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Organic Farming Practices of Plains and Hills Farmers and Their Extent of Compliance with National Program for Organic Production (NPOP) Guidelines

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ABSTRACT Organic farming is a form of agriculture that relies on crop rotation, green manure, compost, biological pest control and mechanical cultivation to maintain soil productivity and control pest, excluding or strictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock feed additives and genetically modified organisms. Government of India has taken up various steps to promote organic agriculture. Under the National Program for Organic Production (NPOP), a range of standards have been evolved. These guidelines should be followed by the farmers during organic farming. The present research paper highlights the extent of compliance with NPOP guidelines by organic farmers in plains and hills regions of Uttarakhand. Further, the paper deals with relationship between farmer's extent of compliance with NPOP guidelines during organic farming and their selected personal variables like age, education; family variables like land holding size, land under organic farming and socio-economic status; and situational variables like awareness and belief regarding organic farming and experience of farmers in organic farming.

INTRODUCTION

Agriculture today is finding itself with mounting difficulties. The environmental lobby complains about pollution from pesticides, fertilizers and livestock effluent and about the dwindling of countryside; the health conscious are worried about the residues in their 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. Farmers are desperate as their profit margins are squeezed and the policies, which they are told to follow, are continually being reversed. The resolution for all these predicaments can be explored under organic farming.

Organic farming is a form of agriculture that relies on crop rotation, green manure, compost, biological pest control and mechanical cultivation to maintain soil productivity and control pest, excluding or strictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock feed additives and genetically modified organisms. Funtilana (1990) has explained organic farming very well and has stated, "Organic Farming is giving back to the nature what is taken from it." It is not mere non-chemicalism in agriculture; it is a system of farming based on integral relationship. Therefore, one should know the relationship among soil, water, plant and micro flora and overall relationship between plants animal kingdom. It is the totality of these relationships, which is the backbone of the organic farming.

To promote organic agriculture in India, the government has taken some initiatives in recent past. APEDA is the nodal agency to promote the Indian organic agriculture and its export opportunities. National Steering Committee under the chairmanship of Secretary Commerce has approved the National Program for Organic Production (NPOP). Under this program, National Organic Standards have been evolved. In developing these standards and procedures due attention is paid to the guidelines as enumerated by international organizations such as International Federation for Organic Agricultural Movement (IFOAM), EU Regulations and FAO Codex Standards. For farmers pursuing organic farming, it is necessary to follow the guidelines of NPOP. Hence, the present investigation was carried out to compare organic farming practices of farmers with NPOP guidelines and the relationship between extent of compliance with NPOP guidelines followed by the farmers and their selected personal, family and situation variables.

Review of Literature

The survey of literature is a vital part of the research endeavour. The investigator made an attempt to scan through available related litera-

ture. The search revealed that efforts have been made to study the influence of organic inputs on the soil and production. Mostly studies were conducted abroad. Hardly any review was found related to extent of compliance with NPOP guidelines by farmers during organic farming. Most of the studies are very specific in terms of inputs, needs and problems under organic farming.

Veeresh (1999) opines that both high technology and sustainable environment cannot go together. Organic farming is conceived as one of the alternatives to conventional agriculture in order to sustain production without seriously harming the environment and ecology. However, he says that in different countries organic farming is perceived differently. While in the advanced countries, its focus is on prevention of chemical contamination, we, in countries like India are concerned of the low soil productivity. Even the capacity to absorb fertilizers depends on the organic content of the soil. The principles of organic farming are more scientific than those of the conventional. India's productivity of many crops is the lowest in the world in spite of the increase in the conventional input use. The decline in soil nutrients, particularly in areas where the chemical inputs are increasingly being used in the absence of adequate organic matter is cited as a reason for low productivity. Doubts about the availability of massive sources of organic inputs also exist. He advocates an advance to organic farming at a reasonable pace and recommends conversion of only 70 per cent of the total cultivable area where unirrigated farming is in vogue. This 70 per cent supplies only 40 per cent of our food production. While this analysis has several merits, it is more addressed to the policy makers and less to the farmers.

