

A Comparative Study of Cost and Profitability of Conventional and Organic Wheat in Southwest Punjab

* *Bahadur Singh*

** *R.K. Mahajan*

Abstract

The study analyzed and compared the cost and profitability of conventional and organic wheat cultivation in Southwest Punjab, India. In the present investigation, 180 wheat farmers were interviewed (120 conventional farmers and 60 organic wheat farmers). Field survey was undertaken in 2013, and reference period covered Rabi season. Per acre produce of organic wheat was 9.18 quintals, while the yield of conventional wheat was 16.74 quintals per acre. We found that with only 30% cost difference, output differed by 82%. Cost of seeds was substantially higher in organic farming (₹ 1154) compared to conventional farming (₹ 634). The expenditure on fertilizers, insecticides, and pesticides was zero in case of the former, and the farmers spent just ₹ 141 on *jeev amrit*, that is, a sort of growth promoter and soil health enhancer. In Southwest Punjab, gross revenue of wheat cultivation on per acre basis of organic farmers was higher in comparison to conventional farmers. Therefore, growing wheat through organic practices was found to be more beneficial in value terms. Though the productivity per acre was lower in organic wheat, but price charged was high. Therefore, gross value of organic produce was higher due to availability of price premium for its produce. Further, organic wheat was found to be remunerative because there was a very small area under cultivation; however, if the same is cultivated at a large scale, the price premium available for the produce will vanish, and if it is purchased at minimum support price, then it will be very uneconomical. There is also a challenge to maintain national food security through organic wheat cultivation (with such lower yields per acre). The study concluded that India needs enough safe food to feed its people instead of a very small amount of pure food. Therefore, instead of switching from conventional to organic techniques, conventional techniques need to be blended with organic techniques by incorporating organic techniques for national food and nutritional security.

Keywords : conventional and organic, cost, profitability, return

JEL Classification : Q11, Q12, Q16, Q18

Paper Submission Date : May 3, 2017 ; **Paper sent back for Revision :** June 9, 2017 ; **Paper Acceptance Date :** June 28, 2017

Conventional technology which comprises of use of high yielding varieties of seeds, chemical fertilizers and insecticides, irrigation and farm machinery brought significant changes in the production and productivity of food grain crops, especially wheat and paddy in Punjab. The response from this technology was so overwhelming that technology brought green revolution in Punjab. There is no doubt that the green revolution in Punjab agriculture brought about a significant reduction in rural poverty in terms of both absolute and relative numbers. However, the gains from the green revolution technology could not sustain for a longer period of time. As a result, the farm sector economy of Punjab has been in crisis for some time now. The productivity of food grain crops has stagnated, the cost per unit of output has been growing, and profit margins have been declining. The manifestation of this crisis is reflected through suicides of farmers. Moreover, it is said that conventional technology has caused severe damage to the soil and ground water table of Punjab. A number of

* *Ph.D. Scholar*, Department of Economics, Punjabi University, Patiala, Punjab. E-mail: pithobagria@gmail.com

** *Professor of Economics*, Department of Postgraduate Studies, Punjabi University Regional Centre, Bathinda, Punjab. E-mail: mahajanrk1@gmail.com

alternatives have been suggested by researchers mainly sponsored by corporate houses and NGO activists, who are concerned about the environment. Most of these researchers have recommend genetically modified crops and organic farming. The question arises : Are profit margins of farmers getting marginalized in case of conventional crops ? Whether per acre production costs are lower for organic crops than that of conventional crops ? Is organic farming more profitable than conventional farming for farmers ? Can national food security be maintained through organic farming?

The present study is a small attempt to examine the comparative costs and returns of cultivation of conventional and organic wheat in the South- Western districts of Punjab. There is a dearth of credible research pertaining to comparative analysis of the cost of conventional and organic wheat crop. Hence, the specific objectives of this paper are :

- (1) To review studies showing cost and profitability of conventional and organic wheat crop.
- (2) To discuss the cost pattern of conventional and organic wheat on different farm sizes.
- (3) To explore the production, productivity, and profitability of conventional and organic wheat crop.
- (4) To determine whether national food security can be maintained through organic farming.

Review of Literature

The following studies were reviewed to adjudge the comparative impact of conventional and organic wheat on costs, production, productivity, and profitability.

Kumar and Singh (2010) found that the problem of stagnation of productivity was found to be more acute in conventional wheat crop as compared to rice in Punjab. The problem of stagnation further aggravated during 2000-01 to 2006-07, as the productivity of conventional wheat was highly stagnated. Alagh (2006) found that with impressive performance during the 1980s, the conventional agricultural economy slowed down in 1990s due to decline in fertility of soil because of high use of synthetic fertilizers and chemical pesticides. With stagnation in productivity and increase in cost of production per acre, the profit margins of farmers got squeezed.

Chand and Haque (1997) were of the view that impressive growth in productivity and output of conventional wheat and rice crops during the post green revolution period was the most important factor in achieving food security and food self-sufficiency in the country. However, during the 1990s, agriculture production got stagnated. Singh and Kolar (2001) analyzed the Punjab agricultural crisis and contended that after attaining an exemplary growth in production, Punjab agriculture has reached the cross-roads where sustaining growth appears to be an arduous task. The margin of profit from major crops has stabilized, and in real terms, is on the decline.

Kramer, Reganold, Glover, Bohannon, and Mooney (2006) established that conventional agriculture has improved crop yield, but at a large cost to the environment. In response to environmental concerns, organic agriculture has become an increasingly popular option. Singh and Grover (2011) contended that organic wheat cultivation was economically viable as the net returns over variable cost of organic wheat were observed to be higher than those of inorganic wheat for organic growers. The lower crop yield of organic wheat was well compensated by the higher price it fetched in the market. However, the authors expressed that the significant reduction in its productivity level posed a serious challenge in terms of food security for the nation.

Charyulu and Biswas (2010) indicated that the efficiency levels were lower in organic farming when compared to conventional farming, relative to their production frontiers. Further, they found that the unit cost of production was lower in organic farming in case of cotton and sugarcane crops ; whereas, the same was lower in conventional farming for paddy and wheat crops. The results showed that there is ample scope for increasing efficiency under organic farms.

Jordan (2008) found that techniques commonly used in organic agriculture had the potential to feed the world, although it could take several years for crop lands in transition from conventional agriculture to organic to gain or regain their productive potential. Badgley et al. (2007) indicated that organic methods could produce enough food on a global per capita basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base.

Beilen (2016) exhibited that conventional and organic agriculture has differential effects on soil ecosystems. Although, he found that conventional agriculture had higher yield than organic agriculture, yet he argued for an increase in the use of organic agriculture strategies to maintain healthy soil in the long run as conventional agriculture system has sustainability issues. Kniss, Savage, and Jabbour (2016) found that on an average, yield in case of most of the organic crops was 80% of conventional crops' yield. However, several crops had no significant difference in yields between organic and conventional crops and even a few organic crops like hay had more yield. Further, they noted that for food security, yield was not the only factor but reducing food wastage, food distribution and, meat intensive diets were also important.

