

Economics of organic farming vis-'-vis conventional farming in India

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Introduction :

India is bestowed with lot of potential to produce all varieties of organic products due to its agro-climatic regions (Salvador et al., 2003). In several parts of the country, the inherited tradition of organic farming is an added advantage (Mahale, 2002). This holds promise for the organic producers to tap the market which is growing steadily in the domestic market related to the export market. Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. The cultivated land under certification is around 2.8 million ha. This includes one million ha under cultivation and the rest is under forest area (wild collection) (APEDA, 2010). India exported 86 items during 2007-08 with the total volume of 37533 MT. The export realization was around 100.4 million US \$ registering a 30 per cent growth over the previous year (APEDA, 2010).

Organic farming systems have attracted increasing attention over the last one decade because they are perceived to offer some solutions to the problems currently besetting the agricultural sector. Organic farming has the potential to provide benefits in terms of environmental protection, conservation of non-renewable resources and improved food quality (Worthington, 2001; Haas et al., 2005). Countries like Europe have recognized and responded to these potential benefits by encouraging farmers to adopt organic farming practices, either directly through financial incentives or indirectly through support for research, extension and marketing initiatives. As a consequence, the organic sector throughout Europe is expanded rapidly (24% of world's organic land). But, in the developing countries like India, the share is around 2 per cent only (included certified and wildlife). However, there is considerable latent interest among farmers in conversion to organic farming in India. But, some farmers are reluctant to convert because of the perceived high costs and risks involved (Shirsagar, 2008). Those who have converted earn equal incomes to their conventional counterparts, if premium markets exist for organic produce (Mac Donald, 2004). Government of India has also initiated programs like National Program for Organic Production (NPOP) and National Project on Organic Farming (NPOF) for systematic promotion of organic farming in the country in project mode in specified areas (NCOF, 2007). Despite the attention which has been paid to organic farming over the last few years, very little accessible information actually exists on the costs and returns of organic farming in India. Similarly, there are only a few attempts of comparing economics between organic and conventional production systems in different states. Therefore, the present paper focuses mainly on economics of organic farming vis-'-vis conventional farming in India.

Study coverage :

The study has purposely chosen four states in India for present study. They are namely; Gujarat, Maharashtra, Punjab and U.P states. From each state; a random sample of fifteen organic and fifteen inorganic farmers were interviewed regarding their cost of cultivation in major crops grown by them. The data for both input and output quantities and their unit prices were collected from the sample farmers. The study pertains to the cropping year 2009-10. The details of study coverage and crops identified across different states are presented in table 1.

Table 1:

Geographic coverage and crops selected for study

State	Gujarat	Maharashtra	Punjab	U.P
Sample districts	Bhuj	Warana	Faridkot and Fatehgarh Saheb	Ahmednagar
Crops Covered	Cotton	Sugarcane	Paddy, wheat and cotton	Wheat, Paddy and Sugarcane

Review of literature :

Lampkin (1994) summarized studies conducted on economics of organic farming in different crops in South and West of England and parts of Scotland and Wales and concluded that organic farming systems were more diverse in terms of enterprise mix; have lower yields and higher labor costs which were not compensated for fully by reduced input costs. Padel and Uli (1994) reviewed several studies on costs and returns of organic farming in various crops in Germany and revealed that organic farming was equally profitable with conventional farming. Lower yields for arable crops were compensated by reduced costs of inputs and premium prices leading to financial stability of farmers. Dubgaard (1994) concluded that the substantial price premiums on outputs and public support policies are essential for the economic viability of organic farming in Denmark. Anderson (1994) found that the lower yields on organic farms contrasted with conventional farms which were balanced by lower production costs in USA. Singh et al (2006) examined the economics of organic farming in Uttaranchal (India) and concluded that cultivation of paddy yielding more profits than wheat cultivation. Shirsagar (2008) studied the impact of organic farming on economics of sugarcane cultivation in Maharashtra (India) and concluded that the yields were low in organic farms than conventional farms but compensated by price premiums. Raj kumar (2009) analyzed economics of carrot cultivation in Nepal and found that higher costs and revenues in inorganic farms while higher benefit cost ratio was observed in organic farms.

