



Reasons for Discontinuance of Agricultural Innovations by Farmers in Tarai Region of Uttarakhand

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ABSTRACT

Innovations play an important role in increasing food production and optimizing resource utilization by farmers. Despite herculean extension efforts, there is still a wide gap between agricultural technologies developed at research institutions and their adoption by farmers. Often, innovations are rejected by the farmers after initial adoption due to several reasons. Hence, this study was undertaken to find out the reasons behind the discontinuance of agricultural innovations. The study was carried out in U.S. Nagar district of Uttarakhand. Five agricultural innovations viz. direct seeding of rice, application of bioagents, mushroom cultivation, polyhouse cultivation and nutritional gardening were selected for the study. For data collection, 89 farmers were interviewed by the researcher using a pretested schedule. The findings revealed that major reasons for discontinuance of agricultural innovations were non-availability of inputs (68.57%), lack of extension agency contact/support (51.42%), lack of interest (37.14%), engagement in other activities (28.57%), cumbersome operation & maintenance (28.57%) and lack of training (22.85%).

Key Words: Adoption, Agricultural innovations, Discontinuance, Farmers, Reasons for discontinuance.

INTRODUCTION

Agriculture sector continues to be the backbone of Indian economy and play a key role in the socio-economic development of the nation. Small farms are the main providers of food and nutritional security to the nation. But Indian farmers working under small farms conditions face difficulties in terms of limited access to technology, inputs, credit, capital and markets. One of the serious challenges facing agriculture sector today is the need to produce more food for a growing population with limited land and water resources which heightens the critical role of innovations in making Indian agriculture more competitive and sustainable. There is a broad consensus that innovations are critical for meeting the challenges that confront the human race, including the need to improve competitiveness, sustainability and equity in agriculture. Innovations not only play an important role in food production

but also have a potential to optimize resource management and utilization by the farmers.

Rogers (2003) defined an innovation as an idea, practice or object that is perceived as new by an individual or unit of adoption". Irrespective of time when the idea or practice was originally developed, it may be considered as an innovation when a person first becomes aware of its existence. Using something old in a new way or applying something new to successfully produce desired change/outcome can also be termed as an innovation. Thus, "perceived newness" is the critical feature of any innovation. A number of facts determine whether an innovation will be adopted or rejected by the unit of adoption. However, besides these two decisions, the unit of adoption may decide to reject an innovation after using it for some time, which is known as discontinuance. Once the innovation is adopted, the adopter usually continues to use it till a better

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alternative is available. But, at times, the adopter may stop using it even when a better alternative is not available. Discontinuance refers to the decision of the adopter to discard the innovation after bringing it to full use. Over a period of time, the real extent of adoption of innovation is indicated by the number of adopters who are still using it at that particular point of time and not the initial number of adopters who had started using the particular innovation. To find out the real adoption level, one has to consider the number of discontinued users as well and subtract their number from that of initial adopters.

Indimuli (2013) reported that among various reasons which have been attributed to farmers' discontinuance decision, lack of information on various aspects of the technology was the main reason. Majority of the respondents did not know where to get the planting material from. The second reason was the high cost of tissue cultured plantlets when compared to conventional suckers. The last reason was the greater requirement for water for the tc-plantlets during their entire period of growth. Palanisami *et al* (2014) found that one of the reasons for discontinuance was the insufficient knowledge about drip irrigation system. Most of the farmers were ignorant about the maintenance package to be adopted for the drip system which acted as one of the reasons for its discontinuance. The findings also revealed that majority of the trained farmers (80%) expressed high cost of the water soluble fertilizers as the major constraint. About half of them revealed that non-availability of pressure gauge was one of the constraints. Some farmers (12%) were reluctant to invest in the venturi unit which is needed for the adoption of fertigation and acid treatment as well. About 41 per cent of them stated that non-availability of water soluble fertilizers in the local village/town market was one of the reasons for discontinuance of fertigation practice even though they had been supplied with the fertilizer tank on subsidy by the Government. One-fourth of the farmers (24%) expected the assistance of extension