From the above review of studies, it can be concluded that after impressive growth in production and productivity of food grain crops through conventional techniques, now productivity is stagnated and with increasing costs, profit margins of farmers have become marginalized in Punjab. Organic techniques emerge as an alternative, though it has concerns regarding lower yields than conventional techniques.

Data Sources and Methodology

The present study is based on primary data. Organic wheat crop is grown mainly in the three districts of southwest Punjab, that is, Faridkot, Bathinda, and Fazilka. For the purpose of this study, these three districts were selected. The primary data was collected from 120 conventional and 60 organic wheat growing farmers of these three districts. The selection of farmers was random. From each district, 60 farmers (40 conventional and 20 organic) were selected. To collect data, a detailed schedule was prepared and 180 wheat growing farmers were personally met and data was collected from them in order to fulfill the objectives of the study. The wheat growing farmers were divided into three size groups on the basis of the size of their operational land holdings. These size groups were : small (0 - 4.99 acres), medium (5 - 9.99 acres), and large (10 and above acres). The data pertained to the 2012-13 agricultural year.

Cost concepts of commission for agriculture costs and prices were used in the study. These concepts are defined as follows :

(1) Cost Concepts

Cost A_1 : All variable costs excluding family labour cost and including land revenue, depreciation, and interest on working capital.

Cost A_2 : Cost A_1 + Rent paid for leased-in land.

Cost B_1 : Cost A_1 + Interest on the value of owned fixed capital assets (excluding land).

Cost B_2 : Cost B_1 + Rental value of owned 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% of cost C_2 on account of managerial functions performed by farmers.

(2) Income Measures

(i) **Gross Value of Output (GVO)** : It is the total value of main and by product multiplied by prevailing prices.

(ii) **Return Over Variable Cost (RVC)** : $RVC = GVO - \text{Cost } A_1$.

(iii) **Farm Business Income (FBI)** : $FBI = GVO - \text{Cost } A_2$.

(iv) **Family Labour Income (FLI)** : $FLI = GVO - \text{Cost } B_2$.

(v) **Net Income (NI)** = $GVO - \text{Cost } C_2$.

(vi) **Returns to Management (RM)** = $GVO - \text{Cost } C_3$.

(vii) **Returns per Rupee (RPR)** = $GVO / \text{Cost } C_2$.

Analysis and Discussion

(1) Conventional Wheat : The Table 1 shows that the cost A_1 on per acre basis for all the farmers is ₹ 7,820, ₹ 7,853, and ₹ 7,233 in Faridkot, Bathinda, and Fazilka districts, respectively. There is not much difference of cost in Faridkot and Bathinda districts. It is the highest (₹ 8367) for small farmers and lowest (₹ 7,430) for the medium farmers of Faridkot district. In case of Bathinda district, it is highest for medium farmers (₹ 8,503) and lowest for the small farmers (₹ 7,321). This is mainly due to the fact that small farmers invested very less amount in agricultural equipment, therefore, depreciation cost is very low for them (₹150) as compared to the cost for medium farmers (₹ 1,090) in Bathinda district. In Fazilka district, cost A_1 is the highest (₹ 8,412) for small farmers and the lowest for large farmers (₹ 7,134) because large farmers spent very less amount on land preparation than small and medium farmers.

Fertilizer consumption on conventional wheat cultivation is ₹ 2153, ₹ 2013, and ₹ 1651 for all farmers of Faridkot, Bathinda, and Fazilka districts, respectively. District wise fertilizer consumption is the highest (₹ 2,193) for large farmers of Faridkot and the lowest (₹ 1,623) for large farmers of Fazilka district. So, the study shows that there is a lot of variation in cost among different farm sizes in case of fertilizer consumption. The expenditure incurred on insecticides and pesticides is much lower for the small farmers. It is ₹ 937 for Faridkot district as compared to ₹ 1,693 for the medium farmers of Bathinda district. A perusal of the data in the Table 1 shows that the farmers incurred the largest share of their A_1 cost on fertilizers, that is, 27.53%, 25.64%, and 22.82% for Faridkot, Bathinda, and Fazilka districts, respectively.

Cost A_2 is the highest (₹ 11,137) for large farms, followed by small (₹ 9,325) and medium farms (₹ 8,635) in Faridkot district. It is the highest for medium farmers (₹ 12,624) followed by large farmers (₹ 10,274) and small farmers (₹ 7,321) in Bathinda district. In Fazilka district, cost A_2 is the highest for small farmers (₹ 13,867) in comparison to medium farmers (₹ 11,522) and large farmers (₹ 8,244).

Cost B_2 is highest for small farmers (₹ 24,978) followed by large (₹ 24,584) and medium farmers (₹ 22,913) in Faridkot district. It is the highest for large farmers (₹ 22,249) followed by medium farmers (₹ 21,900) and small farmers (₹ 21,374) in Bathinda district. In Fazilka district, it is marginally higher for small farmers (₹ 21,779) than that for large farmers (₹ 21,692) and medium farmers (₹ 21,662).

Cost C_2 is the highest for small farmers (₹ 25,452) and the lowest for medium farmers (₹ 23,072) in Faridkot. In Bathinda district, cost C_2 is highest for large farmers (₹ 22,298) followed by medium (₹ 22,003) and small farmers (₹ 21,540). The cost C_2 is the highest for small farmers (₹ 22,070) followed by large (₹ 21,812) and medium farmers (₹ 21,810) in Fazilka district. The cost C_3 is more or less the same in Faridkot district (₹ 27,998) for small farmers and the figure is ₹ 27,210 for the large farmers. It is the lowest for the medium farmers, that is, ₹ 25,379 per acre. The cost C_3 is highest for large farmers (₹ 24,258) followed by medium (₹ 24,203) and small farmers (₹ 23,694) in the Bathinda district. The cost C_3 is highest for small farmers (₹ 24,277) followed by large farmers (₹ 23,993) and medium farmers (₹ 23,991) in Fazilka district.

Table 1. Cost Pattern of Conventional Wheat in Southwest Punjab (₹ per Acre) (continued)

