Cost and income structure of organic and conventional french bean cultivation: a case study of Himachal Pradesh

Abstract

The objective of this study was to investigate the cost and income structure of organic and conventional french bean cultivation in Solan district, Himachal Pradesh, in the 2018/ 2019 crop year. The sample included 80 farmers selected using a purposive sampling method, consisting of 40 organic and 40 conventional french bean growers. Survey questionnaires were used as the main instrument for data collection. Descriptive statistics and cost and income analysis were used for data analysis. The results indicate that the cost of production was higher, and output was lower under organic bean cultivation. Despite this, organic bean cultivation was more profitable than conventional farming, which was attributed to the higher prevailing market price for organic beans. Organic growers encounter numerous challenges and issues when cultivating and marketing of vegetables. Farmers seek a variety of aid from the government, business sector, and co-operative organizations to solve all of these challenges.

Keywords: organic farming, conventional farming, purposive sampling, government, co-operative organizations

Introduction

India grows a large number of vegetables from temperate to humid tropics and from sea level to the snowline. Vegetables are an excellent source of vitamins, particularly niacin, riboflavin, thiamin and vitamins A and C. They also supply minerals such as calcium and iron besides proteins and carbohydrates. Vegetables are known to be the cheapest source of natural beneficial ingredients. Apart from the nutritional benefits, the production of vegetables improves the economy of a country as these are very good source of income and employment. During 2020-21 the area under vegetable crop was 10.86 Million Hectare with a production of 200.45 Million Tonne in India. For this period the total vegetable production was highest in case of West Bengal (30.33 Million Tonne) followed by Uttar Pradesh (29.16 Million Tonne) (Anonyms 2021**)**. The area under vegetable cultivation was 11.35 Million Ha with a production of 204.84 million tonnes in the year 2021-22. India is a prominent exporter of fresh vegetables in the world. The country has exported 827,288.05 MT of Fresh Vegetables other than Onion to the world, worth Rs. 2,443.04 crores during the year 2022-23 (Anonymous, 2024).

Revolution in agriculture and information technology during the past two decades or so in conjunction with the natural bounty of agro-climatic advantages in Himachal Pradesh has catapulted the state's agriculture to new heights through vegetable cultivation. This is amply borne by the fact

that the area under vegetable cultivation in the state more than trebled to about seventy five thousand hectares during this period with a concomitant quadrupling of production to nearly sixteen lakh tonnes which has surpassed the food grains production in the state. Vegetables cultivation has augmented the farmers' incomes in the Himachal state leading to the upliftment of their living standards and is thus a more lucrative option vis-a-vis cereals crops, more so on the rainfed small sized holdings in the mid to high hill districts (Kumar, 2013).

In India, agriculture is not extremely intense in terms of the use of agrochemicals in a number of different types of soil land. Gujarat, Kerala, Karnataka, Uttarakhand, Sikkim, Rajasthan, Maharashtra, Tamil Nadu, Madhya Pradesh, and Himachal Pradesh are the main states in India engaged in organic agriculture (Das et al., 2020). The use of agricultural chemicals is generally quite low, particularly in tribal and mountainous areas, which helps the switch to organic farming (Manida and Nedumaran, 2021).In the hill states like Himachal Pradesh, farmers try to earn livelihood from small and marginal fragmented land holdings, which usually lack irrigation, transportation and market facilities. About 71 percent numbers of landholdings are below 1.0 hectare with average size of 0.40 hectare and about 80 percent of the total cultivated land is rainfed (GoHP, 2021). Due to such limitations, agriculture in hills is uncertain and due to this uncertainty the rural inequalities are increasing and employment opportunities are shrinking (Devi and Karol, 2020). Poverty and unemployment are major problems faced by rural community (Singh et al. 2017). Vegetable farming has paved new path of economic development in hilly states like Himachal Pradesh (Singh and Hansra, 2018)

This opportunity however is constrained by increasing input costs and impoverished soils. Farmers are looking for alternatives in view of ever increasing cost of synthetic inputs and poor input output ratio. The vegetable and fruit business of Himachal farmers can transform drastically by adopting organic farming. In this backdrop, the present study was conducted to investigate the Cost and Income structure of Organic and Conventional French Bean Cultivation in the Solan district of Himachal Pradesh. The specific objectives of the study are given below:

1. To estimate the costs and income structure of organic and conventional french bean cultivation at different size of farms.
2. To work out the various production and marketing constraints of organicfrench bean cultivation faced by farmers.

