage under sweet corn in Haryana. The data was collected from the farmers based on pre-structured interview schedule using face-to-face interview method. A sample of 80 farmers were taken using multi-stage purposive-cum random sampling technique in which 20 farmers each from four villages of Rai block was selected based on highest area under the crop. Total cost of cultivation was found to be ₹ 53731.52 acre^{-1} and yield was 64.13 quintal acre^{-1} for all categories of farm on an average while gross returns were ₹ 99466.61 acre^{-1} and net returns were ₹ 45735.08 acre^{-1}. Small farmers had highest cost of cultivation *i.e.*, ₹ 54411.63 acre^{-1} followed by marginal, medium while least in case of large farmers. Medium farmers had highest return *i.e.*, ₹ 102418.97 acre^{-1} followed by large, small and lowest for marginal farms *i.e.*, ₹ 94791.67 acre^{-1}. The major constraints included high cost of seeds as reported by about 82% of farmers followed by problem of stray animals (76%) and the non availability of quality seeds in time (72%). This study provides essential insights into sweet corn production in Sonepat, Haryana, offering valuable cost-return estimations and identifying key constraints. However, limitations include regional specificity and a relatively small sample size.

Keywords: Sweet corn, Costs and returns, Crop diversification, Sonepat

INTRODUCTION

India's economic development depends largely on progress of agriculture, as it feeds 1.3 billion people and employs about 54.6 per cent of the population. After rice and wheat, maize is emerging as human food as well as animal feed, and it is also widely used in starch industry. With only 2.4 per cent of the world's geographical area and 4 per cent of its water resources, India supports 17 per cent of the world's human population and 15 per cent of the world's livestock (FAO). The demand for food grains in India is continuously increasing due to steady population growth. Maize is seen as a promising crop for diversifying agriculture in India's uplands. After rice and wheat, it is now India's third most important cereal crop. The food grain production for the agricultural year 2021-22 was appraised be 315.72 million tonnes (Ministry of Agriculture & Farmers Welfare, 2023).

Maize (*Zea mays* L.) constitutes one of the predominately grown food grains in the world. It is staple food for a large number of people in Latin America, Africa, and Asia and is the basis for food security as per Consultative Group on International Agricultural Research (CGIAR, 2021). Maize production has increased, mainly because of its relatively better adaptation to different environments and strong demand for biofuel (ethanol), animal feed, for the production of sweetening agents, and other non-food industrial products, *i.e.*, packaging materials that are biodegradable (Singh, 2017; Serna Saldivar *et al.*, 2016).

Sweet corn (*Zea mays* L.) is a type of corn with a thin pericarp layer, a translucent, thorny appearance of kernels. It is a common vegetable crop, and its popularity has grown in North America, Europe and Asia. It is a rich source of vitamins, minerals and dietary fiber. Around 40 per cent of the corn used in manufacturing is frozen, while the rest is canned. The USA ranks number one in sweet corn production, followed by Japan, Canada, France and Taiwan. Nowadays, it is being consumed in frozen or canned form on a large scale in India as well. Thus, sweet corn has a very huge market potential, especially if the processing and packing needs of large-scale production are taken care of.

Nowadays, there is an emphasis on the diversification of cropping system and finding alternative crops for the changing climate and depleting groundwater levels in India, especially in the context of Haryana and Punjab. So, diversification and value addition through the

cultivation of sweet corn for vegetable purposes is emerging as a highly profitable activity (Dass *et al.*, 2012). It can also be a contingent crop in the event of crop failure. As a result, sweet corn is both a cash crop and a catch crop. Being a crop that can be grown round the year, it can provide jobs for the rural poor, ranging from children to the elderly. In Indian cities, the market for sweet corn is rapidly growing. Since immature cobs are harvested as an economical product, the sweet corn can be harvested in 70-80 days. However, after harvest of sweet corn cobs, the young plants are utilized as green fodder highly nutritious and rich in starch which can be alternate to sole fodder crops like sorghum. As a result, several crops of sweet corn can be grown in areas adjacent to cities like Sonepat or other urban areas (peri urban agriculture), bringing in a higher income for the farmer.

Therefore, keeping in view the importance of sweet corn from the nutritional point of view and its vast potential in increasing the income of farmers and diversification of the cropping system, the present study was carried out.

MATERIALS AND METHODS

A multi-stage purposive cum random sampling technique was applied for selection of final sampling units. The primary data for the year 2020-21 were collected by survey method using personal interview with the help of pre-tested schedule designed for the study. The current research was carried out in Sonepat district of Haryana. Sonepat district was chosen for the study because the region has a lot of potential for sweet corn cultivation and commercialization. Sweet corn crop is being cultivated on about 5200 acres by nearly 2500 farmers in Sonepat district which is highest in Haryana (DoA Sonepat, 2019-20). Based upon largest acreage, one main sweet corn producing block (Rai block) was selected for the second round of sampling from a designated area. Out of Rai block, four prominent villages were chosen based on the prevalence of sweet corn farming. A sample of 20 farmers were chosen at random from each village, including Manoli, Bhaira Bankipur, Khurrampur and Pabsara i.e., 80 farmers in total were taken for the study.

