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Inputs in Organic Farming: Are They Factual in Plain and Hill Regions of Uttarakhand

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ABSTRACT Agriculture sector contributes a major portion in gross production of India. In spite of this, agriculture today is finding itself in increasing difficulties. The adverse impact of agriculture based on synthetic fertilizers and herbicides is visible in the degradation of soil fertility, quality of food, taste of food and so on. Organic agriculture may prove to be a boon to curb these adverse effects. There is dearth of information on inputs of organic farming in Uttarakhand in general, and in the plain and hill regions of Uttarakhand in specific. Hence, the present exploratory study was conceived with the broad objective of building authentic data based on input aspect used in organic farming by farmers in Uttarakhand. Purposive random sampling was adopted to select districts, blocks and villages. A sampling frame was prepared after conducting census survey. A sample of 72 farmers pursuing organic farming was selected randomly for the study. The study was conducted in plain and hill regions of Uttarakhand. It was evident from the present research that local sources of information such as Sarpanch, Gram-sabha members and so on lacked to facilitate farmers, pursuing organic farming. No farmer used certified organic seed. It was observed in present investigation that instead of different types of composts, DAP and Urea were also used by good number of farmers, which were not allowed in NPOP guidelines. Farmers in the hill faced more irrigation problems as compared to plain farmers. It can be concluded from the research that farmers were not following NPOP guidelines stringently. To encourage organic farming, its awareness should be increased among farmers. To promote organic farming government should make policies and plan training and educational modules for farmers.

1. INTRODUCTION

Agriculture today is finding itself in increasing difficulties. It is being assailed on so many sides that it hardly knows which way to turn. The environmental lobby complains about pollution from pesticides, fertilizers and livestock effluent and about the rope of countryside; the health-conscious are worried about the residues in the diet and the tastelessness of food; the anti marketers point accusingly at the surpluses arising from the CAP (Common Agriculture Policy) and finally, the great technological advances of recent years are seen to be causing rather than alleviating the terrible famines of the third world countries. Farmers are desperate as their profit margins are squeezed and the policies, which they are told to follow, are continually being reversed.

There is one solution that cuts a totally different path. It addresses all the problems currently facing agriculture. It is organic agriculture. Organic farming is a system that is designed and made to produce agricultural products by the use of methods and substances that maintain the integrity of organic agricultural products until they reach the consumer. This is accomplished by using where possible cultural, biological and mechanical methods as opposed to using substances, to fulfill any specific fluctuation within the system so as to maintain long term soil biological activity; ensure effective peak management; recycle wastes to return nutrients to the land; provide attentive care for farm animals and handle the agricultural products without use of extraneous synthetic additives or processing in accordance with the act and regulations.

Only 30 per cent of India's total cultivable area is covered with fertilizer where irrigation facilities are available and the remaining 70 per cent of the arable land, which is mainly rain fed area, have not been using any fertilizers. Also, it is estimated that around 600 to 700 mt. of agricultural waste is available in every year but most of it is not properly used. There are several alternatives for supply of soil nutrients from organic sources like vermicompost, bio-fertilizers and so on. Technologies have been developed to produce quantities of vermicompost. An attempt was made to identify the inputs used for organic farming in plain and hill regions of Uttarakhand.

2. REVIEW OF LITERATURE

Certain inputs and cropping and cultural practices are an integral part of management on an organic farm. Common elements include legume-based rotations and small amounts of organic fertilizers. Farmyard manure, compost, green manure, biofertilizer and crop rotation are used to gain plant nutrients. Common crops are forages, vegetables, small grains and small fruits. Pests are controlled through selective rotations, biological methods and organic insecticides. Weed control is usually done through proper timing of tillage and planting, crop rotations and moving.

Wyss (2000) studied the influence of different farming systems on nutrient contents and on grass silage quality. The results of this trial indicated that the amount and type of fertilizer which differs between organic and conventional systems, influenced the botanical composition, the nutrient content of the grass and therefore, the fermentation quality of the silages. It showed that along with higher fertilizer level, crude protein and crude fiber contents generally increased while sugar content decreased.

A study was conducted by Nehra and Grewal (2001) to observe the influence of organic manures and inorganic fertilizers on soil properties and yield of wheat. It was observed that organic manures increased grain and straw yields of wheat; organic carbon content and available NPK in soil significantly.