Methodology

Solan, being one of the leading districts of Himachal Pradesh in the production of vegetables, was purposively selected for study. Further, two blocks, Solan and Dharmpur block were selected purposively from Solan district on the basis of maximum area under organic farming. At the second stage, a complete list of villages engaged in organic cultivation in selected blocks was prepared, and out of which, five villages were selected randomly from each selected block. Lastly, at the final stage, from each of the selected villages four farmers practising organic farming and same number of farmers following conventional farming were randomly selected from the same village for the purpose of comparison. Thus, a total sample of 80 respondents were interviewed. Primary data were collected during 2018-19 through the survey method using specially designed and pre-tested schedules.

The secondary information was obtained from various published and unpublished reports and from government officials like ADOs, patwaris, gram panchayat pardhans, etc. The tabular method of data analysis was employed in the study. Among the leading vegetables, french bean was selected for the study.

Analytical Techniques

Cost of cultivation concepts as recommended by, "Special expert committee on cost estimates, GOI, New Delhi" were used in this study.For the estimation of profitability from organic and conventional french beancultivation, farm business efficiency measures were used.The selected farmers were classified into marginal (up to 1 ha), small (1-2 ha) and medium (2-4 ha) for equity considerations (Table 1).

Table 1: Farm category wise distribution of sampled french bean growers in study area

Particulars	Marginal	Small	Medium	Total
Size of land holding (ha)	<1	1-2	2-4	
Organic	19	13	8	40
Conventional	16	16	8	40

Simple tabular analysis was used to examine the cost and return of organic and conventional french bean cultivation. Simple statistical tools like averages and percentages were used to compare, contrast and interpret the results.

In order to assess the profitability of organic and conventional french beancultivationin the study area, the various cost components such as Costs A_1, A_2, B_1, B_2, C_1, C_2 and C_3 were calculated.

The cost of production of french beanwas calculated as per the definition given by Commission on Agricultural Costs and Prices (CACP).

Cost A_1 includes cost of hired human labour, cost of owned machinery, cost of hired

machinery, cost of bio- fertilizer/fertilizer, cost of farm yard manure, cost of seed (owned / purchased), cost of plant protection chemicals, land revenue, depreciation on farm machinery, equipment's and farm buildings and interest on owned working capital

Cost A_2 = Cost A_1 + Rent paid for leased in land

Cost B_1 = Cost A_1 + Interest on owned fixed capital assets excluding land

Cost B_2 = Cost B_1 + Rental value of own land (net of land revenue) + Rent paid for leased in land

Cost C_1 = Cost B_1 + Imputed value of family labour

Cost C_2 = Cost B_2 + Imputed value of family labour

Cost C_3= Cost C_2 +10 percent of cost C_2 on account of managerial function performed by the farmer.

For working out profitability of organic and conventional french bean cultivation in the study areas following income measures were worked out:

Farm business income = Gross income – Cost A_1

Family labour income = Gross income – Cost B_2

Net income over Cost C_1 = Gross income – Cost C_1

Net income over Cost C_2 = Gross income – Cost C_2

Net income over Cost C_3 = Gross income – Cost C_3

Results and discussion

Cost of cultivation

In organic farming, farmyard manure (37.14 per cent) constituted highest share in total variable Cost A_1 followed by the human hired labour (15.78 per cent), seed/plant (11.73 per cent), plant protection (6.74 per cent), bio-fertilizers (6.42 per cent), hired machinery labour (3.28 per cent), stalking (3.26 per cent) and owned machinery labour (1.58 per cent). Land holding category wise examination revealed that for marginal farmers, farmyard manure constituted 43.28 per cent and the cost of human hired labour constituted 14.04 per cent to the total variable cost (Table 2). In the case of small farmer category, Cost A_1 was worked out to Rs. 49937 per hectare of which farmyard manure accounted to about 32.17 per cent, followed by human hired labour which worked out to 17.15 per cent of Cost A_1. In the case of medium farmer category, the contribution of farmyard manure was 28.33 per cent and that of human hired labour was 18.34 per cent.