or development staff to adopt acid treatment technology in their farms as they were not very confident in adopting the technology on their own which was not forthcoming. Wijerathna *et al* (2014) found that marketing and transport problems were the major reasons for discontinuation of protected cultivation by half of the farmers. The second important reason was pest and disease attacks (13%). Non-availability of labour in time (10%) and inability to maintain and low profit (7%) were the other reasons. Loganandhan *et al* (2015) in a study on post adoption behavior of farmers found that the discontinuance of red gram was due to less preference and lack of awareness about the indirect benefit of border strip.

Thus, finding out the reasons behind their failure is essential for generation of better innovations and more successful efforts to diffuse them within the social system. Hence, this study was conducted to find out the reasons for discontinuance of selected agricultural innovations in the study area.

MATERIALS AND METHODS

The study was conducted in Udham Singh Nagar district of Uttarakhand state because farmers in the district are well known throughout the country for their progressiveness and have shown a great prosperity towards use of improved seeds, fertilizers and agricultural technologies on a large scale. Agricultural innovations were listed. Five innovations that were promoted and disseminated to farmers by scientists of the College of Agriculture, G.B. Pant University of Agriculture & Technology and Department of Agriculture in the last ten years, viz. direct seeding of rice, application of bioagents, mushroom cultivation, polyhouse cultivation and nutritional gardening were selected randomly for the study using chit method.

The initial list of adopters of these innovations from four blocks in the district comprised of 138 respondents. Out of these, only 89 respondents could be traced by the researcher and all of them were selected for the study.

Reasons for Discontinuance of Agricultural Innovations

The potential reasons for the discontinuance of the innovations were listed on the basis of preliminary field visits and by concerning literature. The list was triangulated during pilot testing of the interview schedule and the obtained reasons were ranked according to the frequency and percentage after the final data collection.

RESULTS AND DISCUSSION

Characteristics of the farmers

The findings revealed that most of the respondents were middle-aged (44.90%), males (84.3%), belonging to general caste (61.8%) and were educated up to graduation level (32.6%). Most of the respondents had small-sized families (78.7%), farming was the primary occupation of majority of the respondents (73%) and 36.36% had business as the secondary occupation. It was found that 46.1% respondents owned marginal-sized holdings. Majority of the respondents (97.8%) belonged to Above Poverty Line (APL) category, had low level of social participation (81%), medium level of information seeking behavior (46.1%) and neutral attitude towards the research station (65.17%). Study also revealed that maximum number of respondents had medium level of economic motivation (49.4%), high innovativeness (59.6%) and medium level of risk taking ability (61.8%). A brief account of socio-economic, communication and psychological characteristics of farmers in the study area is given below in Table 1.

Table 1. Distribution of respondents on the basis of socio-economic, communication and psychological characteristics.

Characteristic	Frequency	Percentage
Age		
Young (21-38 yr)	35	39.4
Middle (39-56 yr)	40	44.9
Old (57-74 yr)	14	15.7
Gender		
Women	14	15.7
Men	75	84.3

Caste		
General	55	61.8
OBC	13	23.6
SC/ST	21	14.6
Education		
Illiterate	3	3.4
Can read & write only	1	1.1
Primary education	11	12.4
Secondary education	11	12.4
Higher secondary education	14	15.7
Diploma	1	1.1
Graduation	29	32.6
Post Graduation & above	19	21.3
Family size		
Small (2-6)	70	78.7
Medium (7-11)	17	19.1
Large (>12)	2	2.2
Primary Occupation		
Business	1	1.1
Independent profession	3	3.4
Cultivation	65	73
Service	7	7.9
Student	3	3.4
No work	10	11.2
Secondary Occupation		
Labour	9	27.27
Business	12	36.36
Independent profession	1	3.03
Cultivation	2	6.06
Service	9	27.27
Size of the landholding		
Marginal (<1 ha)	41	46.1
Small (1-2 ha)	12	13.5
Semi-medium (2-4 ha)	13	14.6
Medium (4-10 ha)	18	20.2
Large (>10 ha)	5	5.6
Family income		
APL category	87	97.8
BPL category	2	2.2

