

Sir Ratan Tata Trust

Impact Assessment study of Center of Organic Farming I & II, Uttarakhand state

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PREFACE

The novel idea of organic agriculture has picked up throughout the globe due to increasing health consciousness and economic growth. Theoretically, our gain from India's vast diversity in agro-climatic parameters was increasingly stressed by the protagonists of World Trade Organization (WTO). The efforts made through UOCB have practically demonstrated the same. It is always adventurous to deal with large numbers of farmers who are already struggling for livelihood, since operational problems in it open a Pandora's box, some of which are tackled, and others, still in the process. After carrying out this study, I have pointed out some loopholes which need to be plugged. Under the existing socio-economic setup waiting for complete and correct solution may mean waiting forever. I congratulate Sir Ratan Tata Trust and other stakeholders for this timely venture.

I am indeed indebted to Arun Pandhi, programme manager, SRTT for arranging finances for this study, and officials of UOCB and Himmatnagar, who helped me to carry it out. Help received from Dr BK Sikka, dean, College of Agri-Business Management, GB Pant University of Agriculture and Technology, Pantnagar, for facilitating data collection is duly acknowledged. I must admit that some higher hill area could not be covered in the survey due to heavy rainfall at the time of survey and field surveyors faced health problems due to climatic vibrations.

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Abbreviations

CHEA	Central Himalayan Environmental Association
DASP	Uttar Pradesh Diversified Agriculture Support Project
UOCB	Uttaranchal Organic Commodity Board
APEDA	Agriculture and Processed Products Export Development Authority
COF	Centre for Organic Farming
USOC	Uttaranchal State Organic Certification Authority
STCOF	State Training Center for Organic Farming

Executive Summary COF I

The idea, efforts and achievements of organic farming in terms of horizontal and vertical coverage are remarkable. In spite of some issues raised (below) for further improvement, the ball of organic farming has been set in motion with an inbuilt force of acceleration and it is going to sustain and prevail in the country.

- 1. The yield decline due to switching over to organic farming was on all farms but the price incentive could not compensate entirely. The cost in terms of no use of inorganic fertilisers and pesticides did decline but labour cost in terms of preparing manures, organic pesticides went up almost by the same level.*
- 2. The farmers have been organised into federations at different levels for bargaining with the procurement agencies but need to be made more effective to develop market linkages for the benefit of the farmers. They should also create awareness among local consumers about the importance of organic produce.*
- 3. Organic farming could be much more successful in cluster approach rather than for individual farmers, otherwise, in undulating and canal irrigated systems, use of inorganic inputs by others can distort all efforts.*
- 4. To the extent replenishment of soil nutrients through organic manures is concerned, it has succeeded to a great extent. The cost reduction is significant. But there is need to scientifically examine and monitor soil fertility regularly in terms of major and micro nutrients and organic matter. Incidence of leaf spot of rice has increased due to less use of nitrogen.*
- 5. Seed is the basic input, of which quality has to be maintained. Under the existing setup, most of the farmers keep their own seeds and the others purchase from the procurement agencies through farmers' federations at a high price. It would be relevant if some farmers are trained in seed production for supply to other farmers. Similarly, some farmers can get specialised in organic input (eg, vermi-compost, seed of green manure crops) production at commercial level.*

6. *Bringing down the use of pesticides to zero per cent at this juncture when the farmers are making dramatic use in some areas, may create more problems in terms of disease inoculums and pest build-up. However, through integrated pest management approach, it can be brought down to the minimum level.*
7. *There is need to have well tested and standardised bio-pesticides and bio-fertilisers as alternative to inorganic ones. The farmers use to the extent they have access to it. Such items should be available at reasonable rates.*
8. *The well trained field staff with UOCB is squeezing. They had a grudge that they get low salaries as compared to their qualification and experience. The UOCB has already got some state government support for providing extension services but due to lack of its own infrastructure the linkage is weak.*
9. *Literature for guiding farmers in this connection such as package of crop practices, importance of organic produce for consumers, value addition etc have been published but somehow has not reached the farmers except regular supply of “Uttara”. Moreover, information and education for the consumers has to be further strengthened to make it demand driven.*
10. *There should be coverage of all farm products of selected farms. For example, in the case of rice-wheat crop system, rice is covered for procurement as organic at premium price but decline in wheat is not compensated by higher price. Thus the crop rotation as such is losing. Similarly, organic crop residue fed to livestock would result in organic livestock products such as milk and meat which should also be rewarded.*

Executive summary COF II

1. *The STCOF had a few experts pertaining to Entomology, Plant Pathology and Agronomy with a mandate of research and training development in the area. There is need to have some more experts, particularly in the area of Agricultural Marketing, Food Sciences and Technology and Horticulture. A*

strong linkage with the GB Pant University of Agriculture and Technology, Pantnagar should be maintained for better achievement of laid down objectives.

- 2. The research outcome of the centre should be got authenticated by getting their feedback from the concerned field staff, a committee of enlightened farmers of the area and processing and marketing agencies and such workshops at least once in a year are essential.*
- 3. There is significant decline in yield of vegetable crops as a result of organic farming, even to the extent that output has remained one-third but no one in the market is ready to pay compensatory higher price unless it is properly labelled and certified by some accredited agency. Although Uttarakhand State Organic Certification Agency (USOCA) has been set up for external certification but the process of external certification has to be strengthened by involving national / international agencies.*
- 4. More exposure trips and highlighting the success stories of organic farming can prove to be helpful.*
- 5. Regular monitoring of level of adoption of new research outcomes and reasons for partial adoption or non-adoption; market and consumers' survey on acceptance of organic products;*
- 6. It should be mandatory that except on-farm testing of new bio-fertilisers and bio-pesticides at the centre, it should not be recommended. Further, many of the manures and bio-pesticides are un-standardised in terms of their ingredients which are essentially required.*
- 7. Since women are the major component in providing labour and management in hill agriculture, their involvement in training has to be increased.*
- 8. Much more efforts in terms of exhibiting the organic products at national and international level through various means would be highly useful.*
- 9. Training and capacity building is of utmost importance for organic farming.*

A. Impact Assessment study of Centre of Organic Farming-I

1. Introduction and objectives

The recently carved out Uttarakhand state falls under Western Himalayan Region of India and has five distinct agro-ecological sub-regions based mainly on altitude varying from 300m to 3600m. Lower Dun and Tarai sub-region constituting the plains, has wheat, rice and sugarcane as the major crops. Upper Dun, Bhabar, lower Shivaliks cultivate wheat, rice, finger millet, jhangora, chaulai and maize crops. Middle Garhwal-Kumaon and Upper Garhwal-Kumaon sub-regions with altitude of 1200-1800m and 1800-2400m respectively raise wheat, rice finger millet, jhangora, cheena, potato, barley, and chaulai. Cold Zone having an altitude of 2400-3600m has wheat, barley, potato, phaphra, chaulai, kauni, ogal, kodo and uva crops in summer season only. Various pulses (Masur and Kulat) are intercropped during the two harvest seasons — early winter after the rainy season. Dry and wet rice, taro, pumpkins, beans, corn, ginger, chilli, cucumbers, leafy vegetables, and tobacco are also grown. Potato has become an important cash crop, grown in areas unsuitable for other plants.

It has a geographical area of 53,483 square kilometres, of which 65 per cent is forest land and only 776 thousand ha (15 per cent of the total land area) is net cultivated. The cropping intensity has steadily increased to 166.1 per cent. About 44.6 per cent of cultivated area is irrigated mainly by canals and tube wells. Over hundreds of years, many of the slopes have been cut into field terraces, a common

characteristic of mountain agriculture throughout the world. The region's farmers have also developed advanced manure, crop rotation, and intercropping systems. Most land on the slopes is unirrigated.

Traditional Himalayan agricultural systems and knowledge base are being steadily eroded by market pressures, bringing both economic and cultural changes in Uttarakhand. Age-old self-reliance has given way to dependency on imports from the productive plains. Cultural domination from the plains also threatens Uttarakhand's traditional foods as an increasing taste for mill-polished rice is outcompeting mountain crops.

After attaining statehood in 2000, Uttarakhand explored the possibility of Organic Agriculture for improving the existing livelihood pattern – through improved technology and marketing inputs. Organic farming, with on-farm input production, premium markets and quality parameters, was found to benefit the situation prevailing in the state. As a consequence of it the use of pesticides which touched a level of 147 tonnes of Technical Grade Material in 2003-04 has gone down to 132 tonnes in the very next year.

In 2001 Sir Ratan Tata Trust, with its partners, launched an initiative, the “Himmothan Pariyojana” to address core areas of concern with a view on participatory watershed development and tackling land degradation, by implementing micro-watershed projects through community based watershed committees, improving community health through village-level drinking water and

environmental sanitation projects and focusing on enhancing rural livelihoods through farm and non-farm activities.

The Uttarakhand Organic Commodity Board (UOCB), Dehradun was formed in 2003. Since its formation, the UOCB has been acting as a nodal agency to enhance organic activities in agriculture and allied sectors like horticulture, medicinal and aromatic plants, herbs, milk production and animal husbandry, throughout Uttarakhand. UOCB has also been providing professional, managerial, technical support and enhancing organizational / management skills of farmer's organizations and lead farmers. The Centre for Organic Farming (COF) was conceived and a three year grant to operationalize the same. It came into existence in July 2003. COF is a deemed centre for excellence in the making and provides technical assistance to those critical areas in the on-going organic initiatives in Uttarakhand, which are being presently provided through state departments. These areas of support are primarily in the form of technical expertise and human resources.

The first phase of support to COF came to an end in December 2006. An impact assessment exercise, consisting of a sample size of 100 farmers, spread over 16 villages was conducted in November 2006. Another cost benefit analysis study conducted in 2005-06 by Dr. Gayur Alam which brought out that the first Phase of support to UOCB (COF-1) was successfully able to reach out to 17,000 farmers and an area of 4,000 hectares was put under organic certification and an average income has increased from Rs41,000 to Rs64,362 for farmers in hills and from Rs. 26,232 to Rs33,232 for farmers in plains (Appendix-1).

Post completion of a successful Phase I, a fresh three year proposal from the Uttaranchal Organic Commodity Board (UOCB) for Centre for Organic Farming (COF-I) was approved under the Phase II of the component 'Enhancing Rural Livelihoods through Farm and Non-Farm Activities' of Himmothan Pariyojana. The Trust, through COF-I, would like to take forward the success of the earlier phase by further providing livelihood opportunities through organic farming in Uttarakhand. Phase II of COF-I (2007-2010) would be more market centric, besides entailing the following activities: (i) establishment of a Technical Cell; (ii) rural institutional building; (iii) establishing a Marketing Cell; (iv) holding exhibitions; (v) establishing a Common Facility Centre; (vi) co-branding; (vii) setting up a toll free organic helpline; (viii) expansion of organic certification; (ix) expansion of Organic Basmati Export Programme (OBEP); and (x) development of informative organic publication. The proposed project was expected to bring an area of 25,000 hectares under organic certification by 2010 to directly or indirectly benefit 50,000 farmers. It was expected that impact of this phase will be wider compared to the earlier phase, since most of the systems are in place and hence only stream-lining the operations, strategies and marketing needs to be carried out. Himmothan, commenced its operations as a registered society in Dehradun in, 2007. Amongst its many activities Himmothan helps facilitate the implementation of Phase 2 of Himmothan Pariyojana, facilitates linkages between the state Government, partner non-profit organizations and technical institutions to develop sustainable and scaleable strategies to help implement and better monitor Government led initiatives.

Nevertheless, impact projections have been made by UOCB, based on the three year design of the whole project, which will end in March 2010. The projections include: (i) the annual income of farmers which ranges between Rs. 98,000 – 123,000 would rise to Rs. 107,800 – 150,000; (ii) an increase in organic farmers from the current level of 5,000 to 50,000 farmers, with 73% being from BPL families; (iv) the present income of BPL families, which is below Rs. 24,000 per annum is expected to increase to Rs. 35,000 per annum; (v) 20,000 families will directly get benefits by continued organic market build up; and (vi) an additional 10,000 families are expected to get benefits through the Green Restaurant outlets.

The main objective of the efforts of UOCB is to benefit both consumers and producers. The gain to the farmer as producer is due to higher demand and price of organic products stemming from quality consciousness and pocket of domestic and international consumers. Apart from this reduced cost of inorganic agro-inputs can help in lowering the cost of production of farm products. Landless labour is also believed to reap the benefit from increased employment and wage rate as most of the operations of organic farming are manual and labour intensive. It was contentious to verify all these hypotheses. The comprehensive data collected from the farmers was expected to assessment and verify the probable impacts on different socio-economic and environmental parameters. With this motive in mind, the study was carried out in five major districts of Uttaranchal Pradesh; namely Udham Singh Nagar, Nainital, Almora, Dehradun and Hardwar. The so collected information led to salient results and inferences discussed in this report.

Objectives

1. To study the impact of organic farming on farm incomes, incomes of landless labour, consumer satisfaction, export etc.
2. To assess the impact of organic agriculture on environmental parameters such as water, soil, air, human and animal health.
3. To review the organizational set up of UOCB, its linkages with policy makers, research and extension systems.
4. To develop a comprehensive baseline for both the projects COF- I and COF-II separately in regard to assess impacts.

