



Motivational Factors on the Adoption of Natural Farming Technology

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Abstract

A study was conducted to determine the factors that would make farmers adopt or reject natural farming technology. Farmers and scientists attach different meanings to natural farming technology, however, in this study it refers to the preparation and use of fermented tissues of plants and animals as natural fertilizers or control agents for crop pests and diseases. Results of several experiments on the use of the technology conducted with rice and some vegetable crops by LSPU faculty and student researchers showed yields comparable with yields of chemically-fertilized crops. Therefore, the College of Agriculture of the university included this technology in its extension programs since 2009. However, despite the series of seminars and demonstrations with farmers, adoption rate is still low. Seventy-two lowland rice farmers, who had attended seminars, in three municipalities in the agricultural zone of Laguna Province served as respondents. Data on their demographic and farming characteristics, extension exposure and perception on the characteristics of natural farming technology were collected and analyzed. Results showed that the adoption of natural farming technology had significant relationship with farmers' characteristics such as organizational affiliation, income and farm size; extension variables such as visits by extension workers, credibility of the extension agents, availability of reading materials, and continuity of receiving information about the technology; and perception about the characteristics of the technology such as relative advantage, simplicity and compatibility with their present condition and resources. These are the variables that should be considered in designing the transfer of natural farming technology to farmers.

Keywords: Motivational factors, Natural farming, Fermented fertilizers, Adoption.

Introduction

As staple crop, rice must be produced in quantities enough to supply the need of the population. Rice occupies the largest portion of the food of Filipinos. The heavy use of chemical inputs in production poses threat to the health of human consumers. One of the technologies that can assure food safety is natural farming technology. Farmers and scientists attach different meanings to natural farming technology, however, in this study it refers to the preparation and use of fermented tissues of plants and animals as natural fertilizers or control agents for crop pests and diseases. The natural farming inputs included in the technology are indigenous microorganism (IMO) culture in rice and molasses, fermented plant juice (FPJ), fermented fruit juice (FFJ), fish amino acid (FFJ), water-soluble calcium phosphate (WCP) prepared from animal bones, water soluble calcium (WC) from poultry eggshells, oriental herbal nutrient (OHN), lactic acid bacteria serum (LABS), natural attractant for flying insects (NAFI), and natural feed for animals.

Improved agricultural technology is successful only when it is adopted and implemented by intended users, the farmers. When an innovation is introduced, it may be readily accepted, partially accepted, partially or completely rejected, or sometimes adopted early and then discontinued¹. The decision-making process

which passes several mental stages is influenced by many factors. The farmer's decision to adopt is not necessarily based only on his rational evaluation of the advantages and profitability of the technology. A farmer does not live in a vacuum and does not always operate as a rational being. He is a member of a community occupying a certain socioeconomic status and is located in certain geographical area where numerous environmental and social factors impinge upon his farming conditions.

Results of several experiments on the use of natural farming technology conducted with rice and some vegetable crops by LSPU faculty and student researchers showed yields comparable with yields of chemically-fertilized crops. Therefore, the College of Agriculture (CA) of the university included this technology in its extension programs since 2009. The CA Extension Services established linkages with the municipal offices of the Department of Agriculture and other local government units to facilitate the technology transfer. However, despite the series of seminars, demonstrations and trainings with farmers on the preparation and use of natural farming inputs, adoption rate is still low.

In this study, natural farming technology adoption was described as a mental process in which farmers go through the stages of having awareness, knowledge of and interest in the

technology and then forming positive or negative perception, and ultimately deciding whether to adopt the technology or not. This process can be influenced by a wide variety of factors, including personal characteristics of farmers, socioeconomic factors and exposure to extension. The knowledge on the factors that would motivate farmers to adopt natural farming technology is important because it can be used in formulating specific technology transfer designs and in targeting specific groups of farmers. This study was conducted to determine the factors that would make farmers adopt or reject natural farming technology.

Methodology

The study was conducted with 72 lowland rice farmers in three municipalities, namely, Siniloan, Pangil and Mabitac, all in the agricultural zone of Laguna. The farmers who had attended one or more of the seminars on natural farming technology conducted by LSPU-CA extension team in partnership with the respective municipal offices of the Department of Agriculture (DA) were purposively selected as respondents. The LGUs of the three municipalities even included such seminars in the Cash for Work Cash for Training Program of the government and invited resource persons from LSPU Siniloan Campus. The seminars and demonstrations were conducted in August to November 2011. Adoption was assessed in summer of 2012 which was found to be low.

An interview schedule was formulated and data on the respondents' demographic and farming characteristics, extension exposure, perception on the characteristics of natural farming technology, and reasons for willingness and unwillingness to adopt the technology were collected. Additional information was gathered from the DA personnel. For quantitative variables mean was determined and used as categorization as old and young, big and small household and other characteristics with groupings into two. To identify the motivational factors of adoption, chi square statistic was used to test relationship between the respondents' characteristics and perception, and willingness to adopt.