Pandharipande (1997) observed that the crops grown using NADEP compost were more resistant to attacks by insects and pests. NADEP compost increased productivity of soil and helped in improving crop yield and saving energy.

Bano (1997) observed the influence of vermicompost on growth and yield of agricultural and horticultural crops. Two varieties of sunflower and one variety of mustard grown, exhibited increase in seed output with treatment, in which vermicompost and NPK were used conjointly. Similar results were obtained with vegetable crops like radish, carrot, brinjal and tomatoes.

A study was conducted by Nehra and Grewal (2001) to observe the influence 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.

Singh et al. (2001) reported that higher chickpea yields by a margin of 15.8, 9.5 and 8.8 percent were recorded with the application of 3, 2 and 1ton/hecture of vermicompost over control, that is, 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 Back Moth. Bark extract exhibited the highest antifeedant and repellent action against larvae and adults of back moth. The female derived from the feeding of bark extract treated food laid significantly lesser number of eggs.

Kanaujia and Narayana (2003) concluded their chili 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 uninoculated. They saved nitrogen requirement up to 50 percent in most of the vegetable crops and increased yield up to 18 percent to 50 percent in different vegetable crops.

Maity and Tripathy (2004) stated that adoption of pure organic farming is possible partially, more specifically crops having high export potential in international markets. On the other hand, full adoption of Integrated Green Revolution Farming, another option of organic farming can be possible to a large extent, where, the basic trends of the green revolution such as intensive use of external inputs, increased irrigation, development of high yielding and hybrid varieties as well as mechanizations of labour are retained with much greater efficiency on the use of these inputs with limited damage to the environment and human health. For this purpose some organic techniques are developed and combined with the high input technology in order to create Integrated Systems such as, "Integrated Nutrient Management" (INM), "Integrated Pest

Management" (IPM) and biological control methods which reduce the need for chemicals.

RESEARCH METHODOLOGY

For the present study, a descriptive research design was formulated to achieve the objectives. A descriptive research design using survey methods was chosen to find out the prevalent compliance of NOOP guidelines by the farmers for organic farming.

Sampling Design and Sample Size

The present study was conducted in plains and hills regions of Uttarakhand. In view of the assumption that in hills regions organic farming was more popular, two districts (Nainital and Dehradun) were selected from hills regions and one district (U. S. Nagar) was selected from plains regions through purposive random sampling. From each district, two blocks were purposively selected and further, from each block two villages were selected. The blocks selected were such that it contained the villages 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 UTDASP (Uttaranchal Diversified Agriculture Support Project) and National Organic Commodities Board.

For the selection of farm families, random sampling procedure was followed. A sampling frame was developed through census survey in the villages. A detailed list of farmers growing and selling organic crops was prepared from 4 selected villages of plains and 8 selected villages from hills through census survey. This sampling frame contained 32 farmers from plain regions and 65 farmers from hill regions. This means total 32 farmers were organic farmers in selected villages of plains and 65 farmers were organic farmers from selected villages of hills regions. Farmers, who had been growing organic crops in total of their farm land since more than one year called as organic farmer in the present study. There after, six organic farmers from each village were selected randomly. Hence, twenty four organic farmers were selected from the villages of plains regions, that is, Udham Singh Nagar district. Forty-eight farmers were selected from the villages of hill regions of Uttarakhand, 24 organic farmers each from Nainital district and Dehradun district. Total sample size was 72 farmers (Fig. 1).