In conventional farming, farmyard manure (30.58 per cent) constituted highest share in Cost A_1 followed by human hired labour (15.38 per cent), seed/plant (12.09 per cent), plant protection chemicals (10.31 per cent), chemical fertilizers (7.13 per cent), stalking (3.37 per cent), hired

machinery labour (3.12 per cent) and owned machinery labour (1.95 per cent).

In Conventional land holding category wise examination revealed that for marginal farmers, farmyard manure constituted 37.31 per cent and the cost of human hired labour constituted 12.55 per cent to the total variable cost. In the case of small farmer category, Cost A_1 was worked out to Rs. 51758 per hectare of which farmyard manure accounted to about 27.03 per cent, followed by cost of human hired labour, which worked out to 17.10 per cent of Cost A_1. In the case of medium farmer category, the contribution of farmyard manure was 22.10 per cent and that of human hired labour was 18.47 per cent.

For overall farms, Cost A_1 (Rs. 53722/ ha) was less for organic farming than conventional farming (Rs. 54440per hac).

Table 2: Cost of cultivation of french bean at different size of farm

Particular	Marginal		Small		Medium		Overall	
	OR	CN	OR	CN	OR	CN	OR	CN
Human hired labour	8144 (14.04)	7421 (12.55)	8566 (17.15)	8852 (17.10)	9122 (18.34)	9322 (18.47)	8477 (15.78)	8374 (15.38)
Owned machinery labour	202 (0.35)	226 (0.38)	1601 (3.21)	1765 (3.41)	1155 (2.32)	1321 (2.62)	847 (1.58)	1061 (1.95)
Hired machinery labour	2950 (5.09)	3315 (5.61)	665 (1.33)	555 (1.07)	719 (1.45)	766 (1.52)	1761 (3.28)	1701 (3.12)
Seed/ plants	6300 (10.86)	6722 (11.37)	6422 (12.86)	6556 (12.67)	6122 (12.31)	6342 (12.57)	6304 (11.73)	6580 (12.09)
FYM	25100 (43.28)	22055 (37.31)	16065 (32.17)	13990 (27.03)	14044 (28.23)	11150 (22.10)	19952 (37.14)	16648 (30.58)
Bio Fertilizers/fertilizers	3555 (6.13)	4266 (7.22)	3444 (6.90)	3711 (7.17)	3212 (6.46	3455 (6.85)	3450 (6.42)	3882 (7.13)
Plant protection	3731 (6.43)	5711 (9.66)	3311 (6.63)	5573 (10.77)	3855 (7.75)	5502 (10.90)	3619 (6.74)	5614 (10.31)
Staking	1723 (2.97)	1788 (3.02)	1803 (3.61)	1821 (3.52)	1723 (3.46)	1955 (3.87)	1749 (3.26)	1835 (3.37)
Depreciation	3925 (6.77)	5261 (8.90)	6144 (12.30)	6977 (13.48)	7960 (16.00)	8822 (17.48)	5453 (10.15)	6660 (12.23)
Land revenue	31 (0.05)	31 (0.05)	31 (0.06)	31 (0.06)	31 (0.06)	31 (0.06)	31 (0.06)	31 (0.06)
Interest on working capital	2327 (4.01)	2318 (3.92)	1884 (3.77)	1927 (3.72)	1798 (3.61)	1792 (3.55)	2077 (3.87)	2056 (3.78)
Cost A_1	57988 (100)	59114 (100)	49937 (100)	51758 (100)	49741 (100)	50458 (100)	53722 (100)	54440 (100)