Results and discussions :

Simple tabular analysis was applied on the primary data collected from the farmers in different states and crops. The results are summarized state wise in tables from 2 to 9.

Economics of paddy (basmati) cultivation in Punjab :

The per acre economics of paddy cultivation in Punjab state both under organic and conventional farming is presented in table 2. Most of the sample organic farmers in this region are following the method of 'natural farming' or 'zero-budgeting'. The cost of production per quintal of paddy was Rs.701 under organic farming (OF) where as Rs.427 in conventional farming (CF). It is almost 64 per cent higher in OF than CF. The average cost of cultivation of paddy in OF was Rs.9325 per acre while the same in CF was Rs.7818 per acre. The cost of cultivation was nearly 19 per cent higher in OF when compared to CF. Average

Table 2 Economics of Paddy cultivation in Punjab (Rs per acre)

	OF	CF	CF=100
Land preparation	1265	1307	97
Seed cost	320	279	115
Sowing cost	1790	1815	99
Fertilizer cost	1955	1760	111
Inter cultivation/Weeding	1245	471	264
Plant protection cost	310	928	33
Irrigation cost	310	72	431
Harvesting cost	1180	771	153
Threshing cost	510	300	170
Marketing cost	440	115	383
Other costs	0	0	-
Total cost of cultivation	9325	7818	119
Yield (Kg)	1335	1836	73
Price (Rs)	19.5	15	130
Fodder (Qtl)	11.2	12.5	90
Price (Rs)	100	94	106
Total revenue	27153	28715	95
Net returns	17828	20897	85
Cost of production (per Qtl)	701	427	164

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Table 3 Economics of Wheat cultivation in Punjab (Rs per acre)

	OF	CF	CF=100
Land preparation	1050	1010	104
Seed cost	1240	1285	96
Sowing cost	275	261	105
Fertilizer cost	1163	1520	77
Inter cultivation/Weeding	1350	495	273
Plant protection cost	92	435	21
Irrigation cost	142	130	109
Harvesting cost	1300	840	155
Threshing cost	710	330	215
Marketing cost	217	130	167
Other costs	0	0	-
Total cost of cultivation	7539	6436	117
Yield (Kg)	1170	2042	57
Price (Rs)	22.3	10.3	217
Fodder (Qtl)	11.4	16.4	70
Price (Rs)	233	227	103
Total revenue	28747	24755	116
Net returns	21208	18319	116
Cost of production (per Qtl)	644	315	204

yield per acre of paddy was 13.35 and 18.36 quintals respectively in OF and CF. But, the unit price of paddy was higher (30 percent) in OF relative to CF. The average net returns per acre of paddy cultivation were Rs. 17828 and Rs.20897 respectively in OF and CF. However, the differences between the gross returns per acre of these farming were marginal (Rs.1562). Among different cost break-ups, the actual costs on weeding and harvesting operations were significantly higher in OF when compared to CF. It clearly indicates the more labor incentive nature of OF than CF. The relative costs on fertilizer application was higher in OF while the same on plant protection was higher in CF. The costs on the remaining cost items were more or less equal in both types.

Economics of wheat cultivation in Punjab:

The comparison of crop economics of wheat cultivation between organic and conventional farming systems is presented in table 3. Most of the sample organic farmers in the state are growing 'Bansi' (local) variety of Wheat. The cost of production per quintal was Rs.644 under OF. But, the same in case of CF was Rs.315. The cost of production per quintal of wheat was more than double in OF. It was due the lower (nearly half) yields under organic farming. But, the overall cost of cultivation per acre was slightly higher (17 per cent) in OF when compared to CF. The market price realization of per kg wheat was significantly higher in OF (117 percent). However, the gross returns per acre of wheat cultivation in Punjab were Rs.28747 and Rs.24755 respectively for OF and CF. The data indicates almost 16 per cent higher gross returns per acre of wheat under OF over CF. However, per acre net returns difference between OF and CF was Rs.2889. It clearly shows the high profitability of wheat cultivation under organic farming in Punjab. Among different crop operations, higher costs under organic farming were observed in weeding, harvesting and threshing. Overall, it indicates huge potential for organic wheat cultivation in Northern states.