Padmaja and Anandha (2001) conducted a study on organic substitution of nutrient for irrigated maize. They concluded that NPK dose could be reduced by 25 per cent with the addition of FYM at the rate of 5 ton per hectare along with Azospirillum without comprising for any reduction in the yield of maize besides ensuring environmental safety.

Singh et al. (2001) reported that higher chickpea yields by a margin of 15.8, 9.5 and 8.8 per cent were recorded with the application of 3, 2 and 1 ton/hectare of Vermicompost over control i.e., no use of Vermicompost.

Sharma (2001) studied the sensitivity of methonolic extracts of roots, bark, leaves and seeds of Neem against different stages of Diamond Black Moth. Bark extract exhibited the highest antifeedant and repellent action against larvae and adults of black moth. The females derived from the feeding of bark extract treated food laid significantly lesser number of eggs.

Bazgir and Srivastava (2001) suggested the applications of Trichoderma species reduced the incidence and severity of stem canker and black scurf of potato and promoted the plant growth and yield either alone or in combination with fungicides.

Weed dynamics in response to soil solarization was studied at the agronomy field unit, Bangalore. Chandrakumar et al. (2001) saw the performance of transparent polythene sheet with varying thickness and duration. Soil solarization with transparent polythene sheets of .05 mm thickness for a period of 60 days was more effective in controlling weeds compared to 40 days and 20 days of soil solarization.

Kanujia and Narayana (2003) concluded that chilli plants inoculated with Mycorrhiza biofertilizer also recorded more plant height, number of fruit, fruit yield as compared to uninoculated plants receiving 75 kg. per hec. Bacterial biofertilizer particularly Azobactor was found more beneficial in root crops. It increased root length, diameter and yield in carrot and radish as compared to uninoculated. They saved nitrogen requirement up to 50 per cent in most of the vegetable crops and increased yield by 18 to 50 per cent in different vegetable crops.

3. METHODOLOGY

In order to assess the inputs in organic farming, the present study was conducted in the plain and hill regions of Uttarakhand. In view of the assumption that in hill regions organic farming was more popular, two districts (Nainital and Dehradun) were selected from the hill regions and one district (U S Nagar) was selected from the plain region through purposive random sampling. From each district, two blocks were purposively selected and from each block two villages were selected. The blocks selected were earmarked as bio-villages. In the selection of villages, purposive random sampling was used as they were selected from the list of bio-villages of the selected districts obtained from National Organic Commodities Board (NOCB), Dehradun. A sampling frame was developed through census survey in the villages. This sampling frame contained 32 farmers from plain region and 65 farmers from hill region. Thereafter, the farm families were selected randomly through fish bowl method, from the total farm families, which were growing organic crops either in part or total of

their farmland. From each group about 73 per cent, i.e., 24 and 48 from plain and hills were selected for the study.

An interview schedule entitled "Organic Farmers Survey Schedule" was used in the study to elicit data on inputs of organic farming. The input section of interview schedule had sub-sections and was designed to gather information on farmers' training related to organic farming, motivation and motivating factors, seeds/ seedlings input, fertilizers/manures, source of water and type of irrigation, weeds and their removal, pests and pesticides, practices for maintenance of soil fertility, labour input, energy input and implements and machinery inputs. Descriptive data were collected from 72 samples personally by using pre-coded interview schedule. Information was noted down on the interview schedule. It was found in the census survey that there were no certified farmers in the bio villages of the study.

4. RESULTS AND DISCUSSION

A look at training input in organic farming revealed that the majority of the respondents irrespective of region had undergone training in organic farming, the proportion of such cases being a little higher in the plains than in the hills. On the whole, 69 per cent were observed to have reported on their training in organic farming in affirmative while the remaining had not undergone any training in organic farming. A comparison amongst the type of training in the plain and hill regions showed that majority of the respondents in the plain region reported participation in demonstrations with one-fifth reporting field visit and negligible proportion reporting seminars. On the other hand, hill respondents reported more training even though the majority reported demonstrations as in the case of those in the plain region. All those who underwent training in the plain and hill regions were trained in organic farming process and application of fertilizers, manures and herbicides (Table 1). The findings further revealed that no training was imparted in other areas such as processing and handling of organic products, labeling/ sorting/ grading, pricing and certification of organic products. As organic crops are emerging as an important premium area in agriculture, the need to train farmers of all categories to become competent to enter organic food market looms large.