	Cost	Faridkot				Bathinda			
		Small	Medium	Large	Overall	Small	Medium	Large	Overall
1	Land Preparation	1026 (12.26)	996 (13.40)	956 (12.14)	963 (12.32)	900 (12.29)	869 (10.22)	755 (9.73)	774 (9.86)
2	Seeds	652 (7.79)	664 (8.93)	625 (7.94)	631 (8.07)	900 (12.29)	750 (8.82)	645 (8.33)	666 (8.48)
3	Bunding	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	45 (0.58)	37 (0.48)
4	Fertilizers	1901 (22.72)	1976 (26.59)	2193 (27.87)	2153 (27.53)	2088 (28.52)	2087 (24.55)	1999 (25.78)	2013 (25.64)
5	Manure	741 (8.85)	248 (3.34)	169 (2.14)	197 (2.52)	0 (0)	69 (0.81)	175 (2.26)	156 (1.99)
6	Insecticides and Pesticides	937 (11.20)	964 (12.98)	1217 (15.46)	1172 (14.99)	1500 (20.49)	1693 (19.91)	1346 (17.37)	1400 (17.83)
7	Harvesting	811 (9.69)	819 (11.02)	838 (10.64)	834 (10.67)	900 (12.29)	850 (10)	835 (10.77)	838 (10.67)
8	Hired Permanent Labour (HPL)	0 (0)	211 (2.83)	331 (4.21)	304 (3.88)	0 (0)	171 (2.01)	494 (6.37)	437 (5.57)
9	Hired Casual Labour	881 (10.54)	879 (11.83)	904 (11.49)	900 (11.50)	706 (9.64)	772 (9.07)	836 (10.78)	824 (10.49)
10	Interest on Working Capital (WC)	148 (1.77)	141 (1.90)	152 (1.94)	151 (1.93)	177 (2.42)	151 (1.77)	155 (1.99)	154 (1.97)
11	Depreciation	1270 (15.18)	534 (7.18)	486 (6.18)	516 (6.60)	150 (2.05)	1090 (12.82)	468 (6.04)	552 (7.03)
12	A1	8367 (100)	7430 (100)	7870 (100)	7820 (100)	7321 (100)	8503 (100)	7753 (100)	7853 (100)
13	A1	8367 (29.88)	7430 (29.27)	7870 (28.92)	7820 (29.00)	7321 (30.89)	8503 (35.13)	7753 (31.60)	7853 (32.10)
14	A2= Cost A1 + Rent Paid for leased in Land	9325 (33.30)	8635 (34.02)	11137 (40.92)	10718 (39.74)	7321 (30.89)	12624 (52.15)	10274 (41.88)	10556 (43.14)
15	B1= Cost A1 + Interest on Fixed capital (Ex Land)	8812 (31.47)	7617 (30.01)	8040 (29.54)	8000 (29.66)	7374 (31.12)	8885 (36.71)	7917 (32.27)	8046 (32.88)
16	B2 = Cost B1 + Rent on Owned Land	24978 (89.21)	22913 (90.28)	24584 (90.34)	24351 (90.30)	21374 (90.20)	21900 (90.20)	22249 (90.70)	22181 (90.66)
17	C1= Cost B1 + Imputed value of Family Labour	9286 (33.16)	7776 (30.63)	8192 (30.10)	8163 (30.27)	7540 (31.82)	8988 (37.13)	7965 (32.47)	8106 (33.13)
18	C2 = Cost B2+ Imputed value of Family Labour	25452 (90.90)	23072 (90.90)	24737 (90.91)	24513 (90.90)	21540 (90.90)	22003 (90.91)	22298 (90.90)	22240 (90.90)
19	C3= Cost C2 + Management Cost (10% of Cost C2)	27998 (100)	25379 (100)	27210 (100)	26965 (100)	23694 (100)	24203 (100)	24528 (100)	24464 (100)

Note : Figures in parentheses from Serial no 1 to 11 are shown as percentage to cost A1 and from 13 to 18 are shown as percentage to Cost C3.

Table 1. Cost Pattern of Conventional Wheat in Southwest Punjab (₹ per Acre)**(Concluded)**

	Cost	Fazilka				Southwest Punjab			
		Small	Medium	Large	Overall	Small	Medium	Large	Overall
1	Land Preparation	1367 (16.25)	1304 (16.75)	852 (11.94)	909 (12.57)	1098 (13.66)	1056 (13.36)	854 (11.26)	882 (11.55)
2	Seeds	724 (8.61)	693 (8.89)	591 (8.29)	604 (8.36)	759 (9.44)	702 (8.88)	620 (8.18)	634 (8.30)
3	Bunding	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	15 (0.20)	12 (0.16)
4	Fertilizers	1888 (22.45)	1833 (22.54)	1623 (22.75)	1651 (22.82)	1959 (24.39)	1965 (24.86)	1938 (25.55)	1939 (25.39)

5	Manure	539 (6.41)	90 (1.16)	21 (0.29)	43 (0.59)	427 (5.31)	136 (1.72)	122 (1.60)	132 (1.73)
6	Insecticides and Pesticides	1588 (18.88)	1482 (19.04)	1439 (20.17)	1447 (20.01)	1342 (16.70)	1380 (17.45)	1334 (17.59)	1340 (17.55)
7	Harvesting	903 (10.73)	859 (11.03)	912 (12.78)	907 (12.54)	871 (10.85)	843 (10.66)	861 (11.35)	860 (11.26)
8	Hired Permanent Labour (HPL)	0 (0)	242 (3.11)	459 (6.44)	425 (5.88)	0 (0)	208 (2.63)	428 (5.64)	389 (5.09)
9	Hired Casual Labour	709 (8.43)	910 (11.69)	650 (9.11)	676 (9.34)	765 (9.53)	853 (10.80)	797 (10.50)	800 (10.47)
10	Interest on Working Capital (WC)	163 (1.94)	156 (2)	146 (2.05)	148 (2.04)	163 (2.03)	149 (1.89)	151 (1.99)	151 (1.98)
11	Depreciation	530 (6.30)	218 (2.80)	441 (6.18)	423 (5.85)	650 (8.09)	614 (7.76)	465 (6.13)	497 (6.51)
12	A1	8412 (100)	7786 (100)	7134 (100)	7233 (100)	8033 (100)	7906 (100)	7586 (100)	7635 (100)
13	A1	8412 (34.65)	7786 (32.45)	7134 (29.73)	7233 (30.13)	8033 (31.72)	7906 (32.23)	7586 (30.05)	7635 (30.36)
14	A2= Cost A1 +Rent Paid for leased in Land	13867 (57.11)	11522 (48.02)	8244 (34.36)	8716 (36.31)	10171 (40.16)	10927 (44.55)	9885 (39.15)	9997 (39.76)
15	B1= Cost A1 + Interest on Fixed capital (Ex Land)	8598 (35.41)	7862 (32.77)	7288 (30.37)	7381 (30.75)	8261 (32.62)	8121 (33.11)	7748 (30.69)	7809 (31.05)
16	B2= Cost B1 + Rent on Owned Land	21779 (89.71)	21662 (90.29)	21692 (90.40)	21692 (90.37)	22710 (89.68)	22158 (90.35)	22842 (90.48)	22741 (90.44)
17	C1= Cost B1 + Imputed value of Family Labour	8889 (36.61)	8010 (33.38)	7408 (30.87)	7508 (31.28)	8572 (33.85)	8258 (33.67)	7855 (31.11)	7926 (31.52)
18	C2= Cost B2+ Imputed value of Family Labour	22070 (90.90)	21810 (90.90)	21812 (90.90)	21820 (90.90)	23021 (90.90)	22295 (90.91)	22949 (90.90)	22858 (90.91)
19	C3= Cost C2 + Management Cost (10% of Cost C2)	24277 (100)	23991 (100)	23993 (100)	24002 (100)	25323 (100)	24524 (100)	25244 (100)	25143 (100)

Note : Figures in parentheses from Serial no 1 to 11 are shown as percentage to cost A1 and from 13 to 18 are shown as percentage to Cost C3.