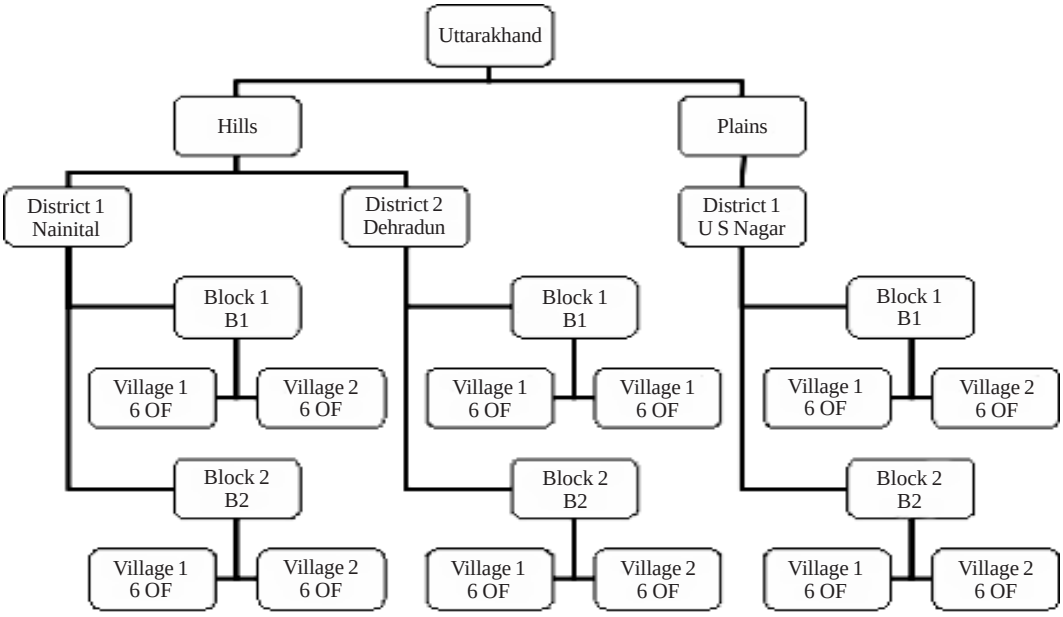

Fig. 1. Sampling design
O F = Organic Farmer

Development of Instrument and Data Collection Procedure

Two tools namely, Census survey schedule and Organic Farmers Survey Schedule were used in the study.

Census Survey Schedule- To prepare a sampling frame, a census survey of organic farmers in selected villages was carried out. A precoded interview schedule was used to elicit data on organic farming and farmers' history of organic farming. This survey was conducted on all organic farmers of selected villages.

Organic Farmers Survey Schedule –This interview schedule was prepared to elicit data on organic farming practices, and extent of compliance with NPOP guidelines by farmers of plain and hill regions. Descriptive data were collected from 72 samples in person by using this precoded interview schedule. Information was noted down on the interview schedule. The investigator explained the purpose of investigation to the sample and fixed appointment for conducting interview.

Pilot study was accomplished with 24 farmers to check the appropriateness of the tool. Minor changes were made in the tool on the basis of pilot study and then the same was finalized to collect final data.

RESULTS AND DISCUSSION

Extent of Compliance with NPOP Guidelines by the Farmers

Farmer's extent of compliance with NPOP guidelines was one of the dependent variables in the present investigation. In order to get meaningful results, a descriptive rating scale-compliance scale was constructed to assess the extent of compliance with NPOP Guidelines. The respondents were asked whether they followed or did not follow the practices by indicating Yes/No on each of the items in the scale. Response on each of the items in the scale was scored 2 and 1 for 'Yes' and 'No' respectively in the case of those that revealed compliance with NPOP guidelines and scoring pattern was reversed in those cases where the items reflected non-compliance with NPOP guidelines. From the individual item score, total and mean score on each item and total of scores of each respondent on the scale and their distribution by scores earned tabulated. The scores were interpreted such that the higher score, the greater the compliance with NPOP guidelines by farmers if organic farming under study and vice versa. The findings related to frequency distribution, total and mean scores on each item of the scale are presented in Tables 1 and 2.

With reference to practice in organic farming like, "is your organic farming in conversion period," "products prepared at the farm from local plants, animals and micro-organism used for pest, diseases and weed management", manure containing human excreta used, " physical methods used for pest, disease and weed management", "synthetic growth regulators and synthetic dyes used", excessive exploitation of water", 'organic products protected from mingling with non – organic product", and " organic and non organic products stored and transported separately", all farmers under study appeared to abide by NPOP guidelines and as a result earned total score of 144 on each.