Institutions were the motivators for 50 per cent organic farmers in the plains while 33 per cent were motivated by other farmers. In the hill region, on the other hand, nearly 67 per cent respondents were self-motivated and 42 per cent by institutional agents. 'Health benefits' was found to be the most popular motivating factor for organic farmer in both the plain and hill regions of Uttarakhand.

Table1: Distribution of farmers by type and aspect of training

Farmers trained in OF	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
Yes	20	83.4	30	62.5	50	69.4
No	4	16.68	18	37.44	22	30.53
Total	24	100	48	100	72	100
Type of training	*Plain (N=20)*		*Hills (N=30)*		*Total (N=50)*	
	F	*%*	*F*	*%*	*F*	*%*
Seminar	1	5	5	16.6	6	12
Workshops	-	-	1	3.3	1	2
Demonstration	12	60	25	82.5	37	74
Field visit day	4	20	5	16.5	9	18
Short training courses	-	-	4	13.2	4	8
Not reported	3	15	-	-	-	-
Total	20	100	40	132	57	114
Aspect of training	*Plain (N=20)*		*Hills (N=30)*		*Total (N=50)*	
	F	*%*	*F*	*%*	*F*	*%*
Organic farming process	20	100	30	100	50	100
Application of fertilizers/manures/ herbicides	20	100	30	100	50	100
Marketing	2	10	4	13.3	6	12
Total	42	210	64	213.3	106	212

Total exceeds cent per cent due to multiple responses

Table 2: Distribution of farmers on the basis of type of seeds and chemical treatment of seeds

Type of seeds	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
Registered	10	41.7	11	22.88	21	29.14
Local	3	12.51	2	4.16	5	6.94
Both registered and local	11	45.87	35	72.8	46	63.84
Total	24	100	48	100	72	100
Chemical treatment of seeds	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
Yes	20	83.4	8	16.66	28	38.8
No	4	16.68	40	83.4	44	61.1
Total	24	100	48	100	72	100

A large proportion of the respondents (nearly 46 per cent) used both types of seeds, namely, registered and local, and nearly 42 per cent respondents used only registered seeds in plain region. However, nearly 13 per cent of the respondents of the plains also used local seeds. In the hill region, majority of the respondents (nearly 73 per cent) used both registered and local seeds. Majority of the respondents (nearly 64 per cent), out of the total, used both registered and local seeds. About 29 per cent of the total sample under study used registered seeds in organic farming. No respondent used certified organic seeds. It was observed in the present investigation that majority of respondents (83 per cent) used chemically treated seeds in plain while17 per cent respondents used it in hill (Table 2). The purpose of chemical treatment was found to be to improve growth of plants and prevention from pest and disease.

The analysis of data in regard to the use of fertilizers/manures revealed that instead of different types of composts such as Bio dynamic compost, Effective Microorganism (EM) compost, NADEP, Vermicompost and Cow Pat Pit, all the respondents in the plains and a little more than half of the respondents (58 per cent) in the hill region, used urea on their farms, which were under organic management. Di Ammonium Phosphate (DAP) was also used by majority of respondents in the plains (nearly 92 per cent) and less than half, i.e., 40 per cent, in the hill region. The mean amount of urea used in the plain was 50.37 kg./acre, in the hills 30.17 kg./acre and in the case of total sample it was 39.5 kg./acre for cereals. The mean amount of DAP for cereals in the case of total respondents was computed to be 38.75kg./acre (Fig. 1). The reason behind application of synthetic fertilizers by the respondents might be their belief of poor yield in organic farming if depended on organic farming during conversion period. Almost all the respondents owned small or semi-medium land holdings and they could not afford poor yield in starting years of organic farming.

Sources of water and type of irrigation were also investigated. All respondents were highly dependent upon rainfall but nearly 75 per cent respondents had tube wells and 25 per cent had other artificial sources like artizens, hydrum and so on in the plains. On the other hand, in the hill region, nearly 37 per cent respondents used tube wells and other sources in addition to or in the absence of natural sources. In other words, all the respondents owned an alternative source of water in the plains other than natural source. While in the hill regions, majority of the respondents depended upon natural sources.