(2) Conventional Wheat in Southwest Punjab : The Cost A_1 , on per acre basis, in southwest Punjab, for the small farmers is maximum (₹ 8,033) and minimum for the large farmers (₹ 7,586). It is due to this reason that small farmers have invested more amount in agricultural equipment. As a result, the depreciation cost is higher for them (₹ 650) than that for medium (₹ 614) and large farmers (₹ 465). The farmers in southwest Punjab use high dosage of fertilizers while doing conventional farming of wheat and this cost is the highest for medium farmers (₹ 1,965). They also use manure in order to increase productivity. The amount spent on manure is ₹ 132 per acre for all the farmers. It is more in case of small farmers (₹ 427) in comparison to the large farmers (₹ 122). Amount spent on insecticides and pesticides is higher for medium farmers (₹ 1,380) as compared to large farmers (₹ 1,334). The cost A_2 is highest (₹ 10,927) for the medium farmers followed by small farmers (₹ 10,171) and large farmers (₹ 9,885).

The cost B_1 is the highest for the small farmers (₹ 8,261) and is the lowest for large farmers (₹ 7,748). On an average, it is ₹ 7,809 in southwest Punjab. The B_2 cost is ₹ 22,741 on an average in southwest Punjab. It is highest for large farmers (₹ 22,842) followed by small (₹ 22,710) and medium farmers (₹ 22,158). For small farmers, C_1 cost is the highest (₹ 8,572) because of the use of more family labour than used by medium and large farmers. The cost C_2 and cost C_3 per acre are too high for small farmers, because of high cost A_1 and use of family labour than that for large and medium farmers in southwest Punjab.

Table 2. Cost Pattern of Organic Wheat in Southwest Punjab (₹ per Acre)

(Continued)

		Faridkot				Bathinda		
	Cost	Small	Medium	Large	Overall	Medium	Large	Overall
1	Land Preparation	1029 (13.69)	500 (9.79)	812 (11.96)	865 (12.66)	1000 (14.57)	810 (12.71)	818 (12.80)
2	Seeds	1071 (14.24)	900 (17.62)	1348 (19.86)	1220 (17.86)	1208 (17.61)	1127 (17.70)	1131 (17.69)
3	Bunding	588 (7.82)	400 (7.83)	732 (10.79)	669 (9.79)	400 (5.83)	684 (10.74)	671 (10.50)
4	Manure	412 (5.48)	0 (0)	1029 (15.16)	824 (12.05)	1000 (14.57)	727 (11.42)	740 (11.57)
5	Jeev Amrit	94 (1.25)	0 (0)	88 (1.30)	90 (1.32)	482 (7.02)	246 (3.87)	257 (4.02)
6	Harvesting	882 (11.74)	800 (15.67)	782 (11.52)	784 (11.48)	773 (11.26)	806 (12.65)	805 (12.59)
7	Hired Permanent Labour (HPL)	0 (0)	165 (3.23)	49 (0.72)	26 (0.38)	71 (1.03)	297 (4.67)	287 (4.49)
8	Hired Casual Labour	412 (5.48)	400 (7.83)	779 (11.48)	641 (9.39)	636 (9.27)	507 (7.96)	513 (8.02)
9	Interest on Working Capital (WC)	126 (1.67)	812 (15.90)	226 (3.33)	161 (2.35)	344 (5.01)	125 (1.96)	135 (2.11)
10	Depreciation	2904 (38.63)	1130 (22.13)	942 (13.88)	1552 (22.72)	948 (13.82)	1040 (16.32)	1035 (16.20)
11	A1	7518 (100)	5107 (100)	6789 (100)	6831 (100)	6862 (100)	6370 (100)	6393 (100)
12	A1	7518 (29.18)	5107 (20.51)	6789 (31.65)	6831 (30.93)	6862 (28.45)	6370 (24.96)	6393 (25.11)
13	A2= Cost A1 +Rent Paid for leased in Land	8577 (33.29)	5107 (20.51)	12061 (56.22)	10699 (48.45)	7504 (31.12)	9965 (39.04)	9852 (38.70)
14	B1= Cost A1 + Interest on Fixed capital (Ex Land)	8534 (33.13)	6132 (24.63)	7260 (33.84)	7399 (33.50)	7194 (29.83)	6734 (26.38)	6755 (26.53)
15	B2= Cost B1 + Rent on Owned Land	23328 (90.56)	22632 (90.90)	19260 (89.79)	20037 (90.74)	21921 (90.90)	23159 (90.75)	23102 (90.75)
16	C1= Cost B1 + Imputed value of Family Labour	8623 (33.47)	6132 (24.63)	7500 (34.96)	7437 (33.68)	7194 (29.83)	6774 (26.54)	6794 (26.69)
17	C2= Cost B2+ Imputed value of Family Labour	23417 (90.91)	22632 (90.90)	19500 (90.90)	20074 (90.91)	21921 (90.90)	23199 (90.90)	23140 (90.90)
18	C3= Cost C2 + Management Cost (10% of Cost C2)	25758 (100)	24896 (100)	21450 (100)	22081 (100)	24113 (100)	25519 (100)	25454 (100)

Note : Figures in parentheses from Serial no. 1 to 10 are shown as percentage to cost A1 and from 12 to 17 are shown as percentage to Cost C3.

(3) Organic Wheat : In addition to the conventional wheat crop, the world's attention towards organic farming systems has also increased over the years. The major reasons for the popularity of organic farming are the potential benefits which this type of cultivation could provide not only in terms of environmental protection and conservation of non-renewable resources, but also in terms of improved food quality. The Table 2 depicts that the A_1 cost of organic wheat produced per acre in the Faridkot district is minimum (₹ 5,107) for medium farmers. Small farmers incurred the maximum A_1 cost (₹ 7,518) and the large farmers incurred a cost of ₹ 6,789 per acre. It is due to this reason that small farmers have invested very much in agricultural equipment. Therefore, depreciation cost is higher for them (₹ 2,904) than it is for medium (₹ 1,130) and large farmers (₹ 942). Large farmers spent very less amount on land preparation, seeds, and bunding cost in comparison to other farm sizes. In case of Bathinda district, the A_1 cost is higher for the medium farmers (₹ 6,862) than that for the large farmers (₹ 6,370). Therefore, it is evident that the large farmers are getting the benefits of economies of scale in agriculture production. The cost A_1 is ₹ 4,401 for all the farmers in Fazilka district. It is the highest for small farmers (₹ 4,902) and the lowest for large farmers (₹ 4,286).

The large farmers spent the maximum on seeds (₹ 1,348) in comparison to medium farmers (₹ 900) and small

Table 2. Cost Pattern of Organic Wheat in Southwest Punjab (₹ Per Acre)

(Concluded)