Figures in parentheses are percentage to total

Income structure

In organic farms, Yield was comparatively higher for marginal farmers (78 q/ha) than medium farmers (75 q/ha) and the small farmers (72 q/ha). Consequently, the per hectare family labour income of marginal farmers (Rs. 150183/ha) was higher than small farmers (Rs. 138609/ha) and medium farmers (Rs. 134613/ha) in the study area (Table 3). Among different categories, the total cost (represented by the Cost C_3), was highest for marginal farmers (Rs. 131838/ha) followed by small farmers (Rs. 121793/ha) and medium farmers (Rs. 108880/ha).

Table 3: Income structure from French Bean cultivation at different size of farm

Particular	Marginal		Small		Medium		Overall	
	OR	CN	OR	CN	OR	CN	OR	CN
Yield of french bean	78.00	86.00	72.00	77.00	75.00	81.00	75.38	81.36
Cost A_1	57988	59114	49937	51758	49741	50458	53722	54440
Cost A_2	57988	59114	49937	51758	49741	50458	53722	54440
Cost B_1	59588	60772	51506	53500	51797	52714	55403	56252
Cost B_2	84753	85937	76671	78665	76962	77879	80568	81417
Cost C_1	94688	88922	85556	79709	73817	72814	87546	82015
Cost C_2	119853	114087	110721	104874	98982	97979	112711	107180
Cost C_3	131838	125496	121793	115362	108880	107777	123982	117898
Gross return	234936	216806	215280	196350	211575	203391	223876	205941
Farm business income	176948	157692	165343	144592	161834	152933	170154	151500
Family labour income	150183	130869	138609	117685	134613	125512	143308	124524
Net income over Cost C_1	140248	127884	129724	116641	137758	130577	136330	123925
Net income over Cost C_2	115083	102719	104559	91476	112593	105412	111165	98760
Net income over Cost C_3	103098	91310	93487	80988	102695	95614	99894	88042
Cost benefit ratio	1.78	1.73	1.77	1.70	1.94	1.89	1.81	1.75

In case of conventional farmers, similar trend had found as yield was comparatively higher for marginal farmers (86 q/ha) than medium farmers (81 q/ha) and the small farmers (77 q/ha). Consequently, the per hectare family labour income of marginal farmers (Rs. 130869/ha) was higher than small farmers (Rs. 117685/ha) and medium farmers (Rs. 125512/ha) in the study area. Among different categories, the total cost was highest for marginal farmers (Rs. 125496/ha) followed by small farmers (Rs. 115362/ha) andmedium farmers (Rs. 107777/ha). Net income were higher in organic

than conventional cultivation mainly on account of premium price received by organic producers. Similar results were reported by Ganesh (2010) and Naik (2010).

Production and marketing constraints of organic bean

The constraints related to production and marketing of organic bean cultivation are presented in Table 4 and Table 5. It is observed from the data that High incidence of pest and diseasewere observed major constraints in the cultivation of organic bean(Table 4) as reported by 92.50% cultivators followed by Costly labour (85%), Small land holding (75%), Non-availability of irrigation (70%), Decline in productivity (65%), Fluctuating production (62.50%), Lack of skilled labour during the operation period(55%), Lack of awareness about organic practices to control the pest and diseases (47.50%), Less-fertile soil (40%) and Lack of technical guidance (37.50%).