On the contrary, there were a few items on which all farmers earned minimum scores, that is, 72 with mean score 1. These items were – "certified organic seeds and plant materials used" and "clearing land through burning organic matter (slash and burn method)". It depicts that these practice were not in compliance with NPOP guidelines in case of any of the farmers under investigation either in plains or hills thereby in the total as well.

Table 2 revealed that the items, "crop rotation with legumes followed" and "all equipments from conventional farming system cleaned be-

Table 1: Distribution of respondent by their total earned scores on extent of compliance with NPOP guidelines

Range of scores	*Plains (N=24)*		*Hills (N=48)*		*Total (N=72)*	
	F	*%*	*F*	*%*	*F*	*%*
30-35	10	41.6	7	14.58	17	23.6
36-40	14	58.3	39	81.25	53	73.6
>40	-	-	2	4.16	2	2.77
Total	24	100	48	100	72	100
Mean	35.42		37.64		36.53	

Table 2: Distribution of farmers by their extent of compliance with NPOP guidelines

S. No.	Statements	Plains(N=24)		Hills (N=48)		Total (N=72)		Total score	Mean score
		Yes F	No %	Yes F	No %	Yes F	No %	Yes F	No %
1.	Farm in conversion period by switching over to organic agriculture	24(100)	-	48(100)	-	72(100)	-	144	2
2.	Follow traditional farming without use of any chemical fertilizer, untreated seed, weedicide etc.	-	24(100)	20(41.6)	28(58.24)	20(27.7)	52(72.2)	1.27	
3.	Continue both organic farming and modern farming in the same farm	14(58.3)	10(41.6)	34(70.72)	14(29.12)	48(66.6)	24(33.12)	96	1.3
4.	Use certified organic seeds and plant materials used	-	24(100)	-	48(100)	-	72(100)	72	1
5.	Use chemically untreated seeds and plant materials as organic seeds not available	4(16.64)	20(83.2)	40(83.2)	8(16.64)	44(60.72)	28(38.64)	116	1.6
6.	Follow crop rotation with legumes	12(50)	12(50)	46(95.68)	2(4.16)	58(80.5)	14(19.4)	130	1.8
7.	Use biofertilizers (Biodegradable material of microbial plant or chemical origin)	24(100)	-	48(100)	-	72(100)	-	144	2
8.	Use synthetic mineral fertilizers	22(91.52)	2(8.32)	8(16.6)	40(83.3)	30(41.4)	42(57.96)	114	1.58
9.	Use manure containing human excreta	22(91.52)	2(8.32)	8(16.6)	40(83.3)	30(41.4)	42(57.96)	144	2
10.	Use synthetic nitrogenous fertilizers, including urea	24(100)	-	28(58.24)	20(41.6)	52(72.2)	20(27.7)	92	1.2
11.	Use product prepared at the farm from local plants, animals, and micro organism for pest, disease and weed management	24(100)	-	48(100)	-	72(100)	-	144	2
12.	Use physical methods for pest, disease and weed management	24(100)	-	48(100)	-	72(100)	-	144	2
13.	Clean equipments from conventional farming system before being used on organically managed areas	19(79.16)	5(20.8)	40(83.3)	8(16.6)	59(81.3)	13(27.4)	131	1.8
14.	Use synthetic herbicides, fungicides, insecticides and other pesticides	22(91.52)	2(8.32)	12(25)	36(75)	34(46.92)	38(52.44)	106	1.47
15.	Use synthetic growth regulators and synthetic dyes	-	24(100)	-	48(100)	-	72(100)	114	2
16.	Clearing of land through the means of burning organic matter (Lash and burn method)	-	24(100)	-	48(100)	-	72(100)	72	1
17.	Excessive exploitation of water	24(100)	-	48(100)	-	72(100)	-	144	2
18.	Protect organic products from commingling with non-organic products	24(100)	-	48(100)	-	72(100)	-	144	2
19.	Store organic and non-organic products separately	24(100)	-	48(100)	-	72(100)	-	144	2
20.	Use disinfectants carcinogenic pesticides in storage	6 (25)	18(75)	9(18.72)	39(81.12)	1.5(20.7)	57(78.66)	129	1.79
21.	Use minerals, vitamins and similar isolated ingredients used	24(100)	-	48(100)	-	72(100)	-	144	2
22.	Use biodegradable packing materials	21(87.36)	3(12.5)	21(43.68)	27(56.16)	42(57.96)	30(41.4)	114	1.58