		Fazilka				Southwest Punjab			
	Cost	Small	Medium	Large	Overall	Small	Medium	Large	Overall
1	Land Preparation	913 (18.63)	1014 (23.30)	755 (17.61)	805 (18.28)	971 (15.64)	838 (15.40)	792 (13.62)	829 (14.12)
2	Seeds	1325 (27.03)	1411 (32.42)	1024 (23.89)	1110 (25.22)	1198 (19.29)	1173 (21.56)	1166 (20.06)	1154 (19.64)
3	Bunding	580 (11.83)	514 (11.81)	512 (11.95)	524 (11.91)	584 (9.41)	438 (8.05)	643 (11.06)	621 (10.58)
4	Manure	267 (5.44)	0 (0)	305 (7.11)	273 (6.19)	339 (5.46)	333 (6.13)	687 (11.82)	612 (10.42)
5	Jeev Amrit	47 (0.95)	21 (0.49)	88 (2.05)	75 (1.70)	70 (1.13)	168 (3.08)	141 (2.42)	141 (2.40)
6	Harvesting	1113 (22.71)	914 (21)	897 (20.93)	937 (21.29)	998 (16.07)	829 (15.24)	828 (14.25)	842 (14.33)
7	Hired Permanent Labour (HPL)	140 (2.86)	0 (0)	30 (0.70)	47 (1.07)	70 (1.13)	79 (1.44)	125 (2.15)	120 (2.04)
8	Hired Casual Labour	310 (6.32)	214 (4.92)	230 (5.36)	243 (5.52)	361 (5.81)	417 (7.66)	505 (8.69)	466 (7.93)
9	Interest on Working Capital (WC)	100 (2.04)	121 (2.77)	108 (2.52)	108 (2.45)	113 (1.82)	426 (7.82)	153 (2.63)	134 (2.29)
10	Depreciation	107 (2.18)	143 (3.28)	337 (7.87)	280 (6.36)	1505 (24.24)	740 (13.61)	773 (13.30)	956 (16.27)
11	A1	4902 (100)	4354 (100)	4286 (100)	4401 (100)	6210 (100)	5441 (100)	5815 (100)	5875 (100)
12	A1	4902 (22.35)	4354 (21.69)	4286 (20.55)	4401 (20.98)	6210 (26.04)	5441 (23.62)	5815 (25.72)	5875 (25.72)
13	A2= Cost A1 +Rent Paid for leased in Land	4902 (22.35)	4354 (21.69)	4286 (20.55)	4401 (20.98)	6739 (28.26)	5655 (24.55)	8770 (38.79)	8317 (36.41)
14	B1= Cost A1 + Interest on Fixed capital (Ex Land)	4902 (22.35)	4404 (21.94)	4404 (21.12)	4493 (21.41)	6718 (28.17)	5910 (25.66)	6133 (27.12)	6216 (27.21)
15	B2= Cost B1 + Rent on Owned Land	19902 (90.75)	18118 (90.26)	18920 (90.74)	19028 (90.70)	21615 (90.65)	20890 (90.71)	20446 (90.44)	20722 (90.73)
16	C1= Cost B1 + Imputed value of Family Labour	4935 (22.50)	4532 (22.57)	4437 (21.28)	4534 (21.61)	6779 (28.43)	5953 (25.85)	6237 (27.59)	6255 (27.38)
17	C2= Cost B2+ Imputed value of Family Labour	19935 (90.90)	18246 (90.90)	18954 (90.91)	19070 (90.90)	21676 (90.90)	20933 (90.90)	20551 (90.90)	20761 (90.90)
18	C3= Cost C2 + Management Cost (10% of Cost C2)	21929 (100)	20071 (100)	20849 (100)	20977 (100)	23844 (100)	23027 (100)	22606 (100)	22837 (100)

Note : Figures in parentheses from Serial no 1 to 10 are shown as percentage to cost A1 and from 12 to 17 are shown as percentage to Cost C3.

farmers (₹ 1,071) in Faridkot district, because of the reason that large farmers sow certified organic seeds in more acres than medium and small farmers do. In Bathinda district, medium farmers spent more (₹ 1,208) on seeds as compared to large farmers (₹ 1,127). The seed cost is highest for the medium farmers (₹ 1,411) and lowest for the large farmers (₹ 1,024) in Fazilka district.

The large farmers spent maximum (₹ 1,029) and the small farmers spent minimum (₹ 412) amount on manure in Faridkot district. The amount spent on manure is ₹ 740 for all farmers in Bathinda district. It is more in case of medium farmers (₹ 1,000) than large farmers (₹ 727). In Fazilka district, manure cost is nil in case of medium farmers and almost similar for the small and large farmers (₹ 267 and ₹ 305, respectively). In all districts, the expenditure on *jeev amrit*, a sort of organic insecticide for organic wheat is nominal. As depicted in the Table 2, cost A_2 is highest for large farmers in Faridkot and Bathinda districts because of the fact that they cultivate more of rented land. In Fazilka district, there is no land lease in amount for all farmers. Hence, cost A_2 is equal to cost A_1 .

Cost B_1 is highest for small farmers in Faridkot and Fazilka districts because of higher cost A_1 . In Bathinda district, cost B_1 is more for medium farmers (₹ 7,194) than that for large farmers (₹ 6,734) again due to higher cost A_1 . In Faridkot and Fazilka districts, cost B_2 is highest for small farmers again. In Bathinda district, cost B_2 is more for large farmers (₹ 23,159) in comparison to cost for medium farmers (₹ 21,921). This is because large farmers have more of their own land for cultivation.

The costs C_1 , C_2 , and C_3 are highest again for small farmers in Faridkot district and Fazilka districts due to earlier mentioned causes. In Bathinda district again, cost C_1 is higher for medium farmers than that for large farmers, and costs C_2 and C_3 are higher for large farmers than the cost for medium farmers.

(4) Organic Wheat in South West Punjab : The Table 2 reveals that the cost A_1 of production of organic wheat per acre in southwest Punjab is ₹ 5,875, whereas at ₹ 6,210, it is the highest for small farmers ; at ₹ 5,441, it is the lowest for the medium farmers and it is ₹ 5,815 per acre for large farmers. It is due to this reason that small farmers have invested a lot in agricultural equipment. Therefore, depreciation cost is higher for them (₹ 1,515) than that for medium (₹ 740) and large farmers (₹ 773). Actually, most farmers shown as large farmers (38 out of 60) were cultivating organic wheat in a very small area of their operational land holdings. The maximum expenditure is on seeds (₹ 1,154 or 19.64% of cost A_1) followed by depreciation cost (₹ 956 or 16.27%), and these two costs constitute almost more than one third of the overall total cost.

It is clear that for the small farmers, the highest proportion of the A_1 cost is incurred on depreciation (24.24%) followed by seed cost (19.29%), harvesting cost (16.07%), and the land preparation cost (15.64%). In case of medium farmers, the trend is same as that for the small farmers. Expenditure on seeds is the highest (21.56%) followed by land preparation cost (15.40%), harvesting (15.24%), and depreciation cost (13.61%). In case of large farmers, the seeds cost is the highest (20.06%) followed by harvesting cost (14.25%), land preparation cost (13.62%), depreciation cost (13.30%), manure (11.82%), and bunding (11.06%). It has been found that A_2 cost is the highest (₹ 8,770) for large farmers, followed by small farmers (₹ 6,739) and medium farmers (₹ 5,655). On an average, it is ₹ 8,317 per acre for all farmers.

B_1 cost is the highest for small farmers due to both high cost A_1 and more use of family labour than for large and medium farmers. The cost B_2 is highest for the small farmers again. The cost C_1 is also the highest for small farmers (₹ 6,779). It is ₹ 6,237 for large farmers and ₹ 5,953 for medium farmers as in the case of cost B_1 . The costs C_2 and C_3 are also high for small farmers.