2. Methodology of the survey

There are 14 Jaivik Krishi Sewa Simities registered with UOCB each covering 1500 farmers and thus an overall area of 4238 acres with various crops such as basmati, wheat, pulses, vegetables, millets, medicinal crops, turmeric, mustard, soap-nut etc. (Appendix II). It was realized that data collection should be done by an independent and reliable agency due to which a team of three Rural Management Specialists was formed in College of Rural Management, GB Pant Agricultural University, Pantnagar (Appendix III). From these districts, 4, 2, 1, 4 and 2 blocks were selected in consultation with officials of UOCB. A sample of 310 farmers was taken from all the 13 selected blocks (Table 2.1). The information collected with the help of questionnaire (Appendix IV) from the farmers by personal interview method pertained to brief socio-economic profile of household and farm, farm size, source of draft power, irrigation system, crop pattern, agronomic practices of organic crops, crop yield, organic manures and pesticides

used by farmers and their impact on yield, market, cost etc and perceptions of the farmers about impact on soil fertility, water saving, capacity building etc.

Support from secondary data was taken from various published sources to compare the results of primary data. The data mostly pertained to the year 2008-09.

Table 2.1: Sample size of farmers

S. No.	District	Block	Number of respondents	Average age in years
1	Udham Singh Nagar	Gadarpur	19	51
		Bajpur	20	44
		Kanshipur	23	44
		Jaispur	31	45
2	Almora	Tarikhhet	49	51
		Betalghat	15	51
3	Nainital	Ramgarh	23	44
4	Dehradun	Raipur	27	41
		Kalsi	15	39
		Sahaspur	25	44
		Vikas nagar	16	41
5	Hardwar	Daiwala	18	46
		Narsan	29	49
	Overall		310	46



3. Socio-economic profile of farmers

A broad view of socio-economic parameters of the respondents studied here included age, education, family size and composition. Farm size, source of power, irrigation status, livestock herd kept and trend followed were some other variables studied as they have significant impact on decision making of the farmers.

3.1. Age of respondents

Age of the farmer is a major determinant in taking innovative decision by him. The farmers do gain experience with age but younger ones are generally

expected to respond react and adapt faster than their elder counterparts. The average age of the sample farmers came out to 46 years, varying from 39 years in Kalsi (Dehradun) to 51 in Gadarpur block of Udham Singh Nagar; and Tarikhet and Betalghat blocks of Almora district (Table 2.1).

3. 2. Family size

The major human resource in agriculture comes from the family itself. The state has 1196 thousand rural households of which 896 thousand are in farming and the rest 25% have to depend upon off-farm employments.

Table 3.2.1: Average Family size of respondents

(Number)

District	Block	Males	Females	Children	Total
Udham Singh Nagar	Gadarpur	1.9	1.9	2.6	6.4
	Bajpur	1.7	1.8	2.7	6.1
	Kanshipur	2.3	1.7	2.3	6.3
	Jaispur	2.3	1.9	2.6	6.7
Almora	Tarikhet	2.6	1.9	2.6	7.0
	Betalghat	3.1	2.0	1.6	6.7
Nainital	Ramgarh	2.2	1.6	2.0	5.8
Dehradun	Raipur	3.0	2.7	2.3	7.9
	Kalsi	3.0	2.6	2.3	7.9
	Sahaspur	3.0	2.4	3.7	9.0
	Vikas nagar	3.3	2.7	4.3	10.2
Hardwar	Daiwala	2.9	2.6	3.3	8.9
	Narsan	3.9	2.9	3.4	10.3
Overall		2.7	2.2	2.7	7.6

A glance at family size and composition of sample respondents is essential. As may be seen from Table 3.2.1, a wide variation in family structure is discernible. Ramgarh block of Nainital district had an average family size even less than 6 as against more than 10 in case of Narsan (Hardwar) and Vikasnagar

(Dehradun). Typically larger family size had higher proportion of children. On an average, a family comprised 7.6 members (2.7 adult male, 2.2 adult female and 2.7 children).

About three-fourth of the number of adult male and female family members stay on agriculture for their main source of livelihood while the rest one-fourth move to alternative employments (Table 3.2.2).

Table 3.2.2: Average employment in agriculture

District	Block	Family labour force engaged in agriculture (number/farm)				% employed in agriculture	
		Men	Women	Children	Total	Men	Women
Udham Singh Nagar	Gadarpur	1.5	0.9	0.3	2.7	78	50
	Bajpur	1.3	1.0	0.1	2.4	79	57
	Kanshipur	1.6	1.0	0.3	2.9	68	58
	Jaispur	1.9	0.7	0.0	2.6	83	40
Almora	Tarikhhet	2.1	1.7	1.1	4.8	80	89
	Betalghat	2.5	1.9	0.7	5.2	83	97
Nainital	Ramgarh	1.8	1.5	0.1	3.5	82	95
Dehradun	Raipur	1.8	1.7	0.3	3.7	59	63
	Kalsi	2.2	2.5	0.1	4.9	73	97
	Sahaspur	2.4	2.0	0.9	5.3	79	85
	Vikas nagar	1.8	1.4	0.6	3.8	56	53
Hardwar	Daiwala	2.2	1.7	0.3	4.3	75	66
	Narsan	2.4	1.9	0.3	4.6	62	64
Overall		2.0	1.5	0.4	3.9	73	70

3.3 Educational level

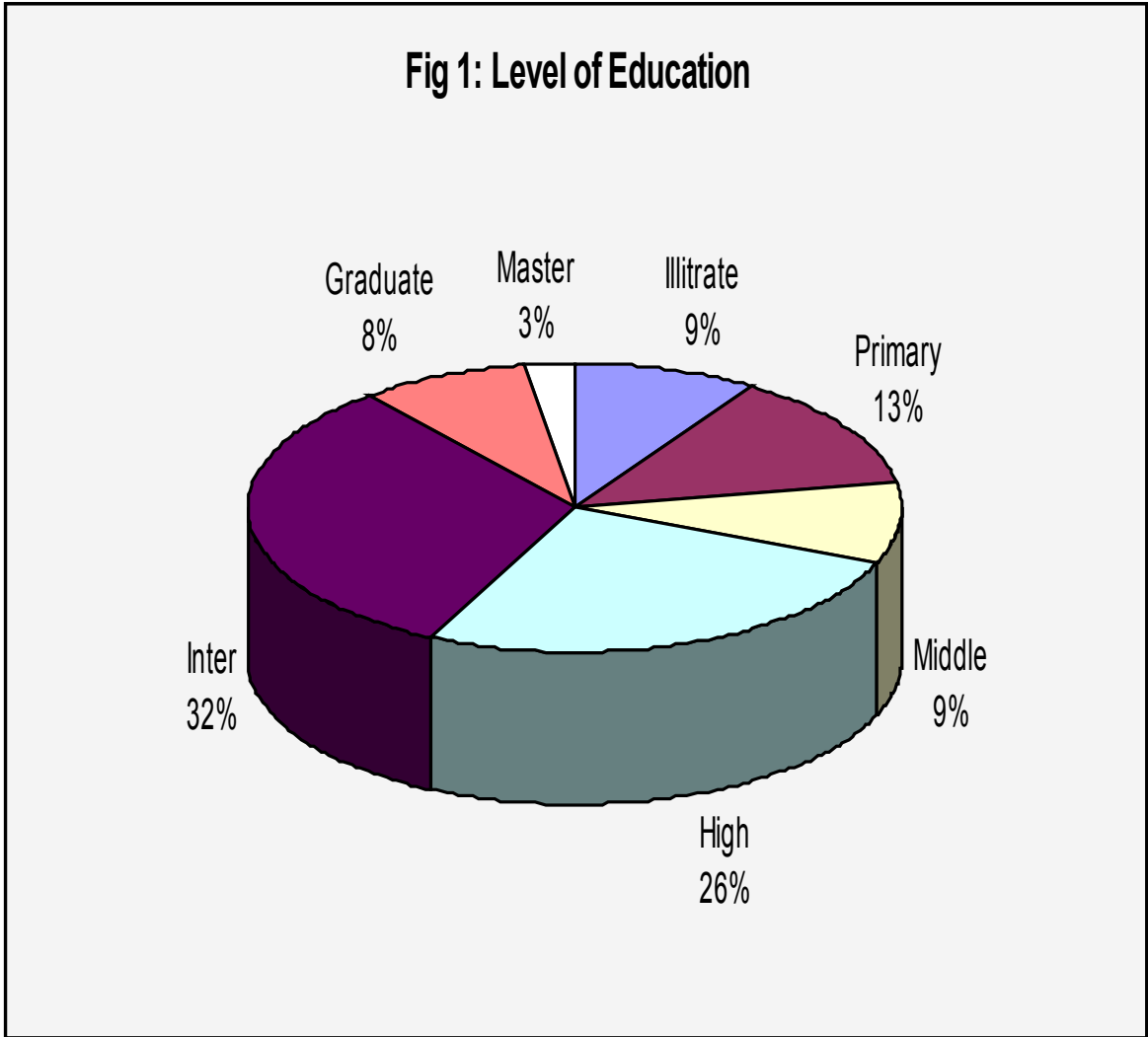
The distribution of farmers on the basis of their formal educational qualification is presented in Table 3.3. Nearly 60% of them were educated either up to high school or intermediate level. Another 8% of them were graduates and 2.6%

were qualified up to master's level. Only 9% were illiterate, 13% qualified primary school and 9% up to middle standard. Typically it could be noted that farmers of Sahaspur and Vikasnagar of Dehradun district were poor in education while farmers of Gadarpur (Udham Singh Nagar) and Tarikhet (Almora) had relatively higher level of education.

Table 3.3: Distribution of respondents according to their level of Education

District	Block	Illiterate	Primary	Middle	High	Inter	Graduate	Master	Total
U. Singh Nagar	Gadarpur		1	1	5	5	6	1	19
	Bajpur		3	3	7	3	3	1	20
	Kanshipur		5	3	6	5	3	1	23
	Jaispur		5		9	7	7	3	31
Almora	Tarikhet	1		3	12	32	1		49
	Betalghat	1		1		13			15
Nainital	Ramgarh	2	3	2	6	6	2	2	23
Dehradun	Raipur	1	1	2	6	15	2		27
	Kalsi	7	7	1					15
	Sahaspur	13	8	2	1		1		25
	Vikasnagar	2	1	1	8	4			16
Hardwar	Daiwala		2	4	4	8			18
	Narsan	1	5	5	16	1	1		29
Overall		28	41	28	80	99	26	8	310
%		9.03	13.23	9.03	25.81	31.94	8.39	2.58	100.00

Fig 1: Level of Education



3.4. Farm size distribution

The pattern of land ownership is unlike that found in the rest of India. Most Uttarakhand farmers are owner-cultivators. Tenant farming and sharecropping are rare, and landholdings generally small and limited to family farms (Approximately 50% of all landholdings are less than 0.5 hectares in size, and 70% under one hectare). As such, the *zamindari* system of big landholders is limited to the plains.

Both geography and Pahari cultural heritage has played a role in maintaining traditionally more equitable, if impoverished, land distribution in Uttarakhand.

The average farm size of respondents in different blocks is presented in Table 3.4.1. The average operational holding averaged to 5.6 acres of which 5.1 acres was owned and 0.5 acres as leased in. There was no case of leasing out of land in the sample. Land lease market was reported only in Udham Singh Nagar. Farm size was also comparatively larger in this area. The average farm size in Betalghat was as small as 1.6 acres.

Based on the distribution of respondents on the basis of owned land holdings, it is clear that about 40% farmers were marginal with less than 2.5 acre area and 28% could be categorized as small farmers having area of 2.5 to 5.0 acres (Table 3.4.2). Another 22% were semi-medium (5-10 acres) and 7.7% as medium farmers. Only 1.9% could be rated as large farmers in the study sample. Based on this one can infer that a vast majority of farmers covered under the project were small and marginal but picture is somewhat better than the reality.