Economics of cotton cultivation in Punjab:

The details of economics of organic cotton farming vis-'-vis conventional farming are summarized in table 4. Many of the sample organic farmers are cultivating desi variety of cotton where as conventional farmers are growing Bt cotton varieties. The cost of production per quintal of cotton under OF was Rs.662 while the same in case of CF was Rs.1112. The cost of production in OF was almost 40 per cent lower than CF. The average cost of cultivation per acre of cotton were Rs.5427 and Rs.12455 respectively under organic and conventional farming. There is a huge difference of Rs.7028 (66 %) between these farming types. The mean yield per acre of OF was 73 per

cent of conventional farming. The unit price realization of cotton was almost same under both production systems. Total gross returns per acre of organic farming were 72 per cent of conventional farming. But, in case of net returns per acre, the share has increased up to 90 per cent. The mean differences between the OF and CF net returns per acre was Rs.1935. It clearly demonstrates the high profitability of organic cotton farming when compared to conventional farming in Punjab. Among various cost components, inter cultivation /weeding and irrigation costs were higher in organic farming. But, the costs on seeds, fertilizers and plant protection chemicals

Table 4 Economics of Cotton cultivation in Punjab (Rs per acre)

	OF	CF	CF = 100
Land preparation	967	850	114
Seed cost	125	1250	10
Sowing cost	150	125	120
Fertilizer cost	333	2250	15
Inter cultivation/Weeding	1332	650	205
Plant protection cost	33	4550	1
Irrigation cost	380	150	253
Harvesting cost	1967	2500	79
Threshing cost	0	0	-
Marketing cost	140	130	108
Other costs	0	0	-
Total cost of cultivation	5427	12455	44
Yield (Kg)	825	1125	73
Price (Rs)	28	28.5	98
Fodder (Qtl)	0	0	-
Price (Rs)	0	0	-
Total revenue	23100	32063	72
Net returns	17673	19608	90
Cost of production (per Qtl)	662	1112	60

Table 5 Economics of paddy cultivation in Uttar Pradesh (Rs per acre)

	OF	CF	CF = 100
Land preparation	3482	3444	101
Seed cost	501	511	98
Sowing cost	1136	1400	81
Fertilizer cost	1082	930	116
Inter cultivation/Weeding	622	375	166
Plant protection cost	350	521	67
Irrigation cost	2281	3300	69
Harvesting cost	2082	2214	94
Threshing cost	1555	1671	93
Marketing cost	140	80	175
Other costs	0	0	-
Total cost of cultivation	13231	14446	92
Yield (Kg)	1518	1807	84
Price (Rs)	15.8	16.9	93
Fodder (Qtl)	10.5	11.8	89

Price (Rs)	70	93	75
Total revenue	24719	31636	78
Net returns	11488	17190	67
Cost of production (per Qtl)	870	803	108

were significantly higher in conventional farming. Actually, the major problem for organic cotton farming is lack of premium prices. The results clearly reveal that organic farmers can safely earn almost equal amount of net margins per acre as conventional farmers.

Economics of paddy cultivation in Uttar Pradesh

The costs and returns of paddy (basmati) cultivation both under organic and conventional farming types are presented in table 5. Most of the sample organic farmers are practicing the method of 'natural farming' or zero-budgeting concept in their farms. The most common basmati varieties growing in this region are Pusa - 1 and Pusa - 1121. The average cost of production per quintal of paddy (basmati) under organic farming was Rs.870 while the same in conventional farming was Rs.803. The cost of production per quintal under OF was 8 per cent lower than CF. The mean yield per acre in OF accounted for 84 per cent of the conventional farming yield. The average gross returns per acre of conventional farming were nearly 28 per cent higher than organic farming. The average net returns per acre of paddy cultivation were Rs.11488 and Rs.17190 respectively for OF and CF. No premium prices were available for organic paddy in Uttar Pradesh. The mean yield levels under organic farming were 16 per cent lower than conventional farming. Among different cost items, weeding cost was significantly higher in organic farming. The costs on plant protection chemicals and irrigation were significantly higher in conventional farming. It clearly indicates that organic farming increased water-use-efficiency of the farm. Lack of premium prices as well as absence of export market channels limits the expansion of organic farming in the state.