For the calculation of the cost and returns structure of the crop; the farm inputs cost, the variable as well as fixed cost, and the net returns from the production were computed based on various different descriptive statistics like mean, percentages, tabulation, ratio and profitability analysis.

Valuation of output

GI=Q × P

Where,

GI= Gross income

Q= Quantity of produce sold

P= Average Price at which produce was sold

Net returns over variable cost

Net returns over variable cost = Gross income - Total variable cost

The key constraints in the sweet corn cultivation faced by the growers in study area was also examined using simple percentage analysis.

RESULTS AND DISCUSSION

The vast majority of the farmers under the study were found to be literate (95%). Educated farmers are more inclined towards cultivating new crops in an area as educated farmers are more willing and able to learn new technological knowledge very quickly as seen by Elum and Sekar (2015), that later on increases the profitability of the crops grown and making correct decisions. Among the respondents, middle aged farmers (35-50 yrs.) constituted the highest percentage (56.25%). Efficiency increases 4.5 percent every ten years of age, to the interval 35 to 44 and then decreases at same rate (Tauer, 1995). The overall average size of operational holding for the selected sweet corn growing farmers came to be 14.2 acres out of which on an average 7.05 acres were under sweet corn cultivation. The percentage acreage under sweet corn was highest in case of marginal sweet corn growing farmers (88.11%) followed by small (77.93%), medium (44.70%) and least in case of large farmers (44.37%). It means the selected marginal sweet corn farmers nearly had to specialize themselves in sweet corn growing. However, the medium and large farmers had opportunity for diversification due to availability of larger land holdings i.e., they allocated less than half of their total land for sweet corn cultivation.

Costs incurred in sweet corn production among different farm sizes, various operational costs were worked out and presented under Table 1. The overall cost structure of sweet corn cultivation reveals that among operational costs major cost included cost on seeds across all fam sizes (i.e., nearly 16%) followed by harvesting cost and investment on Fertilizers (i.e., near to 8%) of the total cost. This can be attributed to the fact that seeds are not grown locally in the country thus per kg seed cost is very high and harvesting is done manually so the cost on harvesting is high.

The comparative analysis of expenses experienced on different items on different categories of farms out of the total costs showed that per-acre expenditure incurred on harvesting, was highest in small farms (8.54%) followed by medium (8.42%), marginal (8.33%) and large farms (8.18%). The transportation cost came to be significantly large in case of marginal (9.98%) and small farms (9.91%) when compared with the medium (8.43%) and large sweet corn growing farmers (8.17%). This can be attributed to the fact that the large and medium farmers were using their own vehicle to transport and also larger quantity of produce which further reduced their cost of transportation. The expenditure incurred on management charges and risk factors were found highest on small farms (5.04%) and least in case of marginal farms (4.99%). But in case of, preparatory tillage cost and fertilizer investment, the per acre expenditure incurred on these items was found highest in medium farms as the quantity of input were more than other categories.

Irrespective of the farm sizes, the major constraints included high cost of seeds as reported by about 82 per cent of farmers followed by problem of stray animals (76%), non-availability of quality seeds in time (72%), non-availability of labour at peak harvesting time (64%), relatively high harvesting cost (56%), difficult availability of loans from regulated sources (46%) and lack of awareness about value addition at farmers level (27%). Black-marketing and adulteration of seeds were main reasons behind the high cost of seeds and low-quality seeds.

Unavailability of labor force during peak harvesting operation period led to increased harvesting cost. It was observed by farmers that after commencement of Mahatma Gandhi National Rural Employment Guarantee Assurance Scheme (MGNREGA). Most of the labourers got diverted towards MGNREGA scheme covering various kind of work that is why, the labour scarcity was there as the agriculture. Laborers were not inclined to work on agricultural fields due to tardy nature of agricultural operations.

On perusal of Table 2, it was revealed that the variable cost and fixed cost were highest among small farmers, thereby the per-acre cost of cultivation of sweet corn was highest in the case of small farmers (₹ 54411.63) followed by marginal farmers (₹ 53746.15), medium (₹ 53508.94) and least for large farmers (₹ 53159.38). The average gross income per acre on medium farms was highest (₹ 102418.97) as compared to large farms (₹ 100940.00), small farms (₹ 99715.79), and marginal farms (94719.67). This may be attributed to the highest production on medium farms (65.45 quintals) followed by large farms (65.35 quintals), small farms (64.05 quintals), and marginal farms (61.67 quintals).