Figures in parentheses denote percentage out of the number of observation in each case, namely, plains, hills and total

fore being used organically managed areas" were found to be agreed by a majority of respondents in plains (50 and 79 per cent respectively) and in hills (95.68 and 83 per cent respectively) with total score being 131 and mean score 1.8 on each. The item "disinfectants and carcinogenic pesticides used in storage" earned total scores of 129 with mean score 1.79. In other words,

these practices were followed by most of the farmers in compliance with NPOP guidelines. Items on which respondents earned mean score between 1.2 – 1.58 implied that the majority of the farmers violated the NPOP guidelines for organic farming in these respects.

Extent of Compliance with NPOP Guidelines in Organic Farming

The study revealed that no one in any of the regions adopted NPOP guidelines in organic farming in totality. A little more than half of the respondents scored between the range of 36-40 on extent of compliance with NPOP guidelines on plains region while a little less than half of the respondents scores between the range of 30-35 on the same. In contrast to this, the hills' farmers revealed relatively higher extent of compliance with NPOP guidelines as evidenced through 82 per cent of them earning 36 scores or more (Table 1).

On the whole, it can be started that three-fourth of the farmers under study earned a score of 36 or more on extent of compliance with NPOP guidelines scale with a possible range of 22 to 44 scores. In other words, to a good extent the guidelines were followed by them in organic farming though they revealed much scope for improvement in their practices.

The study imparted an idea that extent of adoption of NPOP guidelines was higher in hills region as compared to plains region, which could be attributed to be the offshoot of the situational (location) factor.

Testing of Hypothesis

Ho 1: There exists no relationship between extent of compliance with NPOP guidelines by selected farmers in the selected plains region and their selected personal variables like age and education; family variables like land holding size, land under organic farming and socio-economic status, and situational variables like awareness, beliefs and experience in organic farming.

The findings related to null hypothesis Ho 1 are presented in Table 3. The computed r-values were found to be significant 0.937** and 0.619** between beliefs and awareness regarding organic farming and extent of compliance with NPOP guidelines respectively in plains region. In other words, as scores on beliefs and awareness increased, the farmer's extent of compliance with NPOP guidelines also increased in plains region.

Table 3: Coefficient correlations between extent of compliance with NPOP guidelines by selected farmers in plains region and their selected personal, family and situational variables

S. No.	*Selected variables*	*'r' value*
1.	Age	-0.334 ns
2.	Education	0.341 ns
3.	Land holding size	-0.215
4.	Land under organic farming	-0.227 ns
5.	SES	-0.095 ns
6.	Belief regarding organic farming	0.937**
7.	Awareness regarding organic farming	0.619**
8.	Experience in organic farming	0.356 ns

*Significant at 0.5 level
** Significant at 0.01 level

Further, the findings revealed that though education and experience did not have significant relationship with extent of compliance with NPOP guidelines, they showed a trend towards positive relationship with extent of compliance with NPOP guidelines in plains region. Similarly, age too revealed a trend towards negative relationship between extents of compliance with NPOP guidelines in plains region. Besides these, no other variable had a significant relationship with extent of compliance with NPOP guidelines in plains region. On the strength of these findings, the above full null hypothesis Ho 1 was partially rejected.

Ho 2: There is no relation between farmer's extent of compliance with NPOP guidelines in hills region and their selected personal variables like age, education; family variables like land holding size, land under organic farming and socio-economic status; and situational variables like awareness and belief regarding organic farming and experience of farmers in organic farming.

Finding related to null hypothesis Ho 2 are presented in Table 4. Findings revealed that experience of farmers in organic farming had a strong positive r-value (0.510**) with their extent of compliance with NPOP guidelines in hills region. Land under organic farming also had a positive correlation coefficient (0.339**) with extent of compliance with NPOP guidelines in hills region. In other words, as experience of farmers in organic farming and land under or-

ganic farming increased, farmer's extent of compliance with NPOP guidelines too increased in hills region.