Economics of sugarcane cultivation in Uttar Pradesh

The detailed break-up of cost of cultivation of sugarcane in Uttar Pradesh state is presented in table 6. Most of the sample organic farmers are growing CoS 88230 variety of sugarcane while majority of conventional growers are using CoS 88230 or CoS 767 varieties. The average cost of

Table 6 Economics of sugarcane cultivation in Uttar Pradesh (Rs per acre)

	OF	CF	CF = 100
Land preparation	2892	3533	82
Seed cost	4090	5065	81
Sowing cost	1514	1313	115
Fertilizer cost	1935	1904	102
Inter cultivation/Weeding	3113	3217	97
Plant protection cost	420	687	61
Irrigation cost	2750	2687	102
Harvesting cost	3495	2847	123
Threshing cost	0	0	-
Marketing cost	2190	1846	119
Other costs	0	0	-
Total cost of cultivation	22399	23099	97
Yield (Kg)	27364	24333	112
Price (Rs)	1.95	2.02	97
Fodder (Qtl)	0	0	-
Price (Rs)	0	0	-
Total revenue	53360	49153	109

Net returns	30961	26054	119
Cost of production (per ton)	820	951	86

Table 7 Economics of wheat cultivation in Uttar Pradesh (Rs per acre)

	OF	CF	CF = 100
Land preparation	2298	2571	89
Seed cost	1281	1034	124
Sowing cost	663	674	98
Fertilizer cost	981	1054	93
Inter cultivation/Weeding	656	432	152
Plant protection cost	85	214	40
Irrigation cost	994	1532	65
Harvesting cost	1510	1674	90
Threshing cost	844	879	96
Marketing cost	106	159	67
Other costs	0	0	-
Total cost of cultivation	9418	10223	92
Yield (Kg)	1519	1682	90
Price (Rs)	13.4	10.5	128
Fodder (Qtl)	14	13.8	101
Price (Rs)	222	193	115
Total revenue	23463	20324	115
Net returns	14045	10101	139
Cost of production (per Qtl)	620	609	102

production of sugarcane per ton was Rs.820 under organic farming. But, the same was 16 per cent higher under conventional farming. The mean yield per acre was 12 per cent higher under organic farming. The gross returns per acre of OF was 9 per cent higher than CF.

However in case of the net returns per acre, this value has gone up to 19 per cent. These results conclude that cultivation of sugarcane was more profitable under organic farming than conventional farming even in the absence of premium prices for organic sugarcane production in U.P. Among different cost components, the costs were more or less equal in both farming systems.

Economics of wheat cultivation in Uttar Pradesh

The economics of wheat cultivation under organic farming vis-'-vis conventional farming is summarized in table 7. Most of the sample organic farmers are cultivating bansi or 292 varieties of wheat. But, many conventional farmers are growing PBW-343 or WL-711 varieties. The cost of production of wheat per quintal was Rs.620 under organic farming. The same under conventional farming was slightly lower at Rs.609 per quintal. But, the average cost of cultivation per acre was lower in organic farming (8 per cent) when compared to conventional farming. The average yield levels were 1519 and 1682 kg respectively under OF and CF. However, the gross returns per acre was higher (15 %) in organic farming than conventional farming. This share has further gone up to 39 per cent in case of net returns per acre. The unit price realization was 28 per cent higher in OF than CF. The results clearly demonstrate that the cultivation of wheat under organic farming is more profitable than conventional farming method in U.P state.

Economics of sugarcane cultivation in Maharashtra :

The cost of cultivation of sugarcane per acre in Maharashtra between organic and convention farming is compared in table 8. Most of sample organic farmers are practicing the method of 'natural farming' or zero-budgeting concept. The most popular varieties under organic and conventional farming systems are Co 86032 and CoC 671/ Co 8014 respectively. The cost of production of sugarcane per ton was Rs.589 in case of organic farming where as the same under conventional farming was Rs.745. The mean

cost of cultivation per acre was 20 per cent lower under organic farming compared to conventional farming. The average yields were almost equal under both the farming systems. The gross returns per acre was slightly higher (8 per cent) under OF than CF. But, the net returns per acre were 35 per cent higher in case of OF than CF farming. The results clearly lend support to sugarcane organic farming in Maharashtra than conventional farming.