Social participation		
Low	81	91
Medium	7	7.9
High	1	1.1
Information seeking behavior		
Low	39	43.8
Medium	41	46.1
High	9	10.1
Attitude towards Research Station		
Favourable	24	26.97
Neutral	58	65.17
Unfavourable	7	7.86
Economic motivation		
Low	7	7.9
Medium	44	49.4
High	38	42.7
Innovativeness		
Low	9	10.1
Medium	27	30.3
High	53	59.6
Risk taking ability		
Low	24	27
Medium	55	61.8
High	10	11.2

Reasons for discontinuance of agricultural innovations

A number of reasons were found during the study that led to the discontinuance of agricultural innovations by farmers in the study area (Table 2).

Non-availability of inputs

Non-availability of inputs was cited as the reason for discontinuance by maximum number of respondents (68.57%). The inputs, however, vary from innovation to innovation. Non-availability of inputs was found to be especially critical in case of three innovations *viz.*, direct seeding of rice, use of bioagents and mushroom cultivation. Under this, the respondents reported non-availability of weedicides in case of direct seeding of rice, non-availability of bioagents and lack of good quality

spawn in case of mushroom cultivation. However, no such constraint was reported in case of polyhouse cultivation and kitchen gardening. In case of polyhouse cultivation, the National Horticultural Board and the State Agricultural Department provided 50 per cent subsidy for construction. In case of kitchen gardening, trial packs were provided during the training and later seeds and other inputs were available at affordable prices.

Table 2. Reasons for discontinuance of selected agricultural innovations.

S r. No.	Reason for discontinuance	Percentage	Rank
1	Non availability of inputs	68.57	1
2	Lack of extension agency contact/support	51.42	2
3	Lack of interest	37.14	3
4	Engaged in other activities	28.57	4
5	Cumbersome operation and maintenance	28.57	4
6	Lack of training	22.85	5
7	No nearby market where produce can be sold	14.28	6
8	Lack of funds	8.57	7
9	Culturally/socially non-acceptable	2.85	8

*Multiple responses

Lack of extension-agency contact

Another important reason cited by the respondents for discontinuance of the agricultural innovations was the lack of contact/support of the extension agency/research station. In case of direct seeding of rice, heavy weed infestation was noticed by the farmers and they lacked the scientific knowledge of weed management. Hence, after adoption they expected the extension agency/research station to provide information/solution for the problem. However, the support of the extension

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agency/research station was not forthcoming at this point because of which a large number of farmers discontinued direct seeding of rice. In case of polyhouse cultivation also, less than satisfactory contact/response by the extension agency was reported by some farmers. In case of application of bioagents, the farmers were given bioagents as a part of project on a one-time basis. Hence, they expected support from the extension agency/research station for the supply of bioagents after adoption which was not forthcoming. In case of mushroom cultivation, support by the extension agency was appreciated by the respondents and it was reported that they had frequent contacts with the extension agency either through visit by the Subject Matter Specialist or visits of the respondents to the research station. The findings were in line with the study of Oladele and Adekoya (2006) who found that lack of extension support was the major reason for discontinuance of farm innovations.

Lack of interest

Lack of interest was also cited as the reason of discontinuance by some respondents. It was found that some of the respondents had initially adopted the innovation due to free distribution (application of bioagents) or had attended the training programme with no serious intention of adopting the innovation (for eg. mushroom cultivation). Lack of interest was not a serious constraint for adoption of direct seeding of rice and polyhouse cultivation as these innovations were mainly promoted among people who had agriculture as their primary occupation and were hence keen about innovations that are likely to increase their farm productivity.