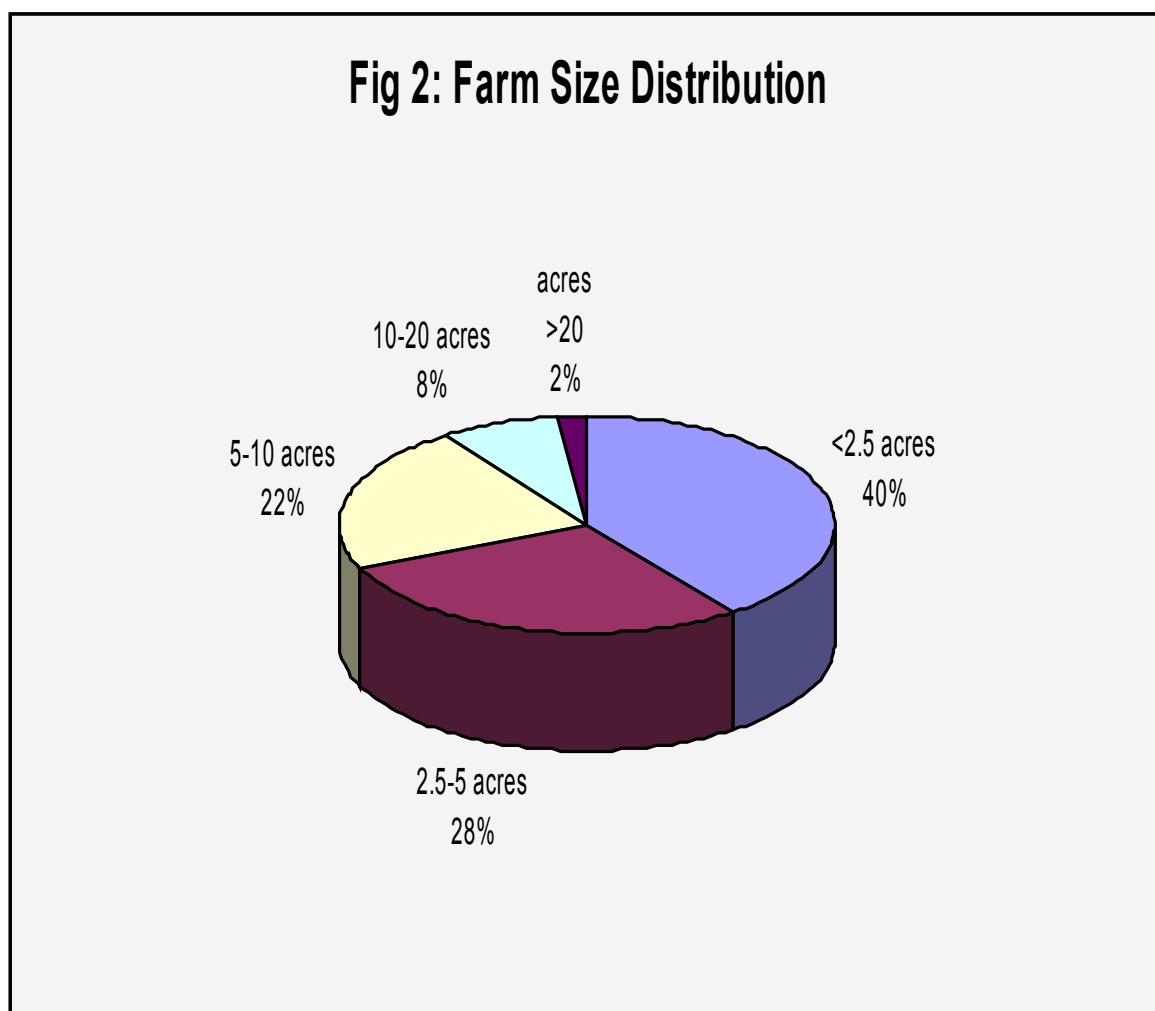
Table 3.4.1: Average Farm size of selected farmers

District	Block	Farm size (acres)		
		Owned	Leased In	Total operational
Udham Singh Nagar	Gadarpur	12.6	6.7	19.3
	Bajpur	7.1	0.5	7.6
	Kanshipur	5.1	0.2	5.3
	Jaispur	8.0	0.0	8.0
Almora	Tarikheth	2.2	0.0	2.2
	Betalghat	1.6	0.0	1.6
Nainital	Ramgarh	2.6	0.0	2.6
Dehradun	Raipur	3.3	0.0	3.3
	Kalsi	4.3	0.0	4.3
	Sahaspur	5.2	0.0	5.2
	Vikas nagar	3.2	0.0	3.2
Hardwar	Daiwala	5.7	0.0	5.7
	Narsan	7.2	0.0	7.2
Overall		5.1	0.5	5.6

Table 3.4.2: Percent distribution of farmers on the basis of owned holding

District	Block	<2.5	2.5-5	5-10	10-20	>20	All
		acres	acres	acres	acres	acres	farmers
Udham Singh Nagar	Gadarpur	10.5	21.1	21.1	26.3	21.1	100.0
	Bajpur	25.0	10.0	50.0	15.0	0.0	100.0
	Kanshipur	17.4	56.5	21.7	4.3	0.0	100.0
	Jaispur	9.7	29.0	35.5	22.6	3.2	100.0
Almora	Tarikheth	83.7	12.2	4.1	0.0	0.0	100.0
	Betalghat	100.0	0.0	0.0	0.0	0.0	100.0
Nainital	Ramgarh	56.5	43.5	0.0	0.0	0.0	100.0
Dehradun	Raipur	59.3	25.9	3.7	11.1	0.0	100.0

	Kalsi	33.3	46.7	13.3	6.7	0.0	100.0
	Sahaspur	20.0	40.0	36.0	4.0	0.0	100.0
	Vikas						
	nagar	50.0	43.8	6.3	0.0	0.0	100.0
Hardwar	Daiwala	27.8	16.7	50.0	5.6	0.0	100.0
	Narsan	6.9	34.5	48.3	6.9	3.4	100.0
Overall		40.0	28.4	21.9	7.7	1.9	100.0
<i>State 2005</i>		<i>70.6</i>	<i>17.8</i>	<i>8.8</i>	<i>2.7</i>	<i>0.1</i>	<i>100.0</i>



3.5. Source of draught power

In spite of small farm size owned and operated by large percentage of farmers, they had their own tractors. Although many of them having small farm

holdings were having pooled tractors i.e. 3-4 small farmers owned one tractor to ascertain the availability of machine in time of need and avoid dependence on hired one. Moreover, maintaining a pair a bullock was considered to be uneconomical by them apart from low operational efficiency. Yet 53% farmers were having a pair of bullock for cultivation of crops (Table 3.5). Mainly on undulating and hilly tracts operating land with bullock has higher feasibility than with tractor. Further, as a part of livestock, bullocks helped to augment the FYM output.

Very small percentage of farmers depended on custom hiring services of tractors to carry out farm operations.

Table 3.5: Source of power of respondent farmers

District	Block	% farmers having	
		Tractor Owned	A pair of bullock
Udham Singh Nagar	Gadarpur	89.5	10.5
	Bajpur	65	75.0
	Kanshipur	56.5	17.4
	Jaispur	80.6	3.2
Almora	Tarikhhet	0	101.0
	Betalghat	0	100.0
Nainital	Ramgarh	0	54.3
Dehradun	Raipur	40.7	66.7
	Kalsi	0	100.0
	Sahaspur	72	36.0
	Vikas nagar	50	31.3
Hardwar	Daiwala	72.2	22.2
	Narsan	86.2	51.7
Overall		46.1	53.2

3.6. Level and Source of Irrigation

In different areas different sources were recorded. In Udham Singh Nagar invariably the entire area is irrigated and the main source of irrigation is tubewell

supplemented with canal irrigation (Table 3.6). In Almora it was canal which irrigated a small area while the rest was unirrigated and depended upon rains. Ramgarh in Nainital and Vikas Nagar block of Dehradun entire area was rainfed. Hardwar and the remaining blocks of Dehradun tubewell accompanied by canal with nulkooop irrigated farm land to a large extent. On the whole, about two-third of the area was irrigated of which 57% of study area was irrigated with tubewell and/or 34% by canal while still about one-third of the area was entirely dependent on rains.

Table 3.6: Source of irrigation

District	Block	% area irrigated by	
		Tubewell	Canal
Udham Singh Nagar	Gadarpur	84.5	28.9
	Bajpur	63.4	35.1
	Kanshipur	97.1	2.0
	Jaispur	97.8	5.2
Almora	Tarikhhet	0.0	36.5
	Betalghat	0.0	91.6
Nainital	Ramgarh	0.0	0.0
Dehradun	Raipur	35.9	65.8
	Kalsi	0.0	0.0
	Sahaspur	2.3	95.0
	Vikas nagar	0.0	96.1
Hardwar	Daiwala	10.7	95.1
	Narsan	81.2	14.0
Overall		56.9	34.4

3.7. Crop-Livestock interactions

The main source of draught power is bullock. Therefore, the farmers maintain at least a pair of bullock for cultivation and transport. Dairy is another supplementary and complementary source of occupation of the respondents. The number of milch animals, particularly cows, buffaloes and goats were an essential

feature of farming in the state. As presented in Table 3.7.1, a farmer on an average had 2.5 cows, 1.9 buffaloes, 0.2 goats, apart from 1.2 other animals, mainly draught animals. These together came out to 5.7 animals. Kalsi and Bajpur blocks showed an average of 8.7 and 8.4 animals respectively. Viewing at larger livestock herds maintained by the farmers, suitable crop-livestock interactions can be planned for improving the livelihood of the households. Even female and hired labour, having low opportunity cost, get gainful employment in rearing of livestock. The crop residue gets recycled through livestock nutrition to improve the soil health. For this purpose, some efforts are already being made to demonstrate about scientific composting but intensive efforts in this direction can help in saving fertilizer cost, improve soil health and encourage organic farming. Efforts are also needed for genetic improvement of animals, streamline livestock product marketing and improving veterinary services in the area.

The farmers' perceptions about trend in size of livestock herd as a consequence of organic farming were also taken. It was brought out that 60.3% respondents had increased or intend to increase livestock, another 39% indicated no change while only 0.65% farmers expressed that livestock number has decreased due to physical overwork in organic farming (Table 3.7.2).

Table 3.7.1: Livestock maintained by farmers

District	Block	Number				
		Cows	Buffaloes	Goat & sheep	Others	Total
Udham Singh Nagar	Gadarpur	2.8	1.1	0.3	0.4	4.6
	Bajpur	3.5	3.2	0.1	1.8	8.4
	Kanshipur	2.2	1.8	0.0	0.7	4.6

	Jaispur	3.5	2.5	0.0	0.5	6.5
Almora	Tarikhhet	1.9	1.4	0.4	2.1	5.8
	Betalghat	1.5	1.1	0.1	2.0	4.7
Nainital	Ramgarh	1.3	0.7	0.4	1.1	3.5
Dehradun	Raipur	3.5	1.5	0.0	1.3	6.3
	Kalsi	3.0	1.7	1.9	2.0	8.7
	Sahaspur	1.1	3.1	0.0	0.7	4.9
	Vikas nagar	2.1	2.1	0.0	0.6	4.8
Hardwar	Daiwala	3.1	1.8	0.3	0.4	5.7
	Narsan	2.9	2.1	0.0	1.0	6.1
Overall		2.5	1.9	0.2	1.2	5.7

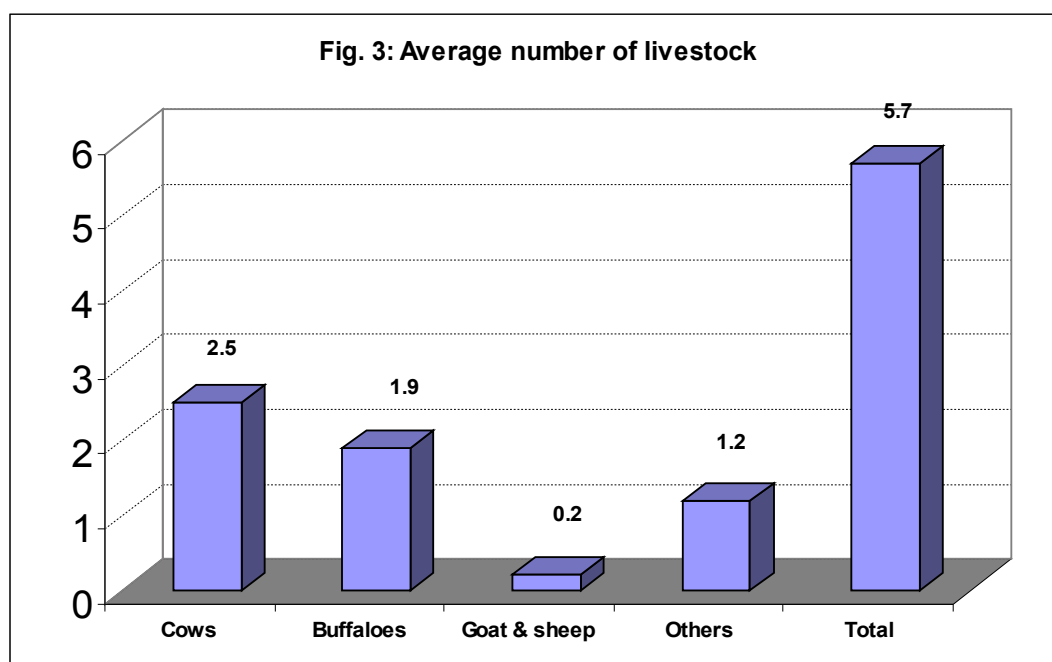


Table 3.7.2: Trend in Livestock number due to organic farming

Size of livestock herd	Number of responses	% of total number of respondents
Increased	187	60.32
Same	121	39.03
Decreased	2	0.65
Total	310	100.00

3.8: Sources of Credit

It is a sensitive matter about which information is difficult to extract in a brief interview with the farmers. Particularly, data on credit availed from non-institutional sources and terms and conditions settled with them lack reliability. But brief information obtained indicated the changing scenario of rural credit where the role of private moneylenders and other non-institutional agencies is rapidly declining and the comparative role of institutional sources is increasing. The sole reasons for this could be softer loans, frequent writing-off of loans by government, reluctance of advances by private sources due to problem of recovery from areas more prone to farmers' suicides and increasing education and general awareness. The trend, however, has strong impact on the cost of credit and other exploitative malpractices of private agencies. However, increase in misuse of borrowed funds cannot be ruled out.