Table 4: Production constraints of organic french bean

S. No.	Constraints	Marginal	Small	Medium	Total	Rank
		19	13	8	40	
Production constraints						
1	High incidence of pest and disease	19 (100)	13 (100)	5 (62.50)	37 (92.50)	I
2	Costly labour	17 (89.47)	11 (84.62)	6 (75.00)	34 (85.00)	II
3	Small land holding	14 (73.68)	12 (92.31)	4 (50.00)	30 (75.00)	III
4	Non-availability of irrigation	15 (78.95)	9 (69.23)	4 (50.00)	28 (70.00)	IV
5	Decline in productivity	14 (73.68)	8 (61.54)	4 (50.00)	26 (65.00)	V
6	Fluctuating production	13 (68.42)	8 (61.54)	4 (50.00)	25 (62.50)	VI
7	Lack of skilled labour during the operation period	7 (36.84)	8 (61.54)	7 (87.50)	22 (55.00)	VII
8	Lack of awareness about organic practices to control the pest and diseases	7 (36.84)	7 (53.85)	5 (62.50)	19 (47.50)	VIII
9	Less-fertile soil	6 (31.58)	6 (46.15)	4 (50.00)	16 (40.00)	IX
10	Lack of technical guidance	6 (31.58)	6 (46.15)	3 (37.50)	15 (37.50)	X

Figures in parentheses are percentage to total

Where Lack of minimum support prices for organic products (Table 5) were major marketing constraints as reported by 95% followed by Non-availability of market place exclusively for organic produce (92.50%), Distant markets (87.50), Price instability (85%), High transport charges (75%), Inadequate storage facilities (67.50) and Non-assurance of getting income (60%).A study conducted by Jaganathan (2004) related to organic farming practices in vegetable cultivation in Thiruvananthapuram district in Kerala which reported similar results.

Table 5: Marketing Constraints of Organic French Bean

S. No.	Marketing Constraints	Marginal	Small	Medium	Total	Rank
		19	13	8	40	
1	Lack of minimum support prices for organic products	18 (94.74)	13 (100.00)	7 (87.50)	38 (95.00)	I
2	Non-availability of market place exclusively for organic produce	17 (89.47)	13 (100.00)	7 (87.50)	37 (92.50)	II
3	Distant markets	17 (89.47)	13 (100.00)	5 (62.50)	35 (87.50)	III
4	Price instability	15 (78.95)	13 (100.00)	6 (75.00)	34 (85.00)	IV
5	High transport charges	15 (78.95)	10 (76.92)	5 (62.50)	30 (75.00)	V
6	Inadequate storage facilities	10 (52.63)	10 (76.92)	7 (87.50)	27 (67.50)	VI
7	Non-assurance of getting income	13 (68.42)	9 (69.23)	2 (25.00)	24 (60.00)	VII

Figures in parentheses are percentage to total

CONCLUSIONS

Cost and income structure organic and conventional bean cultivation was analysed by using CACP data In Himachal Pradesh. Different costs affect organic and conventional bean profitability. In this study, some important costs were taken into account to calculate economics of selected crop. The results of analysis that farmyard manure (37.14 per cent) constituted highest share of total variable Cost A_1 in organic farming followed by the human hired labour (15.78 per cent), seed/plant (11.73 per cent), plant protection (6.74 per cent), bio-fertilizers (6.42 per cent), hired machinery labour (3.28 per cent), stalking (3.26 per cent) and owned machinery labour (1.58 per cent). In conventional farming, farmyard manure (30.58 per cent) constituted highest share in Cost A_1 followed by human hired labour (15.38 per cent), seed/plant (12.09 per cent), plant protection chemicals (10.31 per cent), chemical fertilizers (7.13 per cent), stalking (3.37 per cent), hired machinery labour (3.12 per cent) and owned machinery labour (1.95 per cent). Net income were higher in organic French Bean cultivation than conventional cultivation mainly on account of premium price received by organic producers. High incidence of pest and disease were observed major constraints in the cultivation of organic bean followed by Costly labour, Small land holding, Non-availability of irrigation, Decline in productivity, Fluctuating production, Lack of skilled labour during the operation period etc. Where Lack of minimum support prices for organic products were major marketing constraints followed by Non-availability of market place exclusively for organic produce, distant markets, Price instability, High transport charges etc.Looking to the above research findings it can be concluded that not only organic bean is a profitable crop in the study area but still there is a scope to generate further income and employment.The organic growers face many difficulties and problems during the period of growing vegetables and marketing it. In order to overcome all these difficulties and problems, the

farmers expect varied assistance from the Government, private and co-operative societies.

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