Engagement in other activities- Mushroom cultivation was mostly adopted by people who either had a secondary occupation or whose primary occupation was not farming. Hence, these people could not spare time for continuing mushroom cultivation and cited pre-occupation with other income-generation activities as the reason for discontinuance. These people initially took up mushroom cultivation as an additional livelihood

activity but were not able to spare time for its continuation. In case of the other four innovations, engagement in other activities was not cited as the main reason for discontinuance as the respondents were primarily engaged in agriculture.

Cumbersome operation and maintenance

Complexity of an innovation is defined as the degree to which it is perceived to be difficult to understand and use. Complexity is one of the important attributes of an innovation and is negatively related to the rate of adoption. In other words, more complex an innovation, there is less likelihood of it being adopted by the potential adopters. In case of direct seeding of rice, rampant weed infestation was one of the major problems. This not only reduced the yield but also made it difficult to carry out other farm operations (irrigation and application of fertilizers became much more cumbersome process in plots where direct seeding of rice was carried out). No such issue was reported as a problem in case of the other four innovations.

Lack of training

Training is an important input not just prior to adoption but also for continuation of the innovation. Information needs of the adopters vary in different stages of the Innovation Decision Process and training plays a critical role in fulfilling these needs. During the study, training support was found to be lacking at two stages: pre-adoption and after-adoption. In case of application of bioagents, the innovation was distributed to the respondents and they were told to apply it in their fields without any training on its working, importance and use. In case of polyhouse cultivation and mushroom cultivation, training was given to the respondents prior to adoption. Despite this, respondents felt that they needed follow-up training on construction of the structures and disease-management. In case of polyhouse cultivation, the respondents felt that the content of the training programme was out-of-date. Some of them reported that they had received training in the neighboring states and felt that

training content of the research station should be updated according to what was taught there.

Lack of market

In today's world market-ward orientation of agriculture is seen as a pre-requisite especially for small holders. Consequently, efforts are being made to incorporate changes in the sector which are going to give better returns to the farmers. Diversification of agriculture is one such strategy. Studies also indicate that innovations which had greater relative advantage (more returns in this case) are more likely to be accepted easily by the potential adopters. It was reported that the respondents had discontinued mushroom cultivation due to lack of market. Marketing in case of mushrooms is complicated by the fact that the produce is highly perishable, lack of awareness among local consumers are not aware and far-off markets which look for bulk suppliers (most of the respondents who had adopted mushroom cultivation were doing it on a small scale). Availability of market was a non-issue for the other innovations.

Lack of funds

Some respondents also reported lack of funds as the reason for discontinuance of the innovations. In the study area, some polyhouse structures were damaged by accidental fire, thunderstorms etc. and it was found that the farmers were unable to repair or rebuild the structure due to lack of funds. The initial structures were often set up with the help of government subsidies and they were unable to bear the cost of repair or rebuilding. In some cases, it was also found that the farmer had not yet received the subsidy from the government and had taken a loan to construct the initial structure. In such cases, damage to the structures led to financially gregarious condition for the farmer. The results were in line with those of Sofranko *et al* (2004) who reported similar results.

Culturally/socially not acceptable

Compatibility with social norms is an important

factor leading to adoption and continued use of an innovation. Compatibility of an innovation is defined as the degree to which it is perceived to be in line with past experiences, values and needs of the potential adopters. It has a significant positive relationship with the rate of adoption. Direct seeding of rice is carried out in a manner different from the conventional type of rice-cultivation. As a result, adopters of this innovation eventually faced social ridicule by fellow farmers who had not adopted the innovation. This led to eventual discontinuance of direct seeding of rice in some cases.