The data collected from the sample farmers indicated that the commercial banks appeared to be catering to the needs of majority of farmers. About 93% of farmers expressed satisfaction with credit availability from different commercial banks of the area but 27% did not borrow from any source and depended upon own funds. Even the All-India survey on indebtedness indicated that only 7.2% farmers of the state were indebted.

3.9. The crop pattern

The crop pattern in the state presented in Appendix-V indicates that wheat, rice, other cereals (such as finger millet, maize) and sugarcane are the major crops accounting for about 80% of the crop area.

On the basis of sample respondents it is clear that in Udham Singh Nagar, Hardwar and Dehradun districts, rice-wheat rotation was most commonly followed with some area allocated to sugarcane and fodders in *rabi* as well as *kharif* season. Blocks of Almora and Nainital under study showed highly diversified farming systems with stress on vegetable crops. As many as 26 organic crops were reported by the respondents (Table 3.9.1).

Rice, mainly basmati was raised by about three-fourth the number of respondents covering about 37.5% of the total cultivated area. Taraoti was the most dominant variety in Udham Singh Nagar, Govinda in Almora, Triveni and Type 3 in Dehradun and Type 3, Pusa 1 and Pusa 1121 in Hardwar district. Except in Nainital, the farmers of all sample areas, wheat was the most important cereal crop in the state. Overall, 79% farmers adopted this enterprise on about 37.5% of their cultivated area. In Udham Singh Nagar, PBW343, UP226, PBW154, HD502 varieties; in Almora WL227 variety; in Dehradun WL2425, RAJ W75 and RR21; and in Hardwar HD502 and UP292 were some varieties important amongst farmers. The overall average yield realized was 14.5q/acre. Typically contrary to plains, in hill areas, the yield was low but the price was higher.

Therefore, major crop rotation followed by farmers was rice-wheat and Sugarcane planted-sugarcane ratoon. Some other major crop rotations followed by respondents were

- Basmati-Wheat/potato-kharif fodders/moong
- Rice-Wheat (+ coriander)
- Ginger-Fresh beans-Wheat/potato
- Cauliflower-Onion-Potato

- Rajma- Potato-pea
- Potato-Cauliflower-pea
- Basmati-Potato
- Finger millet-Wheat

Table 3.9.1: Crops grown by farmers with average yield and price

S. No.	Crop	No. of farmers	% farmers	Av. Yield (q/ac)	Average farm gate price (Rs/q)
1	Basmati	230	74.2	9.0	3400
2	Non-basmati	64	20.6	16.2	850
3	Wheat	245	79.0	11.4	1100
4	Finger millet	22	7.1	10.5	700
5	Maize	12	3.9	18	600
6	Barley	12	3.9	7.3	800
7	Jowar	7	2.3	160	650
8	Sugarcane	33	10.6	287	150
9	Peas	48	15.5	36	1800
9	Tomato	27	8.7	41	475
10	Potato	25	8.1	45	1000
11	Cauliflower	35	11.3	42	450
12	Ginger/Turmeric	8	1.9	27	3000
13	Apple	7	2.3	150	1400
14	Pear	2	0.6	50	1250
15	Plum	6	1.9	10	1250
16	Apricot	4	1.3	70	1200
17	Chilli green/red	6	1.9	25/5	700/4000
18	Tulsi green	5	1.6	20	700
19	Coriander green*	3	1.0	28	2000
20	French beans	15	4.8	30	900
21	Soybean	14	4.5	5	2100
22	Rajma	7	2.3	5.5	5400
23	Arbi	3	1.0	30	800
24	Mustard	13	4.2	6	2000
25	Onion	2	0.6	110	550

Typically this year the price of coriander green was exceptionally high.

Area under basmati is increasing in the potential belt of Tarai due to higher market price and more so due to market contract of organic basmati at still higher

price. However, major crop rotation rice-wheat does not gain much due to decline in yield of wheat and lack of adequate buyback arrangement. In Vikasnagar block of Dehradun, wheat crop is replaced by *tulsi* (Sweet Basil) sold at Rs700/q green foliage to Flex Foods Ltd. With an average yield of 25q/acre, it provides a net income of about Rs12000/acre even as a catch crop intervening between wheat and basmati. Thus the emerging crop rotation is Wheat-Basil-Basmati. Its scope is limited due to the limited market.

Table 3.9.2: Paddy crop on sample farms

District	Block	No. of growers	%	Area	%	Most Common Variety	Av yield
U. Singh Nagar	Gadarpur	19	100	6.5	33.7	Taraori	8.2
	Bajpur	20	100	2.4	31.6	Pusa 1	13.1
	Kanshipur	23	100	3.1	58.5	Taraori	8.1
	Jaispur	31	100	4.2	52.5	Taraori	9.5
Almora	Tarikhet	7	14.3	0.1	4.5	Govinda	9
	Betalghat	4	26.7	0.1	6.3	Govinda	8.8
Nainital	Ramgarh	0	0	0.4	15.4		
Dehradun	Raipur	26	96.3	1.4	42.4	Type3	12
	Kalsi	12	80	1.7	39.5	Local	7.7
	Sahaspur	25	100	2.6	50.0	Type 3	12.2
	Vikasnagar	16	100	2.4	75.0	Triveni	12.8
Hardwar	Daiwala	18	100	1.7	29.8	Type 3	12.5
	Narsan	29	100	2.1	29.2	Pusa1/1121	12.7
Overall		230	74.2	2.1	37.5		

Table 3.9.3: Wheat crop on sample farms

District	Block	Farmers		Area		Av. Yield	Major Varieties
		No.	%	acres	%		
Udham	Gadarpur	19	100.0	8.0	41.5	15.6	UP226, HD502,

Singh Nagar							PBW154
	Bajpur	20	100.0	2.4	31.6	16.1	HD502, UP226, PBW343, PBW154
	Kanshipur	23	100.0	2.9	54.7	11.6	HD502, UP262
	Jaispur	31	100.0	3.6	45.0	15.8	WL711, PBW343, UP262
Almora	Tarikhhet	22	44.9	0.4	18.2	14.4	WL227
	Betalghat	14	93.3	0.5	31.3	14.6	WL227
Nainital	Ramgarh	0	0.0	0.0	0.0	0.0	
Dehradun	Raipur	26	96.3	1.4	42.4	12.5	W75, UP2425
	Kalsi	2	13.3	0.3	7.0	11.0	Local
	Sahaspur	25	100.0	2.7	51.9	11.2	Raj 75
	Vikas nagar	16	100.0	2.1	65.6	12.5	RR21
Hardwar	Daiwala	18	100.0	1.8	31.6	14.4	HD502
	Narsan	29	100.0	2.3	31.9	13.1	UP292
Overall		245	79.0	2.1	37.5	13.7	

3.10 Crop Economics

On the basis of data collected from the respondents, it can be inferred that basmati-wheat together pay about Rs34000 as net return while from sugarcane was slightly higher (Table 3.12). In plain areas basmati-wheat promised higher return due to higher yields. Ratoon sugarcane is still more paying but problem of sugarcane marketing is sometimes very severe due to which the farmers avoid taking high risk. There are a number of other crops, particularly vegetable crops profitability of which is higher than these crops but was highly variable due to volatile prices.

3.10: Economics of major crops (Rs/acre)

Operation	Basmati	Wheat	Sugarcane
Field preparation with	1500	1500	1500

tractor			
Seed	540	1000	5000
Transplanting/ sowing	1200	300	800
Irrigations	600	100	400
Plant protection	500	300	800
FYM/Green	1500	1500	1800
Manure/Vermi-Compost			
Harvesting & Threshing manual	1200	1200	3000
Transport & marketing	450	600	1800
Total cost	7490	6500	13800
Main Yield	9*3400=30600	13*1080=14040	275*150=41250
By-product	15*100=1500	14*150=2100	75*120=9000
Total GR	32100	16140	50250
Net Return	24610	9640	36500

4. Organic farming operations

The commonly argue against organic agriculture regarding ‘food security issue’ needs to be addressed here too. The state has typically two distinct areas; two plain districts with high potential agriculture using high level of agro-chemicals while the rest area of the state is hilly having poor irrigation base, low crop yields and by default organic in nature having relatively low use of agro-chemicals. It is quite easy to convince and even follow organic agriculture in the latter belt. It is relatively an arduous task to bring the former one in its fold. Yet the concerted efforts of UOCB and other agencies have yielded good results but remains, by and large, a mixed blessing.

Most of the farmers prepare manures and bio-pesticides themselves. The labour requirement goes up significantly. In majority of hill farmers, family labour available in comparison to farm size is very high. Gainful employment is also

provided for such families having positive impact on their livelihood. Mutual arrangement of labour by organic groups of farmers at certain places was made to avoid dependence on hired labour and carrying out operations in time. Availability of animal waste and crop and forest biomass, less susceptible varieties, suitable crop rotations and natural support of climatic factors have also important bearing on organic farming. Most of these conditions are favourable in hilly tracts while the Udham Singh Nagar and lower Doon of the state have reverse picture. The market conditions do not favour the organic farming due to lack of market owing to small scale of production and marketable surplus and high transport and handling costs.

The following operations have witnessed major changes by way of shift from inorganic to organic farming.

4.1.1 Ploughing/Sowing/transplanting

The general observation was that the soil becomes better workable due to organic matter. The drudgery of bullock and human labour gets reduced while performing these operations. Due to transplanting rice by family labour, dense plant population is kept which is helpful in getting higher yield of the crop and keeps the weeds under control. Before sowing, seed is treated with Trichoderma. Seed rate of wheat is also kept on higher side for the same reason. Source of seed is own in most of the cases but in some areas, farmers' federations arrange for seed from private agencies, particularly from export players. Prevailing seed price of Type 3 was Rs47/kg and that of Traori as Rs57/kg.

4.1.2 Weeding

Generally weedicides were used in the plain areas while manual weeding was done in the hilly tracts. With this change, apart from mechanical measures, mustard oil mixed with saw dust is being used in case of rice crop as pre-emergence control of herbs. Post-emergence control is done by employing manual labour. Manual labour is used in case of wheat and sugarcane too. Thus the use of human labour in organic farming has gone up by 20-30%.

4.1.3 Irrigation

It was reported by many respondents that they preferred tubewell irrigation rather than canal to avoid percolation of inorganic weedicides and fertilizers from other fields of the area. However, if the entire area is in the fold of organic agriculture, then even canal water can be used without much problem.

4.1.4 Soil nutrition

Farmers selected stopped using inorganic fertilizers and in place were using vermin-compost, green manuring, farm yard manure, cow urine and vermin-wash. Daincha seed was available at Rs40/kg and was sown for green manuring before transplanting rice crop. Composting the animal dung and waste, crop residue and grasses was done in pits dug for this purpose. It was prepared in layers for early decomposition of the matter. Vermi-compost was prepared by some farmers by

decomposing earthworms with animal waste and used in the soil as a rich source of nutrients and organic matter. Recycling of livestock, crop and forest biomass to enrich the soil was appreciable.

Taraori variety of basmati was common as it requires less soil nutrients, particularly nitrogen, otherwise the crop lodges. Therefore, it was preferred over other basmati varieties. Kailbahar is used as growth promoter in wheat. Rhizobium culture was used for seed treatment in case of leguminous crops mainly pulses.

However, zinc deficiency was commonly realized in paddy which was corrected by application of zinc sulphate.

4.1.5 Bio-pesticides

Neem oil, trichoderma, Sydemonash, Calbahar, Camistrong (Amono acids) in Auderma formation (Trichderma WP) Rs200/kg used for pulses and other crops. To control other pests, trichderma predomonas @500g/acre is sprayed or mixed with compost or used for seed treatment. Dehradun variety of basmati suffers from lodging while Taraori suffers from blast against which turmeric and gur are mixed in water and sprayed on the crop.

A mixture of 10 lit of cow urine, 1 kg of green chillies, 10 kg of neem leaves and one kg of garlic is prepared and is kept for 7-10 days. Then it is filtered and is used against a large variety of pests. It was stated to be a good source of soil fertility as well. Another such practice was marigold plus cow urine plus buttermilk (lassi) were mixed, kept for a few days and sprayed to control pests. Yet Bacterial

Leaf Blight (BLB) and leaf blight of rice and rusts of wheat were quite common diseases not properly controlled by such pesticides.

Most of these bio-inputs are used on ad-hoc basis but need to be standardized through research trials.

4.2 Impact of organic farming

It is pertinent to examine the impact of organic farming on economy of farmers and landless labour classes, social fabric, ecology of the area etc. In this section an effort has been made to pinpoint some such effects based on the survey.

4.2.1 Impact on Yield & price

In general, it was reported that due to shifting from inorganic to organic farming, the yield of basmati paddy declined by about 25% (from 12q/acre to 9q/acre), wheat by 28% (from 18q/acre to 13q/acre) and sugarcane by 21.4% (from 350 to 275 q/acre) in Tarai and lower Doon area. In hilly tracts these are not as very important crops and yield levels already low. In case of major vegetable crops, yield decline was observed to be 20-25%. The general observation/ perception of the farmers was that initially yield declines significantly but later covers up to some extent. Most of the minor crops such as pulses, oilseeds, coriander, and finger millet do not require much fertilizer. Therefore, significant decline in yield was not reported.