As far as cost and returns between different land size is concerned, there is a significant gap between cost and returns between smaller category (*i.e.*, small and marginal) and larger category (*i.e.*, medium and large) farms because greater operational holding has a positive effect on returns/productivity.

Table 1: Cost of Inputs in sweet corn production for different sizes of farm holdings (in ₹ acre^{-1}).

Particulars	Marginal farms			Small farms			Medium farms			Large farms			Overall		
Preparatory Tillage	Quantity	Value (₹)	(%)	Quantity	Value (₹)	(%)	Quantity	Value (₹)	(%)	Quantity	Value (₹)	(%)	Quantity	Value (₹)	(%)
	3083	2416.67	4.49	4.05	2447.37	4.5	4.28	2470.69	4.62	4.55	2847.5	4.68	4.18	2455.56	4.57
Sowing Ridging		1237.5 1320.83	2.3 2.45		1268.42 1334.21	2.33 2.45		1217.24 1351.72	2.27 2.53		1222.5 1332.5	2.3 2.51		1238.5 1332.5	2.3 2.48
Seed(kg) FYM *Fertilizer nutrients(kg)*	3.21	8714.17 641.67	16.18 1.19	3.2	8715.79 634.21	16.02 1.17	3.15	8665.52 632.76	16.19 1.18	3.19	8688.5 596.25	16.34 1.12	3.2	8688.5 626.22	16.17 1.17
A. Urea	183.75	1143.33	2.12	187.11	1209.47	2.22	170.69	1119.66	2.09	168.75	1087	2.04	177.57	1139.87	2.12
B. DAP	75	1875	3.48	78.95	1984.21	3.65	82.76	2070.69	3.87	82.5	2067.5	3.89	79.8	1999.35	3.72
C. Potash	50	807.75	1.5	50	810.63	1.49	50	808.76	1.51	50	808.85	1.52	50	809	1.51
D. Zinc Sulphate Total Fertilizer Investment Fertilizers application	2.5	202.08 4028.17 325	0.38 7.48 0.6	4.74	373.68 4378 352.63	0.69 8.05 0.65	4.14	329.31 4328.41 353.45	0.62 8.09 0.66	5	403.75 4367.1 362.5	0.76 8.22 0.68	4.09 311.47	327.21 4275.42 348.39	0.61 7.96 0.65
Irrigation Hoeing/Weeding Plant Protection Harvesting Miscellaneous Total working capital(1-13) Interest on working capital TVC (Total variable Cost) Transportation charges Management charges Risk Factor Rental Value of land Fixed Cost TC (Total Cost)	5	1375 625 675.83 4483.33 133.33 25976.5 909.18 26885.68 5375 2688.57 2688.57 16500 26960.47 53846.15	2.55 1.16 1.26 8.33 0.25 48.24 1.69 49.93 9.98 4.99 4.99 30.64 50.07 100	5.16	1410.53 576.32 740 4647.37 100 26604.84 931.17 27536.01 5394.74 2753.6 2753.6 15973.68 26875.62 54411.63	2.59 1.06 1.36 8.54 0.18 48.9 1.71 50.61 9.91 5.06 5.06 29.36 49.39 100	5.24	1437.93 591.38 887.93 4506.9 100 26543.93 929.04 27472.97 4524.14 2747.3 2747.3 16017.24 26035.97 53508.94	2.69 1.11 1.66 8.42 0.19 49.61 1.74 51.34 8.45 5.13 5.13 29.93 48.66 100	5.25	1442.5 612.5 899 4350 100 26460.85 926.13 27386.98 4345 2738.7 2738.7 15950 25772.45 53159.38	2.71 1.15 1.69 8.18 0.19 49.78 1.74 51.52 8.17 5.15 5.15 30 48.48 100	5.25	1416.49 601.3 800.69 4496.9 108.33 26396.53 923.88 27320.41 4909.72 2732.04 2732.04 16037.31 26411.12 53731.52	2.64 1.12 1.49 8.37 0.2 49.13 1.72 50.85 9.14 5.08 5.08 29.85 49.15 100

Table 2: Costs incurred and returns realized in sweet corn production(in ₹ acre^{-1}).