All the respondents irrespective of the region, adopted manual operations for the removal of weeds. In addition to this, majority of the respondents in the plain region, i.e., nearly 83 per cent each used chemical weedicides, such as

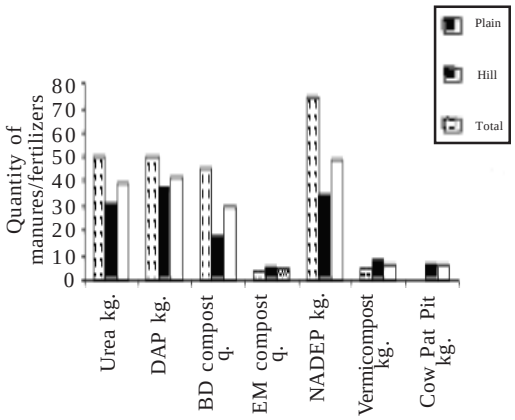

Fig. 1: Distribution of farmers by means of used manures/fertillizers per acre Type of manures/ fertilizers

2-4D and Isoproturon respectively. Cow urine, a natural product, was used by a small percentage of the respondents as a weedicide, i.e., nearly 8 per cent in the plain region. On the contrary, a few respondents of the hills, i.e., nearly 6 per cent and 15 per cent used Isoproturon and Pumasuper respectively while nearly 10 per cent respondents used cow urine as a weedicide.

The study showed that the farmers in the plain region used more variety of weedicides in contrast to those in the hills and also that most of the farmers in the plains used chemical weedicides whereas its use was limited to a very small proportion of farmers in the hills.

In the plains, 50 per cent respondents each used crop rotation and intercropping to maintain soil fertility. On the other hand, nearly all the respondents (96 per cent) adopted crop rotation but no respondent adopted intercropping in the hill region. Heichel and Barnes (1984) stated that legumes could replace 25 to 50 per cent of nitrogen fertilizer needs of high yield cropping system.

The labour charges were relatively higher in the hills (Rs. 76.5 per day), as compared to the plain region (Rs. 66.5 per day). Difference was found in the working schedule of the male and female labour. There were some farm activities in which female labour was not involved such as ploughing, harrowing, irrigation and dressing of fertilizers. On the other hand, female labour was seen to be engaged in sowing/planting, hoeing, harvesting, threshing and drying and storage. Comparatively, female labours' workdays were less than that of the male labour under organic farming as far as these activities were concerned (Fig. 2).

In the plains, a major portion of respondents, i.e., 92 per cent and in the hills 79 per cent, reported use of mechanized means powered by fossil fuel for ploughing, harrowing and planking. In the hills, a good number of respondents, i.e., 67 per cent used draft animals also for ploughing. The findings revealed that majority of the respondents in the hills used both power as well as draft animals for ploughing. The farmers of Uttarakhand under study, used electrical energy or diesel to power the machines to perform farm operations in organic farming wherever powered systems were available at affordable costs and in the hilly terrain, human labour and draft animals performed most of the operations. Uprooting of weeds, sowing and deweeding were farming operations those were manually performed by all or majority of the respondents of the study. The analysis of data of all the respondents showed that seed drill, emitter/sprinkler and winnower were used by a relatively smaller percentage of

Table 3: Distribution of farmers by type of weeds found in their field, its removal and use of weedicides

Weeds	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
Chenopodium alba	24	100	48	100	72	100
Avena fatua	24	100	48	100	72	100
Cyperus rotundus	12	50	36	75	48	66.62
Kuri	-	-	36	75	36	49.96
Parthenium hysterophorus	-	-	12	25	12	16.65
Jvant	-	-	36	75	36	49.96
Total	60	250	204	425	264	366.6
Removal of weeds/pests	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
Hand/manual operation	24	100	48	100	72	100
Weedicides/pesticides	20	83.4	7	14.6	27	37.47
Total	44	183.33	55	114.58	99	137.5
Weedicide	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
2-4 D	20	83.4	-	-	20	27.76
Isoproturon	20	83.4	3	6.24	23	31.4
Pumasuper	1	4.17	7	14.56	8	11.10
Ormix	4	16.68	-	-	4	5.55
Cow urine	2	8.34	5	10.4	7	9.71
Total	47	195.8	15	31.25	62	86.11