Table 4: Coefficient correlations between extent of compliance with NPOP guidelines by selected farmers in plains region and their selected personal, family and situational variables

S. No.	*Selected variables*	*'r' value*
1.	Age	0.086 ns
2.	Education	.276
3.	Land holding size	0.039
4.	Land under organic farming	0.339*
5.	SES	- 0.215
6.	Belief regarding organic farming	0.112
7.	Awareness regarding organic farming	0.185
8.	Experience in organic farming	0.510**

*Significant at 0.5 level
** Significant at 0.01 level

Other than these variables, no other variables had significant relationship with extent of compliance with NPOP guidelines in hills region. On the basis of the strength of these findings, the null hypothesis Ho 2.2 was partially rejected.

Ho 3: There exists no difference in the extent of compliance with the guidelines of NPOP in organic farming by selected farmers of Uttarakhand by location of their farmers, that is, plains and hills.

The mean score of respondents in plains organic farming was calculated to be 35.42 which was lower than the mean score of respondents in hills on extent of compliance with NPOP guidelines in organic farming, that is, 37.64 (Table 5).

In order to assess the influence of location on extent of compliance with NPOP guidelines in organic farming, 't' test was carried out. The computed't' value was found to be significant at 0.05 level of significance when mean score on extent of compliance with NPOP guidelines in organic farming by selected farmers by location of their farm was compared (Table 5). In other words, the respondents of plains were found to be significantly different from respondents of hills region in the extent of compliance with NPOP guidelines in organic farming. It can be seen in the Table 5 that farmers in hills region were found to be more compliance with NPOP guidelines in organic framing. Thus, on the basis of the findings, null hypothesis Ho5 was rejected.

CONCLUSION

Cent per cent farmers under study reported to be in compliance with NPOP guidelines in terms of their farms being in conversion period as required to become eligible for organic certification irrespective of the region. Other practices like 'use of biofertilizers', 'use of manure containing human excreta', 'use of local agribased products for pest, disease and weed management', 'use of physical method for pest, disease and weed management' 'use of synthetic growth regulators' were practices on which cent per cent farmers in both the regions revealed compliance with NPOP guidelines.

'Clean equipment and tools used in modern farming prior to its use in organic farming', 'follow crop rotation with leguminous plants', and 'use chemically untreated seeds and plant materials' were practice on which majority of the farmers irrespective of regions revealed compliance with NPOP guidelines. 'Use of urea', Slash and burn method', 'use of certified seeds and plant materials', 'follow traditional farming without chemical fertilizers etc.' and 'continue both organic and modern farming in the same farm' were practices of almost all farmers' in organic farming that revealed non compliance with NPOP guidelines.

Farmers' belief towards organic farming and their awareness regarding organic farming emerged as significant variables affecting the extent of compliance with NPOP guidelines in plain region. As farmers' scores on belief towards organic farming and their awareness re-

Table 5: 't' value showing the significance in difference in mean scores of extent of compliance with NPOP guidelines by selected farmers in organic farming by their location

Group	*Location*	*No.*	*Mean*	*Mean contrast*	*SD*	*DF*	*Mean difference*	*t-value*
1.	Plain	24	35.42	1:2	2.43	70	2.22	3.71*
2.	Hills	48	37.64		2.15	70		

*Significant at 0.5 level
** Significant at 0.01 level

garding organic farming increased, extent of compliance with NPOP guidelines too increased and vice versa in plain region.

However, in hill region, farmers' experience in organic farming was found as a significant variable affecting extent of compliance with NPOP guidelines.

Personal variables like age and education and family variables like socio-economic status of farmers did not appear to have any influence on extent of compliance with NPOP guidelines. Land holding was identified as a variable which influenced extent of compliance with NPOP guidelines by location of farms, that is, plain and hill regions.

RECOMMENDATIONS

The study revealed that respondents were totally unaware of many areas related to organic farming such as certification process, conversion period and so on. 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.

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