(5) Cost Comparison of Conventional Wheat and Organic Wheat : A comparison of Table 1 and Table 2 clearly shows that per acre cost of cultivation is lower (₹ 5,875) in case of organic wheat crop than conventional wheat crop (₹ 7,635) in southwest Punjab. A further perusal of the data in Table 5 shows that organic farmers with ₹ 5,875 cultivation cost produced just 9.18 quintals of wheat per acre, while conventional farmers with ₹ 7,635 cultivation cost produced 16.74 quintals of wheat. Therefore, with just 30% increase in input cost, output of conventional wheat increases by 82%. The land preparation cost for conventional wheat is ₹ 882 and it is ₹ 829 in case of organic crop, while per acre expenditure on seeds is substantially higher in organic farming, that is, ₹ 1,154 as compared to ₹ 634 for conventional farming. The expenditure on fertilizers and insecticides & pesticides is zero in case of the former and the farmers spent just ₹ 141 on *jeev amrit*. The fertilizer and insecticides & pesticides components of cost A_1 are ₹ 1,939 and ₹ 1,340, respectively in case of the conventional wheat crop. As a consequence, the net effect is that the cost of production in case of organic farming is lesser than that of conventional wheat crop.

The A_2 cost is ₹ 9,997 and ₹ 8,317 for conventional and organic wheat crop, respectively. The B_1 cost of conventional wheat is ₹ 7,809 and the corresponding figure for organic wheat is ₹ 6,216. The cost B_2 of conventional wheat is ₹ 22,741 in southwest Punjab and the corresponding figure for organic wheat is ₹ 20,722. Cost C_1 incurred on conventional crop of wheat is ₹ 7,926 and the corresponding figure for organic crop of wheat

Table 3. Different Concepts of Profitability of Conventional Wheat (₹ Per Acre)

District	Farm Size	GVO	RVC	FBI	FLI	NI	RM	RPR
Faridkot	Small	28520 (100)	20153 (70.66)	19195 (67.30)	3542 (12.41)	3068 (10.75)	523 (1.83)	112
	Medium	27643 (100)	20212 (73.11)	19008 (68.76)	4730 (17.11)	4571 (16.53)	2264 (8.19)	120
	Large	25880 (100)	18010 (69.59)	14743 (56.96)	1295 (5.00)	1143 (4.41)	-1331 (-5.14)	105
	Overall	26214 (100)	18394 (70.16)	15496 (59.11)	1863 (7.1)	1701 (6.48)	-750 (-2.86)	107
Bathinda	Small	24450 (100)	17129 (70.05)	17129 (70.05)	3076 (12.58)	2910 (11.9)	756 (3.09)	114
	Medium	27251 (100)	18748 (68.79)	14627 (53.67)	5351 (19.63)	5248 (19.25)	304 (11.18)	124
	Large	24703 (100)	16950 (68.61)	14429 (58.4)	2454 (9.93)	2405 (9.73)	175 (0.70)	111
	Overall	25068 (100)	17215 (68.67)	14512 (57.89)	2888 (11.52)	2829 (11.2)	605 (2.41)	113
Fazilka	Small	23140 (100)	14727 (63.64)	9273 (40.07)	1360 (5.87)	1069 (4.61)	-1138 (-4.91)	105
	Medium	24314 (100)	16528 (67.97)	12792 (52.61)	2652 (10.9)	2504 (10.29)	323 (1.32)	111
	Large	20901 (100)	13767 (65.86)	12657 (60.55)	-791 (-3.78)	-911 (-4.35)	-3092 (-14.79)	96
	Overall	21282 (100)	14049 (66.01)	12566 (59.04)	-410 (-1.92)	-537 (-2.52)	-2719 (-12.77)	98
Southwest	Small	25370 (100)	17337 (68.33)	15199 (59.9)	2660 (10.48)	2349 (9.25)	47 (0.18)	110
Punjab	Medium	26402 (100)	18496 (70)	15475 (58.61)	4244 (16.07)	4108 (15.55)	1878 (7.11)	118
	Large	23828 (100)	16242 (68.16)	13943 (58.51)	986 (4.13)	879 (3.68)	-1416 (-5.94)	104
	Overall	24188 (100)	16553 (68.43)	14192 (58.67)	1447 (5.98)	1331 (5.50)	-955 (-3.94)	106

Note : Figures in parentheses are shown as percentage to *GVO*.

Legends: *GVO* - Gross value of output, *RVC* - Returns over variable cost, *FBI* - Family business income, *FLI* - Family labour income, *NI* - Net income, *RM*- Returns to management, *RPR* - Returns per rupee

is less, that is, ₹ 6,255. It has been found that the cost C_2 of conventional crop of wheat is ₹ 22,858 and the corresponding figure for organic crop of wheat is ₹ 20,761. The C_3 cost for conventional crop of wheat is ₹ 25,143 and the corresponding figure for organic crop of wheat is ₹ 22,837. Therefore, in comparison to cost A_1 and A_2 , the difference between other costs, that is, B_1 , B_2 , C_1 , C_2 , and C_3 incurred on production of conventional and organic wheat gets reduced.

(6) Gross Income and Profitability of Conventional Wheat : The Table 3 shows gross value of output (*GVO*) on per acre basis in all the selected three districts of Punjab across all the three categories of farmers of conventional wheat. *GVO* is higher in Faridkot district (₹ 26,214) than in Bathinda (₹ 25,068) and Fazilka districts (₹ 21,282), which clearly shows that there is little variation in *GVO* across the selected districts of Punjab.

The medium farmers earned the highest level (₹ 18,496) of return over variable cost (*RVC*) than small farmers (₹ 17,337) and large farmers (₹ 16,242) in southwest Punjab. The farm business income (*FBI*) is higher for medium farmers (₹ 15,475) than small (₹ 15,199) and large farmers (₹ 13,943) due to higher production, while cost A_2 is lower for the other two categories of farmers.

For farmers from the Bathinda district, the family labour income (*FLI*) is the highest (₹ 2,888), followed by farmers in Faridkot district (₹ 1,863) and for Fazilka, the *FLI* is in negative (₹ 410). Therefore, conventional wheat growing farmers in Fazilka district are unable to recover the value of their family labour applied in agriculture. Moreover, the pattern of *FLI* earned across the different farm sizes in southwest Punjab highly differs. For the medium farmers, *FLI* is the highest (₹ 4,244) followed by small farmers (₹ 2,660) and large farmers (₹ 986) in southwest Punjab. The general pattern in this is that the middle farmers earn the highest *FLI* in their respective districts. When *FLI* is taken as the measure of profitability, cultivating wheat in Faridkot and Bathinda districts is profitable, and farmers of Fazilka district are unable to recover the value of their family labour.

There is a noticeable difference between the *NI* across the three districts. The highest *NI* has been earned by the farmers in Bathinda district (₹ 2829) followed by the farmers in Faridkot district (₹ 1,701). On the other hand, the farmers in Fazilka district suffered losses in *NI* of the order of ₹ 537 per acre. Therefore, conventional wheat growing farmers of Fazilka even cannot recover their out of pocket expenses. The returns to management from conventional wheat crop are negative in Fazilka and Faridkot districts and are very meager in Bathinda district (₹ 605).