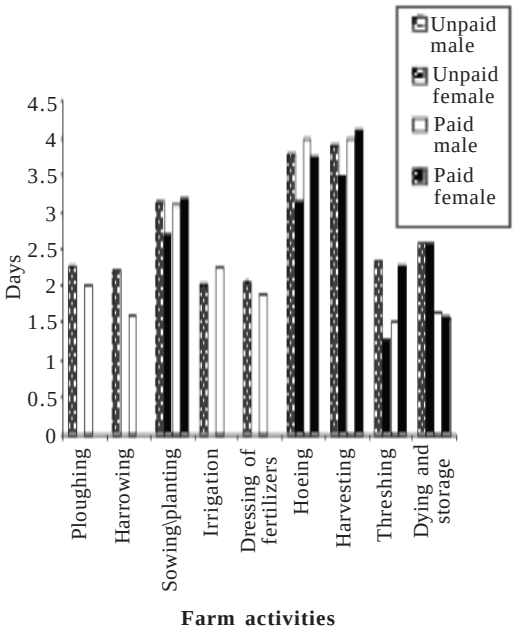

Fig. 2: Details of number of days of work done by labours in different farm activities Farm activities

respondents, i.e., about 17 per cent while the other tools/machines were used by majority. Majority of the respondents in the plain region (83 per cent) owned their implements, while only 25 per cent respondents of the hills used personal implements/tools/machineries. Nearly 75 per cent respondents of the hills used hired implements/ tools/machineries (Table 4, 5).

5. CONCLUSION

Organic agriculture was encouraged by the government of Uttarakhand state. Organic farming is pursued in the districts of Uttarakhand in its plains and hill regions. The farms are in conversion period. A few females are also involved in organic farming. Majority of the respondents in the plain and hill regions had attended different kinds of training. Demonstration was found as the most common kind of training attended by respondents. In most of the cases, content of training centered around organic farming process and application of fertilizers/ manures/ herbicides. Besides training, government officers, NGO's, radio and periodicals played a crucial role in imparting information on organic farming to the farmers. Various attributes such as health benefits, soil friendly, environmental friendly and so on were perceived as motivating factors in adopting organic farming by farmers.

Table 4: Distribution of farmers by energy input for different farming operations

Energy input	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
Ploughing						
Draft animals	2	8.34	32	66.56	34	47.19
Powered	22	91.74	38	79.04	60	83.28
Harrowing						
Draft animals	2	8.34	20	41.6	22	30.54
Powered	22	91.74	38	79.04	60	83.28
Planking Label 1						
Draft animals	2	8.34	20	41.6	22	30.54
Powered	22	91.74	38	79.04	60	83.28
Total	176	732.16	320	665.6	496	684.48

Table 5: Distribution of farmers by implements/machinery used in organic farming

Implements	*Plain (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
Plough	2	8.34	32	66.56	34	47.19
Cultivator	24	100	36	75	60	83.28
Harrow	24	100	36	75	60	83.28
Plank and rollers	24	100	48	100	72	100
Seed drill	12	50	-	-	12	16.65
Emitter/sprinkle	12	50	-	-	12	16.65
Sickle	24	100	48	100	72	100
Khurpi	24	100	48	100	72	100
Wooden stick for threshing	-	-	30	62.4	30	41.64
Thresher	24	100	36	75	60	83.28
Winnower	6	25	6	12.48	12	16.66

Bio Dynamic Compost, Effective Microorganism Compost, Vermicompost, Cow Pat Pit and NADEP were applied in farmers' farms. In spite of these manures, synthetic fertilizers like Urea and DAP too were used by farmers. Some farmers used synthetic weedicides and pesticides to protect their crops, which are not allowed in NPOP guidelines. The data revealed that the respondents, especially, in the plains were not following NPOP guidelines stringently. It might be attributed to the fact that the respondents were not aware of the same as the document was not easily accessible and available to them. Also, even it was available, they might not have been able to comprehend it. It could also due to easy availability of synthetic or chemical weedicides in the plain areas which made them use it as a quick and easy means to control weeds. Flooding was the most popular irrigation method. Amongst organic crops, rice appeared to be the most labour intensive crop followed by vegetables, leguminous crops and wheat. It was found that the majority of the respondents used powered machines for ploughing, harrowing, planking and threshing in organic farming under study. Powered technologies were used for some activities like harrowing, planking and threshing etc. Powered technologies were more common in plain region than hill.

6. RECOMMENDATIONS

- To encourage organic farming, its awareness should be increased among farmers. Training modules should be formulated to give training to the farmers related to organic farming. Information centers should be planned in every block, whose representative should be spread in every village under organic farming. It will facilitate farmers to take knowledge instantly.
- The study revealed that most of the respondents used old technologies for different activities. Besides this, many activities were done only manually such as uprooting of weeds, sowing, deweeding and so on. To encourage organic farming, more improved women friendly technologies are needed for different farm activities. Most of the future progress in achieving a sustainable agriculture will rely on adoption of newly emerging technology and creation of new forms of energy.

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