Economics of cotton cultivation in Gujarat:

The economics of cotton cultivation in Gujarat is presented in table 9. Most of the sample organic farmers are growing devraj variety while many of the conventional farmers are cultivating Bt cotton or V-797 variety of cotton. Agrocel Industries Limited at Rapar office is providing the technical service, inputs and buyback arrangements for organic farmers. The cost of production of cotton per quintal was Rs.784 in organic farming. The cost of production was almost 10 per cent higher under conventional farming. The mean average yield per acre of organic farm accounted for 90 per cent of the same in conventional farm. The average cost of cultivation per acre were Rs.9906 and Rs.12088 respectively under OF and CF. The cost of cultivation per acre was almost 22 per cent higher under conventional farming. The unit price realization under organic farming was 25 per cent higher when compared to conventional farming. The gross returns per acre were 13 per cent higher under organic farming than the conventional farming. But, in case of net returns per acre this gap has become wider at Rs.7187. Over all, the results conclude that the cultivation of cotton under organic farming is more profitable than conventional farming.

Summary and conclusions

Due to very little accessible and authentic information on economics of organic farming in India, an attempt is made to assess it in different crops and states. The crop economics results showed a mixed response. In general, organic farming is a production system which has low productivity levels, needs more

Table 8 Economics of sugarcane cultivation in Maharashtra (Rs per acre)

	OF	CF	CF = 100
Land preparation	3675	4100	90
Seed cost	4825	5300	91
Sowing cost	1313	1120	117
Fertilizer cost	2344	5450	43
Inter cultivation/Weeding	3313	4300	77
Plant protection cost	275	1550	18
Irrigation cost	3588	3040	118
Harvesting cost	2375	2700	88
Threshing cost	0	0	-
Marketing cost	838	760	110
Other costs	0	0	-
Total cost of cultivation	22546	28320	80
Yield (Kg)	38375	38000	101
Price (Rs)	1.6	1.5	107
Fodder (Qtl)	0	0	-
Price (Rs)	0	0	-
Total revenue	61400	57000	108
Net returns	38854	28680	135
Cost of production (per ton)	589	745	79

Table 9 Economics of cotton cultivation in Gujarat (Rs per acre)

	OF	CF	CF = 100
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Land preparation	939	1600	59
Seed cost	206	281	73
Sowing cost	443	375	118
Fertilizer cost	1586	2675	59
Inter cultivation/Weeding	1946	1800	108
Plant protection cost	110	478	23
Irrigation cost	1161	1291	90
Harvesting cost	3515	3525	100
Threshing cost	0	0	-
Marketing cost	0	63	0
Other costs	0	0	-
Total cost of cultivation	9906	12088	82
Yield (Kg)	1263	1400	90
Price (Rs)	35	28	125
Fodder (Qtl)	0	0	-
Price (Rs)	0	0	-
Total revenue	44205	39200	113
Net returns	34299	27112	127
Cost of production (per Qtl)	784	863	91

labor, require low energy inputs and has a changing net income levels along with selling prices. Overall, crop economics results concluded that the unit cost of production is lower in organic farming in case of Cotton (both Gujarat and Punjab) and Sugarcane (both in U.P and Maharashtra) crops where as the same is lower in conventional farming for Paddy and Wheat (both in Punjab and U.P) crops. These mixed results are in conformity with the findings of Lampkin and Padel, 1994. These results also supports that the efficiency levels are lower in organic farming when compared to conventional farming, relative to their production frontiers. The results conclude that there is ample scope for organic farming in India. Exposure to more trainings as well as increase in technical guidance would enhance the productivity and efficiency of organic farms in India.

The role of the Government is critical in motivating the farmers towards organic farming in the country. Some of the major suggestions for expansion of organic farming are: creation of separate 'green channels' for marketing of organic foods; announcement of premium prices for organic staple food crops; creation of demand by more awareness programs; input/conversion subsidies for encouraging organic growers; more R & D investments on organic farming and finally cheap and quick certification process etc.

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