As far as the conventional wheat crop is concerned, as shown in the Table 3, the value of *RPR* is reported to be higher in case of Bathinda district (113%) than in Faridkot (107%). The farmers in Fazilka district suffered negative returns, as the value of *RPR* in this district is merely 98%. Thus, in this Fazilka district, even all out of pocket expenses have not been recovered. Thus, if the objective of examining the effectiveness of the wheat crop's price policy (i.e. MSP) in terms of facilitating agriculturalists to get adequate profits is emphasized, the present study finds that the MSP of wheat is not serving its purpose of giving minimum returns to the farmers in Fazilka district.

(7) Gross Income and Profitability of Organic Wheat : As can be inferred from the Table 4, the gross value of output (*GVO*) of organic wheat on per acre basis for all farm sizes is the highest (₹ 30,523) for Fazilka and Faridkot districts, whereas, it is little less in case of Bathinda district (₹ 29,691). Moreover, it is highest for large farmers in Faridkot (₹ 39,824) and Fazilka (₹ 37,341) districts ; whereas, it is highest for medium farmers in Bathinda district (₹ 37,782).

On an average, all farmers earned per acre *RVC* of ₹ 23,692, ₹ 23,299, and ₹ 26,122 for Faridkot, Bathinda, and Fazilka districts, respectively. The *FBI* on per acre basis is highest for large farmers too in Faridkot (₹ 27,763) and Fazilka districts (₹ 33,055). On the other hand, it is highest for medium farmers again in Bathinda district (₹ 30,278).

Table 4. Different Concepts of Profitability of Organic Wheat (₹ Per Acre)

District	Farm Size	GVO	RVC	FBI	FLI	NI	RM	RPR
Faridkot	Small	26961 (100)	19443 (72.11)	18384 (68.18)	3633 (13.47)	3544 (13.14)	1203 (4.46)	115
	Medium	20200 (100)	15093 (74.71)	15093 (74.71)	-2432 (-12.03)	-2432 (-12.03)	-4696 (-23.24)	89
	Large	39824 (100)	33035 (82.95)	27763 (69.71)	20563 (51.63)	20324 (51.03)	18374 (46.13)	204
	Overall	30523 (100)	23692 (77.62)	19824 (64.94)	10487 (34.35)	10449 (34.23)	8442 (27.65)	152
	Small	-	-	-	-	-	-	-
Bathinda	Medium	37782 (100)	30920 (81.83)	30278 (80.13)	15860 (41.97)	15860 (41.97)	13668 (36.17)	172
	Large	29435 (100)	23065 (78.35)	19471 (66.14)	6277 (21.32)	6236 (21.18)	3916 (13.30)	127
	Overall	29691 (100)	23299 (78.47)	19840 (66.44)	6590 (22.19)	6551 (22.06)	4237 (14.27)	128
Fazilka	Small	34113 (100)	29211 (85.63)	29211 (85.63)	14211 (41.65)	14178 (41.56)	12184 (35.71)	171
	Medium	31929 (100)	27575 (86.36)	27575 (86.36)	13811 (43.25)	13682 (42.85)	11858 (37.71)	175
	Large	37341 (100)	33055 (88.52)	33055 (88.52)	18421 (49.33)	18387 (49.24)	16492 (44.16)	197
	Overall	30523 (100)	26122 (85.58)	26122 (85.58)	11495 (37.66)	11453 (37.52)	9546 (31.27)	160
Southwest	Small	20358 (100)	16218 (79.66)	15865 (77.93)	5948 (29.21)	5907 (29.01)	4462 (21.91)	95
Punjab	Medium	29970 (100)	24529 (81.84)	24315 (81.13)	9080 (30.29)	9037 (30.15)	6943 (23.16)	146
	Large	35533 (100)	29719 (83.63)	26763 (75.31)	15087 (42.45)	14983 (42.16)	12928 (36.38)	176
	Overall	30246 (100)	24371 (80.57)	21929 (72.50)	9524 (31.48)	9485 (31.35)	7408 (24.49)	147

Note : Figures in parentheses are shown as percentage to *GVO*. The small farmers in Bathinda did not cultivate organic wheat.

Legends: *GVO* - Gross value of output, *RVC* - Returns over variable cost, *FBI* - Family business income, *FLI* - Family labour income, *NI* - Net income, *RM* - Returns to management, *RPR* - Returns per rupee

Table 5. Per Unit Production Cost Ratio of Yield between Conventional and Organic Wheat

District	Farm Size	Conventional wheat yield (Quintals Per acre)	Organic wheat yield (Quintals Per acre)	Ratio of production between conventional and organic wheat
Faridkot	Small	20.04	7.89	2.54
	Medium	19.36	6.00	3.23
	Large	18.05	12.54	1.44
	Overall	18.30	9.26	1.98
Bathinda	Small	17.00	nil	
	Medium	19.09	11.82	1.62
	Large	17.19	8.97	1.92
	Overall	17.46	9.10	1.92
Fazilka	Small	15.83	11.07	1.43
	Medium	16.96	9.86	1.72
	Large	14.55	12.08	1.20
	Overall	14.81	9.26	1.60
Southwest	Small	17.68	10.32	1.71
Punjab	Medium	18.61	9.58	1.94
	Large	16.44	10.23	1.61
	Overall	16.74	9.18	1.82

The *FLI* is highest in Fazilka district (₹ 11,495) followed by Faridkot (₹ 10,487) and Bathinda districts (₹ 6,590). Across the farm sizes in all three districts, there is no uniform pattern. There is a significant dissimilarity in the *NI* earned by the farmers from each farm size across all the districts from organic wheat crop on per acre basis. Moreover, there are no uniform patterns in the value of *NI* across the three farmer sizes across the three districts. As proportion to *GVO*, highest *NI* is earned by large farmers (51.03%) of Faridkot and it is negative for medium farmers (-12.03%) of the same district.

The returns to management on per acre basis in case of organic wheat crop in descending order are: Fazilka (₹ 9,546), Faridkot (₹ 8,442), and Bathinda (₹ 4,237). Furthermore, the results clearly specify that organic farming provided the highest management returns to large farmers in Faridkot (₹ 18,374) and Fazilka (₹ 16,492) districts ; whereas, medium farmers earned the highest returns in case of Bathinda district (₹ 13,668).

The large farmers in Faridkot (204%) and Fazilka (197%) got higher *RPR* compared to other categories of farmers in these two districts. In case of Bathinda district, on the other hand, small farmers did not cultivate the organic wheat crop and medium farmers (172%) got the largest *RPR* in comparison to large farmers. On an average, the *RPR* for all farmers of southwest Punjab is 147%.

(8) Profitability Comparison of Conventional and Organic Wheat : In southwest Punjab, *GVO* of wheat cultivation on per acre basis of organic farmers (₹ 30,246) is higher in comparison to conventional farmers (₹ 24,188). Therefore, growing wheat through organic practices is more beneficial in value terms. But yield per acre is 1.82 times higher for conventional farmers (16.74 quintals) than it is for organic farmers (9.18 quintals). Therefore, gross value of organic produce is higher due to availability of price premium for its produce. Furthermore, organic wheat is remunerative because there is a very small area under cultivation. When cultivated at a large scale, the price premium available to its produce will vanish and if it is purchased at minimum support price, then it will be very uneconomical.