As may be seen from Table 4.2.1.1 that by switching over from inorganic to organic farming resulted in significant decline (more than 10%) in average yield of major crops such as basmati and non-basmati rice, wheat and chilli. The other crops which witnessed fall in yield were tomato, mustard, peas and sugarcane. On the other hand, yield of traditional crops such as barley, finger millets, pulses and spices increased, except tulsi and jowar average yield of which did not change. As stated above, initially, the yield goes down by shifting from inorganic to organic farming but it is stated to cover up in about 4-5 years. However, it needs scientifically authentication about stability and sustainability of each crop yield, as an expected outcome of COF II. The impact on leguminous crops like pea, pulses, oilseeds etc economic impact was reported to be somewhat positive while on exhaustive crops such as rice, wheat, cauliflower, the impact reported is adverse. The farmers' observation may not be correct as a number of other parameters affecting yield also change overtime.

Table 4.2.1.1: Impact on Average Yield (q/ac) of various crops, 2008-09

Crop	Inorganic	Organic	% Increase
Basmati	10.5	9	-14.29
Non-basmati	18	16.2	-10.00
Wheat	13.8	11.4	-17.39
Finger millet	10	10.5	5.00
Maize	17	18	5.88
Barley	6	7.3	21.67
Jowar	160	160	0.00
Sugarcane	300	287	-4.33
Peas	38	36	-5.26

Tomato	45	41	-8.89
Potato	42	45	7.14
Cauliflower	44	42	-4.55
Ginger/Turmeric	25	27	8.00
Chilli green/red	28	25	-10.71
Tulsi green	20	20	0.00
Coriander green*	25	28	12.00
French beans	27.5	30	9.09
Soybean	4	5	25.00
Rajma	5	5.5	10.00
Arbi	27	30	11.11
Mustard	6.5	6	-7.69
Onion	105	110	4.76

The price of crops varied with the variety and location. Except in case of arbi, non-basmati rice, tulsi and onion, of which the price remained the same, the average price of other farm products realized in the market showed improvements, varying from crop to crop (Table 4.2.1.2). The price of organic basmati rice was higher by about 13% and that of mustard by about 11% as compared to inorganic. For wheat no sizable price incentive was recorded. In case of sugarcane all farmers did not shift to organic due to inadequate demand by Green Fiesta which paid price incentive of 30% to compensate the decline in yield. Except for basmati, only a small part of the produce was procured by a few roped in agencies. This parameter needs to be stressed upon for making the farmers realize the larger benefits. It is not out of place to mention here that the increase in farm gate price was not as sizable as the price paid by the consumers. Thus benefit derived by market middlemen did not percolate to the farmers. Therefore, organized efforts of marketing by the farmers are needed. Almost entire basmati, 13% wheat and about 10% vegetables were purchased at premium price while the rest was sold at the open market price.

Table 4.2.1.2: Average farm gate price (Rs/q)

Crop	Inorganic	Organic	% Increase
Basmati	3000	3400	13.33
Non-basmati	850	850	0.00
Wheat	1050	1100	4.76
Finger millet	685	700	2.19
Maize	590	600	1.69
Barley	770	800	3.90
Jowar	630	650	3.17
Sugarcane	140	150	7.14
Peas	1700	1800	5.88
Tomato	450	475	5.56
Potato	990	1000	1.01
Cauliflower	430	450	4.65
Ginger/Turmeric	2800	3000	7.14
Chilli green/red	650	700	7.69
Tulsi green	700	700	0.00
Coriander green*	1900	2000	5.26
French beans	850	900	5.88
Soybean	2000	2100	5.00
Rajma	5200	5400	3.85
Arbi	800	800	0.00
Mustard	1800	2000	11.11
Onion	550	550	0.00

4.2.2: Cost of cultivation

Another parameter having significant impact on the crop profitability is the cost of cultivation per acre. As most of the input parameters are qualitative and have varied impact on different sets of farmers depending upon the cropping pattern and interventions made, it is very difficult to exactly measure the impact.

Still as a case of Basmati crop, some estimation is made in Table 4.2.2.1. It was estimated that a net saving in terms cost reduction of Rs700/acre was realized by switching over to organic cultivation. The gain could be still higher if family labour which gets more employment has otherwise low opportunity cost.

Table 4.2.2.1: Cost of cultivation under organic vs inorganic basmati, 2009

Field operation	Organic (Rs/acre)	Inorganic (Rs/acre)	Remarks
Field preparation	1500	1700	Soil gets better workable due to organic matter
Seed	540	540	
Transplanting	1200	1200	
Irrigation	600	800	Water holding capacity of soil increases, requiring less no. of irrigations
Hoeing/weeding	250	200	Manual weeding apart from bio-herbicides requires higher labour cost.
Fertilizers/ organic composting	1500	1500	As compared to inorganic farming, the cost in organic farming goes down in hilly areas where organic material available is more
Plant protection	500	800	Due to use of local material in organic farming.
Harvesting & threshing	1200	1200	
Marketing	400	450	Depends upon the quantity of output.
TOTAL	7690	8390	

Due to use of organic products in place of inorganic inputs, the cost of cultivation showed decline in most of the crops (Table 4.2.2.2). The higher cost of

labour offset the other cost savings in case of peas, ginger, turmeric, mustard and onion crops.

Table 4.2.2.2: Cost of cultivation- Organic vs Inorganic crops (Rs/acre)

Crop	Inorganic	Organic	% decrease
Basmati	8390	7690	8.34
Non-basmati	7800	7600	2.56
Wheat	7400	6500	12.16
Finger millet	3150	2800	11.11
Maize	4200	3800	9.52
Barley	3600	3320	7.78
Jowar	3150	2800	11.11
Sugarcane	14500	13740	3.90
Peas	10070	10870	-7.94
Tomato	9400	9400	0.00
Potato	8500	8200	3.53
Cauliflower	9180	9980	-8.71
Ginger/Turmeric	5400	5500	-1.85
Chilli green/red	8600	7800	9.30
Tulsi green	3700	3700	0.00
Coriander green*	8350	7800	6.59
French beans	4500	4000	11.11
Soybean	4500	4000	11.11
Rajma	4500	4000	11.11
Arbi	5900	5700	3.39
Mustard	4200	4500	-7.14
Onion	8350	8450	-1.20

4.2.3: Overall monetary assessment of Impact

The combined effect of changes in yield, price and cost of production apart from shift in crop pattern in favour of more remunerative crop enterprises has been presented in Table 4.2.3.1. The weighted average net gain was worked out by

taking % area under each crop as weights. The overall net gain thus worked out as Rs762/acre in case of plains and Rs2121/acre in case of hilly tracts.

Table 4.2.3.1: Net Gain of major organic crops, 2008-09

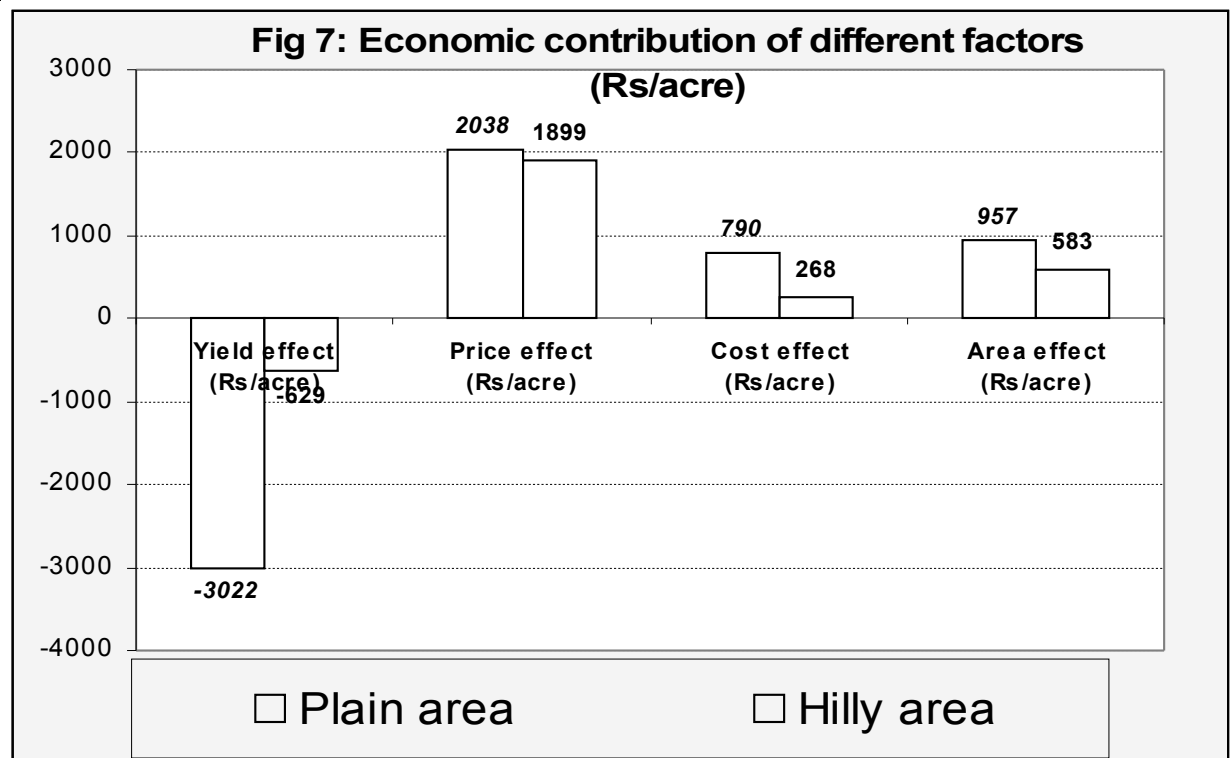
Crop pattern	(% area)		Average net gain using crop areas as weights (Rs/acre)	
	Plain	Hilly	Plain	Hilly
Basmati	28	19	504	342
Non-basmati	26	6	-190	-44
Wheat	53	22	-451	-187
Maize & millets	7	12	131	224
Sugarcane	15	2	362	48
Potato & onion	6	6	232	232
Other vegetables	12	26	-31	-67
Pulses	3	18	108	1050
Spices	2	11	95	520
Oilseeds	3	7	3	7
Fruits	0	2		
Other crops	26	17		
Total	181	148	762	2121

The factors which contributed to the net economic gain were the yield, price, cost of cultivation and area shift. Interestingly, contribution of yield was negative to the tune of -Rs3022/acre in plains and -Rs629 in hilly areas (Table 4.2.3.2 and Fig 7). The effect of price increase was Rs2038 and Rs1899 per acre in plain and hill area respectively. The cost reduction could exert positive effect to the extent of Rs790 and Rs268 and area shift by Rs957 and Rs583 respectively. On the whole, the corresponding economic benefit amounted to Rs762 and Rs2121 per acre or Rs5791 and Rs6787 per farm. Thus farm income increased by 3.80% in

plain and Rs13.55% in hilly areas. Higher benefit in hill areas was due to predominance of traditional crops which gained on many counts.

Table 4.2.3.2: Factors contributing to direct Economic Impact of the project

S. No.	Parameter	Plain area	Hilly area
1	Yield effect (Rs/acre)	-3022	-629
2	Price effect (Rs/acre)	2038	1899
3	Cost effect (Rs/acre)	790	268
4	Area effect (Rs/acre)	957	583
	Total gain (Rs/acre)	762	2121
	Farm size (acres)	7.6	3.2
	Per farm gain (Rs)	5791	6787
	Current Farm income (Rs/acre)	20833	17772
	Total Farm income (Rs/annum)	158331	56870
	% Increase in income	3.80%	13.55%



4.2.4 Impact on water requirements

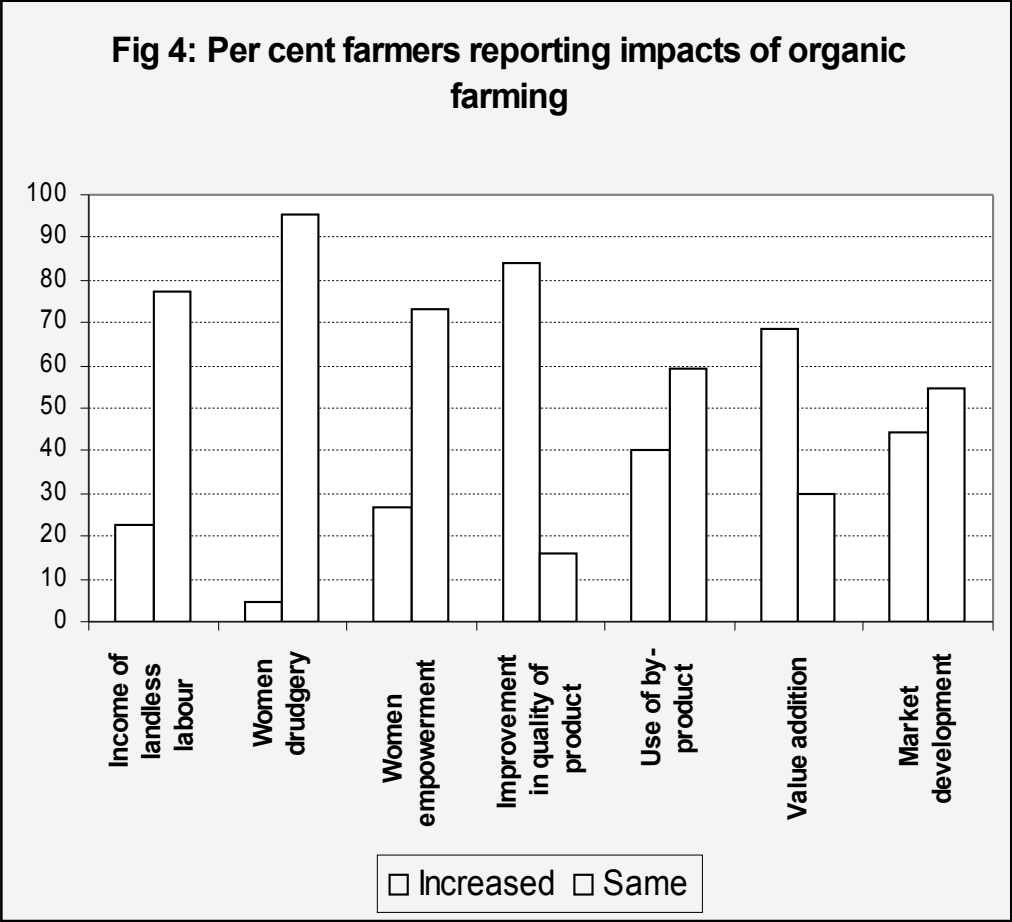
The experience of the farmers was that water requirement of the crop goes down drastically due to organic farming practices. The use of organic manures improves the organic matter in the soil and improves its water retention capacity. Thus saving of water, the most critical resource by about 14% was reported. To further improve water resource in the area it was suggested that water harvesting tanks to harness the rainwater availability should be planned.