Particulars	Marginal farms		Small farms		Medium farms		Large farms		Overall	
	Quantity	Value(₹)	Quantity	Value(₹)	Quantity	Value(₹)	Quantity	Value(₹)	Quantity	Value
TVC (Total variable Cost)		26885.68		27536.01		27472.97		27386.98		27320.4
TC (Total Cost)		53846.15		54411.63		53508.94		53159.38		53731.5
Production (qtl) A. Main Product(Cobs)	61.67	90333.33	64.05	95057.89	65.45	97436.21	65.35	96077.5	64.13	94726.23
B. By- Product		4458.33		4657.89		4982.76		4862.5		4740.37
Gross Returns		94791.67		99715.79		102418.97		100940		99466.61
Return over variable cost		67905.99		72179.78		74946		73553.02		72146.2
Net Return		40945.52		45304.15		48910.02		47780.62		45735.08
Cost of Production/qtl		873.18		849.48		819.27		814.41		840.48
Return per rupee Investment		1.76		1.84		1.92		1.90		1.86

Also, larger category farmers are better price takers in the market due to better bargaining power. Among larger categories (*i.e.*, medium and large category) of farmers, medium farmers outperformed large because medium captures better opportunity in the market and get slightly better yield too. It was further estimated that, the cost of production per quintal was highest on marginal farms followed by small, medium and large farms *i.e.*, 873.18, 849.48, 819.27, 814.41 respectively. The return per rupee of investment was found to be highest on medium farm followed by large, small, and marginal farms (*i.e.*, 1.92, 1.90, 1.84, 1.76 respectively).

CONCLUSIONS

As the result of study, it was concluded that the marginal and small farmers who grow sweet corn were mostly specialized in sweet corn cultivation while the medium and large farmers were allocating less than 50 percent of their total land for sweet corn cultivation. Among all kinds of operational costs, the cost incurred on seeds (₹ 8688.50) was highest followed by cost of harvesting and cost on fertilizers. The overall per-acre cost of cultivation was ₹ 53731.52. Net return per-acre of sweet corn turned out to be ₹ 45735.08 while return per-rupee of investment was 1.86. The returns from sweet corn were highest in case of medium farms followed by the large, small and marginal farms. The cost of production per quintal was highest on marginal farms 873.18 followed by small, medium and large farms i.e., while the return per rupee of investment was highest on medium farms were 1.92. Overall, sweet corn concluded to be a very good crop and can be grown by all categories of farmers to get a better outcome.

FUTURE SCOPE

— A proper scientific package of practices should be developed for the existing and new farmers who are interested to engage in sweet corn cultivation to help them in judicious input utilization and increasing the productivity of the crop grown as well as income per rupee investment.

— Production of seeds should be started in India locally in order to cut the major operational cost on seeds.

— As this crop is of short duration, high income per rupee invested and require less water it can be promoted as alternative crop for existing rice-wheat cropping system. Therefore, can be a very good tool for crop diversification.

Acknowledgement. The authors would like to acknowledge the farmers who provided the data for the current study.
Conflict of Interest. None.

REFERENCES

CGIAR Research Program on Maize, Research Portfolio(2017-2021)

Dass, S., Kumar, A., Jat, S. L., Parihar, C. M., Singh, A. K., Chikkappa, G. K. and Jat, M. L. (2012). Maize holds potential for diversification and livelihood security. *Indian Journal of Agronomy*, *57*(3s), 32-37.

Elum Zelda A and Sekar C. 2015. Bt cotton: evaluating farmers' perception in Tamil Nadu, *International Journal of Agricultural Policy and Research*, *3*(5), 236–41.

Food and Agriculture Organization of the United Nations (1997). FAOSTAT statistical database. [Rome]: FAO.

Government of Haryana (2021). Economic survey of Haryana 2020-21, Panchkula: Department of Economic and Statistical analysis.

Ministry of Agriculture & Farmers Welfare, 2023

Patil, V. P. and Mahendran, K. (2019). Structure of cost and returns in maize production under different supply chains in Northern and Southern Karnataka. *Journal of Pharmacognosy and Phytochemistry*, *8*(3), 4686-4689.

Serna-Saldivar, S. O. (2021). Understanding the Functionality and Manufacturing of Nixtamalized Maize Products. *Journal of Cereal Science*, *99*, 103205.

Singh, N. (2017). Maize Scenario in Haryana: A Brief Review. *International Journal of Pure & Applied Bioscience*, *5*(6), 1616–1623.

Sunish Sharma, S. P. Singh, Maninder Singh and Ashish Verma (2022). A Comparative Study on Cost and Returns of Maize Cultivation in Jammu Region of J&K. *Biological Forum – An International Journal*, *14*(4), 734-736.

Tauer, L. (1995). Age and farmer productivity. *Review of Agricultural Economics*, *17*(1), 63-69.

How to cite this article: Raj Ratan Panday, Parminder Singh, Dalip Kumar Bishnoi, Sagar Rawal and Ashok Dhillon (2023). An Economic Analysis of Sweet Corn (*Zea mays* L.) Cultivation in Sonepat District of Haryana. *Biological Forum – An International Journal*, *15*(10): 314-317.