In southwest Punjab, the *GVO* of organic wheat cultivation is highest (₹ 35,533) for large farmers and lowest

for small farmers (₹ 20,358). This is because large farmers have more opportunities to sell their produce at higher prices than small farmers. *FLI* is just ₹ 1,447 for conventional farmers, while it is ₹ 9,524 for organic farmers. Net income (*NI*) is very high (₹ 9,485) for organic farmers than conventional farmers (₹ 1,331). Returns to management for wheat cultivation are ₹ 7,408 for organic and negative (₹ -955) for conventional farmers. Returns per rupee (*RPR*) is 147% for organic farmers and it is just 106% for conventional farmers. Thus, if the objective of examining the effectiveness of wheat crop's price policy (i.e. MSP) in terms of facilitating agriculturalists to get adequate profits is emphasized, the present study finds that the MSP of conventional wheat is not serving its purpose of giving minimum returns to farmers. Therefore, conventional wheat cultivating farmers are just able to recover the value of their family labour and rent of owned land and have to bear loss of value of their management functions.

Policy Suggestions

Some policy suggestions have been provided here on the basis of the analysis of the present study :

- ✎ The present study shows that high use of chemical fertilizers has reduced the fertility of soil. Therefore, promotion of compost with agricultural residue to reduce input use, that is, chemical fertilizers and pesticides etc. is the need of the hour.
- ✎ To meet the requirement of rising population of the world, there is need of safe food and not pure food. Therefore, until sustainable alternative model of agricultural development is found, judicious use of chemical fertilizers and pesticides, that is, the amount of acceptable limit of these which is not harmful to health and environment may be allowed for food production.
- ✎ The present study elaborates that depreciation costs for farmers have been gradually accumulated due to over investment and that led to low returns, particularly from organic agriculture in Punjab. So, cooperative societies should be promoted for supply of agriculture machinery to poor farmers.
- ✎ Rationalization of subsidies is essential for preserving agricultural natural resources. Farmers who are judiciously using land and water resources for crop cultivation in comparison to other farmers must be made eligible for more subsidies.
- ✎ There is need to increase public expenditure on agricultural research and extension services. These facilities can enable agricultural scientists to study conventional and organic farming systems, their working, and dynamic inter-relationships, problems, and solutions. For example, when farmers use artificial irrigation methods for organic agriculture (OF), it does not remain organic. Farmers need training regarding adoption of organic techniques along with judicious use of other inputs in cultivation.
- ✎ Effective purchase against the downfall of prices of agricultural products is necessary. Farmers have been cultivating wheat and paddy as support prices of these crops is more remunerative for them than that of other crops. For diversification of agriculture, market reforms are necessary, rather than only concentrating on input promotion strategy. Farmers are also dissatisfied with minimum support prices (MSP) mechanism. Therefore, fixing of MSP by taking rising costs and stagnant yields into consideration is the need of the hour.
- ✎ Effective crop insurance mechanism is the need of the hour to save farmers from committing suicides and agricultural distress. Bt cotton growers in the country, particularly in Punjab, faced enormous losses due to white fly attack. Lack of proper insurance led these farmers to committing suicide as some studies on Bt growers reported from Maharashtra state of India indicated.

Conclusion, Limitations of the Study, and Scope for Further Research

Although per acre cost of cultivation is lower for organic wheat than conventional wheat in southwest Punjab, with just 30% increase in input cost, output of conventional wheat increases by 82% (Table 5). The gross value of produce of wheat cultivation of organic farmers is higher in comparison to conventional farmers due to availability of price premium for its produce. Further, it seems that organic wheat is remunerative. It may be because of the fact that organic wheat is grown in a very small area. However, when it is cultivated at a large scale, price premium available to its produce may vanish. There is also a challenge to maintain national food security through organic wheat cultivation (with such low yields per acre). India needs enough safe food to feed its people instead of a very small amount of pure food. Therefore, instead of changing conventional for organic techniques, conventional techniques need to be blended with organic techniques by incorporating organic techniques under it.

This study relied mainly on the information provided by the respondents. Generally, the respondents did not keep any record of the cost incurred and income gained from their agricultural practices. Few respondents deliberately concealed some information and under-reported their income, expenditure, and investment levels. A few of the respondents did not give clear information about their holdings. Also, while giving response to the question regarding conventional, GM, and organic crops, some respondents did not have clear knowledge about the varieties they had grown. Further research should be done for a longer period of time, say 5 to 6 years, to see the results on per acre yield of wheat by cultivation through organic techniques.

References

- Alagh, Y. K. (2006). Overview. In, *State of the Indian farmer: A millennium study*. New Delhi : Ministry of Agriculture, Government of India.
- Badgley, C., Moghtader, J., Quintero, E., Zakem, E., Chappell, M. J., Avilés-Vázquez, K., Samulon, A., & Perfecto, I. (2007). Organic agriculture and the global food supply. *Renewable Agriculture and Food Systems*, 22(2), 86 - 108. doi: <https://doi.org/10.1017/S1742170507001640>
- Beilen, N. V. (2016). *Effects of conventional and organic agricultural techniques on soil ecology*. A Report by the Center for Development and Strategy, New York. Retrieved from www.thinkcds.org/wpcontent/uploads/2016/01/Final_Van_Beilen_2016.pdf
- Chand, R., & Haque, T. (1997). Sustainability of rice-wheat crop system in Indo-Gangetic region. *Economic and Political Weekly*, 32 (13), 26-30.
- Charyulu, D. K., & Biswas, S. (2010). *Economics and efficiency of organic farming vis-à-vis conventional farming in India (Working Paper No. 2010-04-03)*. Retrieved from <http://sa.indiaenvironmentportal.org.in/files/rnpworkingpaper.pdf>
- Jordan, C. (2008). *Can organic agriculture feed the world ?* Retrieved from [http://www.springvalleyecofarms.org:8090/UserFiles/File/Can Organic Ag Feed the World_08132009.pdf](http://www.springvalleyecofarms.org:8090/UserFiles/File/Can%20Organic%20Ag%20Feed%20the%20World_08132009.pdf)
- Kniss, A. R., Savage, S. D., & Jabbour, R. (2016). Commercial crop yields reveal strengths and weaknesses for organic agriculture in the United States. *PLOS ONE*, 11(11). DOI : <https://doi.org/10.1371/journal.pone.0161673>

- Kramer, S. B., Reganold, J. P., Glover, J. D., Bohannon, B. J. M., & Mooney, H. A. (2006). Reduced nitrate leaching and enhanced denitrifier activity and efficiency in organically fertilized soils. *Proceedings of the National Academy of Sciences of the United States of America*, 103(12), 4522 - 4527. doi: <https://doi.org/10.1073/pnas.0600359103>
- Kumar, S., & Singh, P. (2010). *Determinants of stagnation in productivity of important crops in Punjab*. Agro Economic Research Centre, Punjab Agricultural University, Ludhiana. Retrieved from aercpau.com/assets/docs/Productivity.pdf
- Singh, I. P., & Grover, D. K. (2011). Economic viability of organic farming : An empirical experience of wheat cultivation in Punjab. *Agricultural Economics Research Review*, 24 (2), 275 - 281.
- Singh, J., & Kolar, J. S. (2001). Agricultural economy of the Punjab at the crossroads. *International Journal of Punjab Studies*, 8 (2).