4.2.5 Economic lot of landless labour

Due to increased labour employment and thus wage rate, increasing scarcity of labour in certain time periods, the income of landless labour was stated by 27% of respondents to have increased (Table 4.2.5). On the other hand, family labour which had low opportunity cost, is increasingly been used on the farm. This is perhaps a significant in terms of reducing the mobility of hill labour to plains in search of employments.

Table 4.2.5: Other impacts realized by farmers (per cent response)

Impact	Increased	Same	Declined
Income of landless labour families	22.90	77.10	0.00
Women drudgery	4.84	95.16	0.00
Women empowerment	26.77	73.23	0.00
Improvement in quality of product	84.19	15.81	0.00
Economic use of by-product	40.00	59.03	0.97
Value addition	68.71	30.00	1.29
Market development	44.52	54.84	0.65



4.2.5 Human Drudgery

Some studies on ergonomics carried out have pointed out that growing of napier grass in some areas has reduced women drudgery. Some tools and implements have been improved for easier grip, comfort in operation, appropriate to height, desirable angle bend have resulted in less muscular pains and less fatigue. Similarly chaff-cutter, maize-sheller and thresher if made on cooperative basis can be helpful. In spite of all this, respondents in majority reported no significant reduction of women drudgery.

4.2.6 Women empowerment

In hill agriculture women subscribe labour almost at par with men (Section 3.2). They exclusively carry out a number of farm operations such as picking of vegetables, rearing of animals, hoeing of crops apart from carrying out domestic activities. But they are not empowered to take strategic management decisions. With the organic farming, their work load has increased but as reported by 27% respondents are also got better empowerment.

4.2.7 Product quality improvement

About 84% respondents were of the view that quality of the farm products have improved apart from better taste, particularly of the vegetables. This is based on the perception of farmers and their family members as consumers. However, this needs to be educated to the consumers in general.

4.2.8 Economic use of by-products

Crop and livestock by-products get better utilized in organic farming. Ploughing back of residue to improve the soil health and as pesticide is of great importance also from environmental angles. About 40% respondents expressed that there is better economic use of farm by-products while 59% of them were of the view that it has remained almost the same.

4.2.9 Value addition and market development

About 69% farmers found value addition in their farm products due to shifting to organic farming. Another 30% did not see any change in this respect.

One of the major considerations was to explore the new markets and to benefit from catering to the requirements of such markets. Nearly 45% farmers

were categorical in stating that new market developments have taken place. Yet 55% respondents did not visualize any new development on marketing front.

Setting up of export zones for various potential commodities is being taken up by UOCB. Aggressive policies in export and organizing/ participating in export fairs/ exhibitions are required. Involvement of more exporters and incentives to the best producers could also be of great importance.

4.2.10 Improving consumers' awareness

As compared to inorganic produce about 80% respondents indicated to have realized higher price. The reasons specified for this were higher domestic and export demand for the organic products, better quality and taste. Some suggestions for boosting demand and price of organic products were consumers' training, free samples, advertisements, Market linkage, mela, Hoardings, organic haat, Pamphlets, organic shops, roping in of more potential buyers, specific organic mandi be established, self help groups of farmers be encouraged to export and sale in distant markets, value addition at farmers' level by grading, packaging, processing etc.

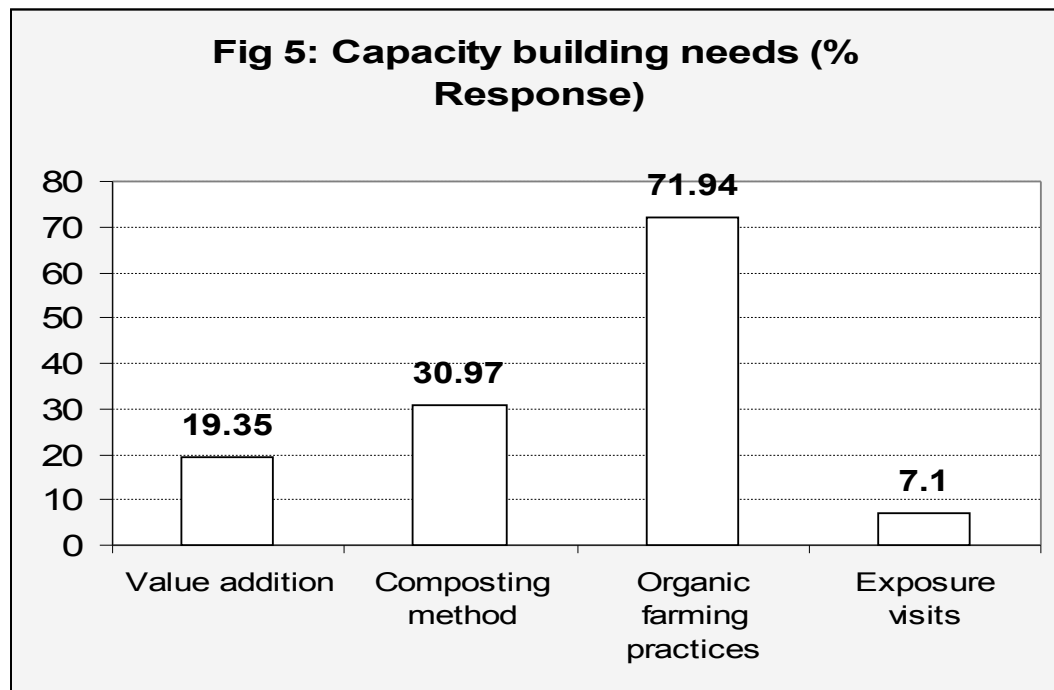
4.2.11 Capacity Building

A pertinent question posed to the respondents was regarding capacity building. On the basis of response, it was observed that value addition in terms of grading & standardization, packaging, storage, processing etc. was expressed by about 19% respondents (Table 4.2.11). Knowledge regarding improved composting method was expressed by 31% of them. Capacity building in terms of process and

procedure of organic farming was the most important stated by 72% farmers. Only 7.1% sample respondents gained from exposure visits conducted in the process.

Table 4.2.11: Need felt for capacity building

	Parameter	Response in number	% Response
1	Value addition	60	19.35
2	Composting method	96	30.97
3	Organic farming practices	223	71.94
4	Exposure visits	22	7.10



4.3 Problems faced in organic farming

As already discussed in section 4.2.2, high fluctuation in markets of organic products stemming from export orders, overall supply and demand situation, involvements and intentions of the market contracting agencies are still some specific fears lurking in the minds of farmers which need to be properly addressed. Other problems realized (presented in Table 4.3) were as under;

4.3.1 Non-availability of seed & organic inputs

It was a cause of concern of about 6% respondents that the organic inputs are not available in time. On the reverse side, nearly 16% stated that the risk of non-availability of such inputs was lesser.

Most of the farmers keep a part of produce as seed. Others purchase from purchase agencies through farmers' federations at higher price after it is cleaned, graded and packed. Seed account for a negligible part of the total cost in most of the crops, any increase in price by way of proper selection of plant material, cleaning and grading and scientific storage over the dormant season has definitely positive impact on germination, yield and quality of produce. As per farmers' perception, some of them should be trained in this area and can specialize in seed production for lowering cost.

4.2.3 Yield and market risks

Views of the respondents regarding intensity of risks they experience in organic products were also taken. Only 9% farmers reported higher in yield risk, 89% no change in risk and only 2% expressed lesser yield risk (Table 4.3). On the other hand, market or price risk was higher as reported by nearly two-third of farmers.

4.3.2 Problem concerning certification

Area under certification is being increased by UOCB but should be made more effective by involving more number of extension workers who should visit atleast thrice a crop season- during sowing, plant protection and harvesting. About three-fourth number of farmers visualized problem of certification of farm products as not so serious and only rest one-fourth of the respondents expressed some doubts of the certification problems.

4.3.3 Behaviour of staff

The behaviour of field workers and other concerned officials with the farmers was reported to be congenial and helpful and did not pose any problem in the process.

Table 4.3: Percent of farmers reporting general problems

Nature of problem	Intensity of the problem		
	Higher	Medium	Lesser
Yield risk	9.35	88.71	1.94
Market risk	62.90	35.16	1.94
Non-availability of organic inputs	5.81	77.42	16.77
Problem relating to certification	0.65	25.16	74.19
Behaviour of staff	2.26	8.06	89.68

5. Summary of impact assessment on different socio-economic and environmental parameters

There is likelihood of changes occurring in terms of various parameters as a trend towards organic farming is set in. The major ones could be as under;

S. No.	Parameter	Rice-Wheat	Vegetable crops	Pulses, oilseeds, spices & other traditional crops
1	Crop Yield	Declined by 25% initially but recovers somewhat subsequently	Yield declined depending upon the intensity of problem	Not much change observed
2	Product Price	Increased by 13% with market clearance of basmati but not of wheat	No change	Increased
3	Cost of production	Declined slightly	Declined	No change
4	Quality of product	Improved	Improved	Improved
5	Utilization of byproduct	As animal feed better for animal health and used as manure	Used mainly for manure	Used as animal feed and as manure
6	Human & animal health	Positive impact	Positive impact	Positive impact
7	Employment	Use of labour increased.	Gainful employment of family labour and use of hired labour increased	Use of family labour and hired labour increased
8	Human drudgery	Soil structure improved and drudgery is reduced. Increased	Soil structure improved and drudgery is reduced. Increased	Soil structure improved and drudgery is reduced. Increased for labour

		for labour intensive organic input preparing and using	for labour intensive organic input preparing and using	intensive organic input preparing and using
9	Capacity building-Skill & attitudinal change	Improved in organizing as a group, marketing avenues, training, sharing knowledge etc.	Improved in organizing as a group, marketing avenues, training, sharing knowledge etc.	Improved in organizing as a group, marketing avenues, training, sharing knowledge etc.
10	Women empowerment	Increased due to their more involvement in livestock mgt. and production of bio-inputs	Increased due to their more involvement in livestock mgt. and production of bio-inputs	Increased due to their more involvement in livestock mgt. and production of bio-inputs
11	Soil Fertility	Improved based on crop yields and visual observations	Improved based on crop yields and visual observations	Improved based on crop yields and visual observations
12	Water saving	Increased due to higher level of organic matter and thus water retention.	Increased due to higher level of organic matter	Increased due to higher level of organic matter
13	Market development –domestic & global	New markets have been and are being explored	New markets have been and are being explored	New markets have been and are being explored
14	Perceptions about future scope	With increasing market linkages and research in organic technology, it will pick up	With increasing market linkages and research in organic technology, it will pick up	With research in organic technology, it will pick up

15	Actions & Policy requirements	Farming system support to all crops and livestock products should be covered	Farming system support to all crops and livestock products should be covered	Farming system support to all crops and livestock products should be covered
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6. Structure of UOCB

The existing structure of UOCB is functioning well except that the extension wing needs to be strengthened in terms of guiding farmers and proper internal certification. From the sale statistics it is clear that export demand has much higher potential. Gain to farmers producing quality for export has to be accentuated by roping in more number of exporting agencies in the procurement process. Although 56 such firms have been listed but only few are actively involved. Even the farmers' federation at state level may be equipped to carry out such business themselves.

There seems to be good success in basmati, less success in wheat, spices and millets but for success in perishables much more systematic efforts are required. In the wake of above observations, extension set up has to be strengthened and farmers should be organized, particularly in marketing of highly perishable farm products to make the system more effective, economical and efficient. Regular monitoring and evaluation regarding operation, physical and financial performance of the project with well laid down indicators are of utmost importance.

B. Impact Assessment study of Centre of Organic Farming

(COF)-II

7. Introduction

The State Training Centre for Organic Farming (STCOF) was set up in Majkhali, Almora district by the Board with the assistance of Sir Ratan Tata Trust to provide practical training for the aspiring organic farmers, stakeholders and others interested people. Different training modules have been developed which ensure practical approach to organic agriculture. The Action Research Cell was initiated in 2006 with an idea of providing solution to commercially viable crops for hill areas.