Besides these reasons, during the study the researcher also came across some unanticipated reasons that eventually led to the discontinuance of the selected agricultural innovations. A large number of farmers in the study area follow rice-pea/mustard-rice cycle. In such cases, the summer rice is ready for harvesting only by June-July. In case of direct seeding of rice, the sowing has to be done in the first fortnight of June which is not possible as the field is not ready. Also, it was found that due to heavy weed infestation and lack of control measures, the yield was comparatively lower than expected in case of direct seeding of rice. The problem of weed infestation was made worse by lack of availability of labour for farm operations during the monsoon period. In some cases of polyhouse cultivation, pest infestation led to severe damage to the crop and heavy losses. As a result, the farmers had to uproot the entire crop and re-sow the area thereby increasing the production cost considerably.

From Table 3 it was evident that direct seeding of rice was mainly discontinued due to non-availability of weedicides and complexity of operations. In case of bioagents, the respondents mainly discontinued due to lack of support by the extension agency and lack of any serious intention to adopt the innovation since the beginning. On the other hand, mushroom cultivation was discontinued due to engagement in other income generating activities by the respondents.

Reasons for Discontinuance of Agricultural Innovations

Table 3. Innovation-wise reasons for discontinuance.

Sr. No	Reasons for discontinuance	Percentage	Rank
1	Direct seeding of rice		
	Non-availability of inputs	87.5	1
	Cumbersome operations and maintenance	62.5	2
	Lack of extension agency contact/support	50.0	3
	Culturally/socially not acceptable	6.25	4
2	Bioagents		
	Lack of extension agency contact/support	83.33	1
	Lack of interest	83.33	2
	Non-availability of inputs	75.0	3
3	Mushroom cultivation		
	Engaged in other activities	80.0	1
	Lack of market	60.0	2
	Lack of training	40.0	3
4	Polyhouse cultivation		
	Lack of funds	75.0	1
	Lack of training	50.0	2

During the study, an attempt was also made by the researcher to find out the reasons where non-adoption was high (mushroom cultivation and polyhouse cultivation). It was found that in case of both these innovations, farmers did not adopt due to non-availability of infrastructure. Some respondents did not adopt as they did not have sufficient land to set up the infrastructure. On the other hand, in some cases, it was also found that while the respondent had sufficient land to construct the structure required for mushroom cultivation or polyhouse, they did not have funds for the same. Studies on diffusion and adoption of innovations indicate that interpersonal channels and peer groups play an important role in furthering the adoption process. Often, a potential

adopter decides to adopt or reject an innovation following interaction with other members within the social system. Experiences of others not only act as vicarious trials but also influence one's adoption decision. In case of mushroom cultivation, it was found that some of the respondents had decided not to adopt due to less than satisfactory experience of other adopters (lack of market, training and non-availability of good quality spawn).

CONCLUSION

There were several reasons for discontinuance of agricultural innovations in the study area. The most important reason for discontinuance was non-availability of inputs. Non-availability of weedicides in case of direct seeding of rice, bioagents for application and good quality spawn in case of mushroom cultivation led to the discontinuance of these innovations. Lack of extension agency contact/support was found to be another major reason for discontinuance, especially in case of direct seeding of rice and application of bioagents. Lack of interest was also cited as the reason of discontinuance in case of application of bioagents and mushroom cultivation. Respondents' engagement in other activities led to the discontinuance of mushroom cultivation in some cases. Cumbersome farm operations due to rampant weed infestation in the fields of direct seeded rice led to the discontinuance of the practice. Lack of funds to reconstruct the accidentally-destroyed polyhouses and mushroom huts was the another important reason to discontinue these practices.

Non-availability of labour for farm operations, unsuitable sowing-time in case of direct seeding of rice and huge crop losses in case of polyhouse cultivation due to severe pest incidences were the unanticipated reasons for discontinuance of the corresponding innovations. In order to prevent the higher extent of discontinuance of useful agricultural innovations, the role of extension agencies should extend beyond mere information giving in present day context and should include providing inputs or

linking the clients with input agencies. In case of innovations that are market oriented, the agencies should examine the market before promoting the innovation. They may also suggest possible buyers to the adopters.

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