To be more specific, Research and Development cell was established with the objectives to carry out research and extension activities, to develop suitable and economically viable package of practices of potentially marketable crops, to develop indigenous plant protection products, documentation and scientific validation of appropriate technologies and extension of technologies through practical training and getting feedback from farmers, Agricultural Development Officers and NGOs.

Objectives concerning Phase II are that physiology of soil due to use of organic compost, bio-fertilizers, bio-agents and bio-pesticides and population of natural enemies in organic fields would also be recorded; developing methods to improve Organic farming activity; development of bio-intensive modules for different marketable commodities; scientific validation of technologies; local seed production and distribution, isolation and identification of new bio-agents and standardization of new products concerning organic agriculture.

Objectives relating to Extension were specified as extend the coverage of organic agriculture; training and encouraging farmers, NGOs, SHGs and corporate sector to act; formulation of crude (water/cow urine) and carry out demonstrations; to get feed back and carry out on-farm trials; conduct short training courses for farmers at the centre and in the villages through youth; and to create commodity specific villages through specialized trainings and demonstrations.

8. Progress and farmers' aspirations

In terms of performance of the center and response of the farmers in this connection are presented under;

8.1 Training

Training modules on organic agriculture offered by the centre include training to the farmers, middle level executives, trainers, animal husbandry and dairy and marketing of organic products. After commencement of training centre in Dec. 2006 till March 2008, 69 such training programmes were organized in which 1644 participant have been received training.

Every farmer stated to have received training in one form or the other. Training was provided generally for 2-3 days in the village itself, at Majkhali, Dehradun, Pantnagar, Madhya Pradesh, Maharashtra and Chandigarh. The benefit of training was rated as 'very much' by only 26% farmers, 'somewhat' by 68% farmers while the remaining 6% were not satisfied with the training component that they did not learn anything new. They suggested that training personnel should act doctors, who feel the pulse of the patients, prescribe medicine and help in procuring and administering the same. There is strong need to educate them about new varieties, availability of seed, agronomic practices and help in procuring the desired inputs and marketing of produce. Even guidance regarding proper utilization of crop residue and other resource conservation technologies is essential. Value addition possibilities with more practical and exposure visits should be the important component of it. They also wanted TA/DA for training.

As per annual report of UOCB in 2006-07 there were 1644 participants in 69 training programmes and in 2007-08, 1247 trainees in 54 training programmes

on IPM, organic farming practices, record keeping and marketing aspects of organic products were stated to be covered. But in sample of 310 respondents, only 13 had received training from the Majkhali Centre and none among them was a woman. They mostly reported the impact as positive in terms of crop sequencing, preparing organic inputs, record keeping and following certain production and marketing practices. Most of them stated to have gained by information but wanted more exposure visits to successful evens of organic farming. All the 13 trainees were from hill areas.

8.2 Quality control and Product Certification

Certification is a process of verification that the products are organic and produced in accordance with specified criteria. All the farmers claimed to be well aware of the procedure of certification and invariably reported that UOCB officials visit their farm regularly and check and cross check if any one of the selected farmer is using inorganic fertilizers or chemicals. Immediate action is taken in case of default. Generally 1-2 visits are paid in every crop season for this purpose. No additional supervision fee is charged from the farmers. Visit by external agency Uttaranchal State Organic Certification Agency (USOCA) officials were reported to be paid on about 8% selected farms. The records of day to day operations and inputs are to be kept in Jaiwak Krishak Diary (Organic Agriculture Diary) supplied to the farmers. It would be still more reliable if some national/ international level agencies are involved in external certification.

Visits of field staff are mostly one to two times in the crop year depending upon the farm location. The possibility of less number of visits in the remote area

can not be ruled out. A farmer selected under the project must be visited atleast thrice: at the sowing time, peak time of plant protection and at the time of harvest. None in the sample reported about orders have come through the e-commerce route, as against those come through direct buyers producers meets.

8.3 Consumers' awareness

The produce ultimately ends with consumption. The consumers preference surveys of different organic products are thus of great importance and need to be carried out regularly. Based on general question, it was brought out here that consumers were ready to pay higher price for the organic produce by about 5-10% but not significantly higher. The health angle or better quality and improved taste of organic products were the two major reasons for their preference.

For some products such as rice, wheat, other cereals, pulses, spices etc, it is possible to pack and certify in suitable packets after certification while some highly perishable products like fruits and vegetables, the farmers and consumers face the problem to pack in suitable consumer packets or certify each small item. Although some sale points dealing with organic products have been initiated but the process has to be made foolproof for the satisfaction of the consumers.

8.4 Awareness about organic inputs

As may be viewed from Table 15, most of the respondents were till the year 2004 and even after that a number of other farmers getting awareness of the organic movement. About 68% of these farmers were made aware by UOCB.

Table 8.1: Awareness about bio-fertilizers and bio-pesticides

Aware since	% response		Who motivated?	% response
2002	18.81		Central Himalayan Environmental Association (CHEA)	5.76
2003	45.54		Agriculture Department	1.02
2004	33.17		Already knew	0.68
2005	21.78		Fellow farmers	7.12
2006	14.85		Through training	1.69
2007	15.35		UOCB	68.47
			Uttar Pradesh Diversified Agriculture Support Project (DASP)	15.25

8.5 Research & Development

Some Research Outcomes

Yield and quality of **French beans** are improved by application of vermi-compost @ 10t/ha and use of Rhizobium culture as compared to inorganic fertilizers. Soil health also gets improved.

1. Yield and quality of **potato** are improved by application of vermi-compost @ 10t/ha plus green manuring with buckwheat. Soil health also gets improved.
2. Yield and quality of **rajma** are improved by application of vermi-compost @ 5t/ha and use of CPP (cow pat pit) @ 15Kg/ha plus vermiwash for foliar spray. Soil health also gets improved.
3. Yield and quality of **lentil** are improved by application of vermi-compost @ 5t/ha and use of Rhizobium culture + PSB (Phosphate

solubilizing bacteria) as compared to inorganic fertilizers. Soil health also gets improved.

4. Application of vermi-compost @ 5 t/ha along with Rhizobium culture seed treatment recorded superior pod yield in case of **pea** even over the recommended dose of fertilizers.

B.t.k. (Halt) @ 1000/ha was most effective to control pod damage.

5. Application of vermi-compost @ 10 t/ha recorded superior **coriander** yield over the various other treatments.
6. Application of BD compost @ 15 t/ha recorded superior **wheat** yield (37.22-37.31 q/ha) over the various other treatments.
7. Cowdung mixed with oak/pine foliar, love/ parthenium grass, tomato/wild buck weed improved the nutritional contents of the manure.
8. Various bio-agents tried for seed treatment and foliar spray showed that seed treatment with T. harzianmu and P. florosence had least disease incidence.

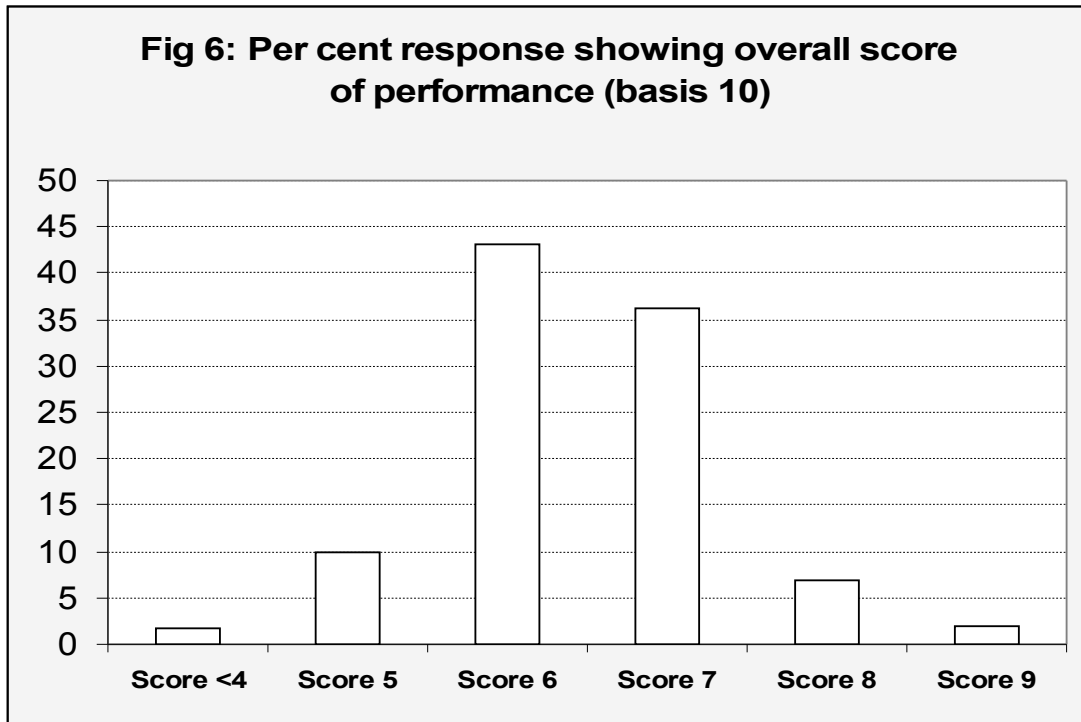
9. Overall score

Based on the discussion on different parameters, the respondents were asked to provide the score for the organic farming efforts. The overall average score worked out to 6.2/10. As presented in Table 9 only 9% farmers ranked it very high as 8-9 out of 10. Most of them (About 80%) put the score either 6 or 7.

Table 9: Distribution of respondents on the basis of average score

Score out of 10	% response
<4	1.7

5	10.0
6	43.0
7	36.3
8	7.0
9	2.0



10. Parameters to study Impact Assessment of COF I: Phase 2

A. Technical cell

1. Field demonstrations

- a. Name of farmers at whose field... Village..... Block...
- b. Crop
- c. Treatment
- d. Area covered
- e. Objectives
- f. Inputs supplied
- g. Field days held
 - i. Number
 - ii. Number of farmers attended
- h. Outcome of the demonstration
 - i. Cost
 - ii. Yield
 - iii. Quality
 - iv. Others specify
- i. Follow up of adoption by
 - i. selected farmer
 - ii. Impact on other farmers

2. Setting up Seed Bank

- a. Crop
- b. Variety
- c. Procurement price
- d. Costs incurred
 - i. Procurement & transportation
 - ii. Cleaning
 - iii. Grading
 - iv. Storage
 - v. Packing
 - vi.
- e. Market channel set up
- f. Price charged from farmer
- g. Response of farmer in terms of
 - i. Quality
 - ii. Germination
 - iii. Price
 - iv. Other

3. Methodology of organic farming in captive areas

- a. Crop
- b. Existing use of
 - i. Fertilizers
 - ii. Pesticides
- c. IPM suggested
- d. Steps taken to minimize use of inorganic inputs

4. Developing technical manuals

- a. Do you maintain records of farm operations? Yes/No
- b. If yes, how?
- c. Which other **publications/ technical material** regarding organic farming did you get?

- d. Benefits realized

Suggested manuals

5. Information and Training received

a. Training

- Have you received training about organic farming? Yes/No
- If yes, for how many days and when?
- What new did you learn there?
- Are you satisfied with the training? Very much/Somewhat/Not satisfied
- What are your suggestions to improve the training component?

b. Capacity building in terms of

- i) Value addition
- ii) Composting method
- iii) Procedure of Organic farming
- iv) Exposure visits

B. Rural institution building

1. OPG

Name of OPG in the area

Are you a member of it?

Objectives

Usefulness

Suggestions to improve

2. Farmers' federation

Name of federation in the area

Are you a member of it?

Objectives

Usefulness

Suggestions to improve

C. Marketing Cell

1. Green restaurant

Name with place

Year of start

Services rendered

Impact realized

2. Exhibition/fair/Festival/Haat

Name the Exhibition/fair/Festival/Haat attended during the year

.....
.....
.....
.....

The response received

.....

3. Co-branding

Summary

Uttarakhand state has diverse agro-climatic conditions, by and large suited for organic farming. The traditional agriculture systems still prevail in some areas which need to be linked with marketing to improve the livelihood of vast majority of poor small and marginal farmers with fragmented land holdings and landless labour households. Sir Ratan Tata Trust played a significant role in setting up of UOCB, COF I and COF II in the form of State Training Center for Organic Farming at Majkhali. This study was carried out to highlight the impact assessment of such an effort and suggest possible measures to improve the process further.

A sample survey of 310 farmers selected from 13 blocks of five districts namely, Udham Singh Nagar, Dehradun, Hardwar, Nainital and Almora was done with a view to assess the farmers' perceptions about economic upliftment, social gains, environmental advantages, operational problems and possibilities of improvements.

Socio-economic profile of farmers revealed that most of them were quite well experienced and their middle age, average family size of 7.6 and almost three-fourth of adult male and females engaged in agriculture. High literacy was quite startling fact with 70% of respondents had matriculation or still higher qualification. Barring the plain area, the farm size was too small with poor

irrigation infrastructure and undulating land slope. Livestock was the supplementary source of livelihood of majority of them. The average herd size worked out to 5.7.

The crop pattern of the area too varied widely i.e. plain area had high potential for price-wheat and sugarcane while the hill farming had highly diversified crops including vegetables and traditional crops like pulses, oilseeds, spices etc.

A number of organic practices carried out by the farmers in terms of use of organic manures and organic pesticides have yielded good results. However, there are some limitations which need to be addressed. Yield of different crops declined at the initiation of organic farming but later showed some recovery. This fall in productivity was compensated by increase in price to a large extent. The apprehension of lowering of cost of cultivation did not prove to be true due to high cost of labour involved in it. The decline in net income got compensated in 3-4 years. The average existing income from crops was calculated as Rs158331 and Rs56870 per farm of plain areas and hill areas respectively. An overall improvement in farm income as a result of change in crop pattern, productivity, price and cost to the tune of Rs5791 or 3.8% in case of plain areas and Rs6787 or 13.55% in case of hilly areas was estimated.

Water requirements did decline due to enhanced water retention capacity of the soil and land preparation operations made easier due to higher organic matter. Weeding with manual labour was a costlier affair. The farmers with higher family

labour got useful employment while those with scarce own labour had to employ more of higher landless labour and thus it enhanced overall employment of human labour. The use of byproducts was also environmental friendly.

It encouraged livestock enterprise for better recycling of biomass and thus drudgery as well empowerment of women increased. A strong need was felt to create consumers' awareness for boosting demand for organic products, rope in more marketing agencies, capacity building of farmers and their federations in value addition, arranging more exposure visits and supply of standard organic inputs.

State Training Center for Organic Farming was set up under COF II with the objective to carry out research, training and extension activities concerning organic farming in the hill agriculture of the state. Extension wing is required to be strengthened. It has made commendable contribution in a short span of time. Constrained by limited number of personnel and other resources, the work requires adaptive trials, authentication and systematic planned approach in the area. Training programmes require more involvement of women, more exposure visits, highlighting success stories. Exhibiting the products in national and international fairs, external certification from national agencies like APEDA would be useful to attain the objectives.

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Appendix-1

Summary results of earlier Impact Assessment studies

The first phase of support to COF came to an end in December 2006. An impact assessment exercise, consisting of a sample size of 100 farmers, spread over 16 villages was conducted in November 2006, which indicated the following:

- (i) a total of 1,200 bio-villages have been adopted;
- (ii) approximately 17,000 farmers are being trained and covered in different aspects of organic farming in the eight districts;
- (iii) an area of 4,000 hectares have been covered under organic certification;
- (iv) 42 commodities have been identified for the market;
- (v) funds totaling Rs. 60 Million have been generated for the project activities;
- (vi) under Organic Basmati Export Project (OBEP), COF facilitated six tonnes of organic Basmati rice in 2003-04; exported 85 tonnes in 2004-05 to Germany, with a premium of 25-30% to the farmers; and exported 175 tonnes of organic Basmati in 2005-06;
- (vii) area under Basmati went up to 800 hectares from 400 hectares and a total of 516 tonnes of paddy, valued to Rs. 9.6 Million was produced and exported;
- (viii) UOCB, along with World Food Programme, standardized the use of locally available Finger Millet (Finger millet) for the production of “India Mix” - a blended, fortified food supplement which was distributed in the Integrated Children Development Schemes (ICDS) run “Angan Wadis”, as a result of which, 300 tonnes of Finger Millet were sourced from the bio-villages of Uttarakhand in 2004-05 and the total market created for Finger Millet in 2005-06 was 1,200 tonnes;
- (ix) UOCB facilitated sales of Rs. 41.5 Million during 2003-06, which includes export of Basmati rice worth Rs. 17.6 Million;
- (x) A cost benefit analysis study conducted in 2005-06 by Dr. Gayur Alam revealed that: (a) organic cultivation of Basmati rice is more profitable than the cultivation of rice using conventional method; (b) economics of organic farming will improve only when the crops grown in the farm are sold at a premium; and (c) majority of farmers were happy with the programme because of

low input costs, improvement in soil conditions and one time payment organized by the UOCB.

Appendix II

Jaivik Krishi Sewa Samities registered with UOCB

S.No.	Society	No. of farmers covered	Certification status (Kharif 2007)	Crops
1	Jaivik Krishi Sewa Samiti, Pauri	1500	259.3	Pulses, Red chilly, coriander
2	Jaivik Krishi Sewa Samiti, Uttarkanshi	1500	254.35	Tuar, Pulses, Lentil
3	Jaivik Krishi Sewa Samiti, Tehri Garhwal	1500	319.91	Vegetables, Tuar, Mustard
4	Jaivik Krishi Sewa Samiti, Rudraprayag	1500	333.81	Tuar, Pulses, Lentil
5	Jaivik Krishi Sewa Samiti, Pithoragarh	1500	186.25	Soapnut, Pulses, Rajma
6	Jaivik Krishi Sewa Samiti, Udham Singh Nagar	1500	994.88	Basmati, Wheat
7	Jaivik Krishi Sewa Samiti, Dehradun	1500	906.23	Basmati, Wheat
8	Jaivik Krishi Sewa Samiti, Haridwar	1500	309.14	Basmati, Wheat
9	Jaivik Krishi Sewa Samiti, Almora	1500	173.51	Red chilly, Amaranthus, Mustard
10	Jaivik Krishi Sewa Samiti, Bageshwar	1500	132.84	Red chilli, Lentil
11	Jaivik Krishi Sewa Samiti, Champawat	1500	46.29	Red chilly, Turmeric, Coriander
12	Jaivik Krishi Sewa	1500	218.27	Amaranthus, Medicinal

	Samiti, Chamoli			crops
13	Jaivik Krishi Sewa Samiti, Nainital	1500	89.14	Vegetables, Pulse4s, Red chilly
14	Jaivik Krishi Sewa Samiti, Pauri	1500	200.1	Millets, coriander
	Total	21000	4237.77	

Source: UOCB Annual Report, 2007-08

Appendix III

Members of Data Collection Team

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Appendix-IV

Farmer's Schedule: Impact of Organic farming in Uttarakhand state, 09

Name of the farmer..... s/o.....Village.....

Block.....District.....Tel. no..... Age.....

1. General information

a) Family structure

S. No.	Category	Number	Years of schooling
1	Adult males	,,,
2	Adult females	,,,
3	Children	,,,

b) Farm size

Category	Area (acres)	Irrigated (I) /Unirrigated (UI)	Source of irrigation	Land rent Rs/acre
Owned				X
Leased in				
Leased out				
Operational		X	X	X

c) Source of power

Source of power	Number	Market rate/acre ploughing
Own Tractor		X
Custom hiring tractor	X	
Bullock		X

d) Source of irrigation

S.No.	Source	H.P.	Area covered (acres)	Remarks
1	Elect. tubewell			
2	Diesel tubewell			
3	Canal			

Operation with number/ quantity	Labour (man hours)	Machinery used	Specify change over the earlier inorganic cultivation & problems faced
1. Land preparation: (Ploughings, plankings)			
2. Seed rate Sowing /transplanting Source of seed			
3. Weeding: Manual Weedicide use			
4. Irrigations			
5. Plant protection			
6. Manres & fertilizers			
7. Harvesting			
8. Threshing			
9. Packaging/ grading/storing etc.			
10. Transportation up to			
Average yield (q/acre)			
Price realized (Rs/q)			
Use of crop by-product			
Method of sale (To pre-harvest contractors/ contracting agencies/ direct to the consumers/ local market/ distant market etc)			
New market linkage developed			
Value addition			
Marketing costs incurred			

b) Crop 2.....Variety.....Complete crop rotation.....

Operation with number/ quantity	Labour (man hours)	Machinery used	Specify change over the earlier inorganic cultivation & problems faced
1. Land preparation: (Ploughings, plankings)			
2. Seed rate Sowing /transplanting			

Source of seed			
3. Weeding: Manual Weedicide use			
4. Irrigations			
5. Plant protection			
6. Manres & fertilizers			
7. Harvesting			
8. Threshing			
9. Packaging/ grading/storing etc.			
10. Transportation up to			
Average yield (q/acre)			
Price realized (Rs/q)			
Use of crop by-product			
Method of sale (To pre-harvest contractors/ contracting agencies/ direct to the consumers/ local market/ distant market etc) New market linkage developed Value addition			
Marketing costs incurred			

c) Crop 3.....Variety.....Complete crop rotation.....

Operation with number/ quantity	Labour (man hours)	Machinery used	Specify change over the earlier inorganic cultivation & problems faced
1. Land preparation: (Ploughings, plankings)			
2. Seed rate Sowing /transplanting Source of seed			
3. Weeding: Manual Weedicide use			
4. Irrigations			
5. Plant protection			

6. Manres & fertilizers			
7. Harvesting			
8. Threshing			
9. Packaging/ grading/storing etc.			
10. Transportation up to			
Average yield (q/acre)			
Price realized (Rs/q)			
Use of crop by-product			
Method of sale (To pre-harvest contractors/ contracting agencies/ direct to the consumers/ local market/ distant market etc)			
New market linkage developed			
Value addition			
Marketing costs incurred			

4. Organic fertilizer use & Plant protection

Details	Bio-fertilizers used	Bio-pesticides used
a) Name organic fertilizers/ Pesticides used		
b) Do you prepare organics on the farm? If yes, with which inputs?	Yes/No	Yes/No
c) If purchased, specify about its availability, price etc.		
d) Used on which crops on your farm?		
e) Since when are you using organics?		
f) Who motivated you on organics? (By training/By UOCB workers/Knew already/Other farmers)		
g) Is subsidy availed on organic farming? If yes, specify		
h) Give details indicating crops and severity of pests/ nutrient deficiency		
i) Inorganic fertilizers & pesticides also used to supplement organics (If so give details)		
j) Improvement in soil health realized (based on soil test/ crop yield/ Visual		

observation/Any other)		
k) Control of pests effective or not? If not, which pests caused damage & to what extent	Yes/No	Yes/No
l) What measures did you take to overcome the problem?		
m) Suggestions to control in future		
n) Is population of friendly animals increasing? Impact on subsidiary enterprises		

5. Certification & Supervision

Are you aware about the certification procedure? Yes/No

Is supervision done by UOCB officials to certify the produce? Yes/No

If yes, how often during the crop?

Do you have to pay for his visit? Yes/No

If yes, how much? Rs.....

What suggestion did you get by supervisors?

.....

Visit if any by any official from external agency for certification

.....

6. Information and Training received

a) Training

Have you received training about organic farming? Yes/No

If yes, for how many days and when?

What new did you learn there?

Are you satisfied with the training? Very much/Somewhat/

Not satisfied

What are your suggestions to improve the training component?

.....

.....

b) Capacity building in terms of

i) Value addition

- ii) Composting method
- iii) Procedure of Organic farming
- iv) Exposure visits

c) Record keeping

Do you maintain records of farm operations? Yes/No

If yes, how?

What lessons have you learnt from record keeping?

d) Which other **publications** regarding organic farming did you get?

.....

e) Did you attend some **exhibition/fair/Festival/Haat** in this connection?

If so, please specify

The response received.....

f) What **other knowledge** did you get in this process?

.....

7. Consumer's awareness

As compared to inorganic produce did you get price Higher /Same/Lower

Reasons for higher or lower price.....

.....

Suggestions to improve the price.....

For your family consumption needs, do you keep organic food? Yes/No

Why?

8. General problems faced in shifting towards organic farming

S. No.	Problem	Extent realized
a	Yield risk	High/Medium/low
b	Market risk	High/Medium/low
c	Non-availability of organic manures/pesticides	High/Medium/low
d	Problems relating to certification	High/Medium/low
e	Behaviour of staff	High/Medium/low

f		High/Medium/low
g		High/Medium/low

9. Other impacts realized in organic farming such as value addition, export etc.

- a) Income of labour families Increased/ Same/Decreased
- b) Women drudgery Increased/ Same/Decreased
- c) Women empowerment Increased/ Same/Decreased
- d) Quality improvement Increased/ Same/Decreased
- e) Economic use of byproducts Increased/ Same/Decreased
- f) Value addition Increased/ Same/Decreased
- g) Market development Increased/ Same/Decreased
- h) Increased/ Same/Decreased
- i) Increased/ Same/Decreased

10. Suggestions for improvement

- a) Residue testing facility
- b) Certification procedure

Tick the most appropriate institution for certification

Farm-fed UOCB NGO Private co. Others (specify)

Reasons for choice.....

- c) SHG formation
- d) Improving consumers' awareness through
 - i
 - ii
 - iii
- e)
- f)

11. Overall comments

Score of satisfaction.....

(Score 0 if completely dissatisfied -10 if most satisfied)

Appendix -V

Crop pattern of the state, 2005-06

Crop	Area in 000 ha	% of cropped area
Rice	302	23.43
Maize	33	2.56
Wheat	395	30.64
Barley	25	1.94
Other cereals	214	16.60
Pulses	61	4.73
Sugarcane	101	7.84
Potato	18	1.40
Groundnut	2	0.16
Sesamum	2	0.16
Rapeseed & mustard	18	1.40
Other oilseeds	35	2.72
Other crops	83	6.44
Total cropped area	1289	100.00

Source: Agri. Stat. at a Glance, 2008