Results and Discussion

Table-1 shows that among the personal characteristics of farmers tested for relationship with willingness to adopt; educational attainment and organizational affiliation had significant relationship. Those with higher organizational affiliation, as measured by the number of organizations joined and positions held, were willing to adopt natural farming technology. Organizational affiliation is significantly related to willingness to adopt natural farming. In a related study, it was seen that local organizations could be an alternative to the traditional agricultural extension model for dissemination of agricultural technologies in many sub-Saharan countries². This is because local organizations are generally perceived as a more efficient way of disseminating technologies to many farmers³ as

well as a source of social capital that facilitates sharing of resources and information among actors. Formation of associations among the rural farmers should be encouraged⁴. The positive correlation of membership in any organization signifies the fact that farmers association which is regarded as one of the important components of social capital possesses the capability to increase the intensity of improved rice varieties adoption⁵. It is then believed that it will be possible for agricultural development agencies to achieve great success when they work in collaboration with farmers' organizations⁶.

Educational attainment has significant influence on farmers' willingness to adopt natural farming technology. It was already shown that the level of educational attainment is directly related to innovation adoption^{7,8}. This is supported by the findings in a related study that farmers having higher level of education are more willing to fully adopt organic farming⁹. Parallel with this result is the conclusion drawn in a study on the prevalence and adoption of agro forestry technologies and practices in Kenya that extension officers should educate the farmers on the long-term benefits of various agro forestry technologies that have higher rates of non-adoption for them to try, accept and then adopt such technologies¹⁰. Emphasizing also the important influence of education on decision making is the proposition that educating women in India is the best way of empowering them towards their ability to make decisions¹¹.

Household size in this study refers to the number of members in a dwelling unit that share the same eating arrangement. Larger household size can increase the intensity of adoption of organic farming¹². Although more members of the household could mean more sources of labor, the present study found no significant relationship with household size and willingness to adopt.

On the socioeconomic characteristics farm size and income had direct relationship with willingness to adopt natural farming technology while availment of credit and tenurial status had no significant relationship. Farm size was found to be a significant factor that impacts technology disadoption^{13,14}. A study found that a negative relationship between farm size and disadoption of technologies that were complement to other technologies used by larger farms¹⁵. This means farmers with larger farms have lower disadoption rate. This is contrary to the findings that farm size negatively influences intensity of adoption of agricultural technology⁴. In the present study, farmers with relatively larger farms were more willing to adopt natural farming. Income was found to be significantly related to willingness to adopt. Farmers with higher income had higher tendency to adopt natural farming technology. This result conforms to the finding in a study that as wealth increases, the intensity of adoption of improved rice variety also increases⁴, and farmers with higher income are more likely to adopt a technology that involve more risks and uncertainties than do farmers with low income¹².

There are studies that have shown that land ownership encourages adoption but the results are debated¹⁶. Although it is logical to believe that tenants are less likely to adopt agricultural innovations because the benefits of adoption will not necessarily accrue to them, tenurial status was found to be not a significant factor of willingness to adopt natural farming technology. This could be explained by the fact that almost all the components of the technology package are water-soluble natural farming inputs, either as fertilizer or for crop protection, and hence, applied as foliar spray. Unlike composts and other organic granular fertilizers, the accumulation of the nutrients in the soil with natural farming is slow. Therefore, the willingness of farmers to adopt was not dependent on whether they have security or no security of tenure.

The results of the present study is similar partly to the findings of the study on the variables that influence participation in mentorship of new freehold growers in South Africa that level of education and farm size had significant influence on growers' decision to participate. However, in that same study, the decision to participate was found to be also dependent on age, gender, prior farming experience and farm ownership unlike the results of the present study which showed that these variables had no significant relationship with willingness to adopt natural farming technology¹⁷.

In a study, on determinants of access to agricultural credit, the researchers found that small and marginal farmers in Dharwad district, Karnataka, India are driven by land size, education level, irrigation facilities, income level and gender in accessing credit¹⁸. Similarly, three of these variables, namely, farm size, level of education and income level were found in the present study as factors that determine farmers' willingness to adopt natural farming technology.

It was shown that among the extension variables, only the number of relevant seminars attended was not significantly related to willingness to adopt. The farmers that were willing to adopt were those who were visited more frequently by extension agents whether from DA, LSPU or other agencies. Contact with extension agents had positively determined market participation of rural household in Nigeria⁴. Those who consider the extension agent as credible were willing to adopt. According to the respondents they found the extension agents credible when they saw them in pictures actually doing what they are discussing during the presentation and when they were able to demonstrate without reading any reference. Those who have available reading materials and continue to receive information expressed willingness to adopt. The effect of receiving information is much reinforced when they get such information from media especially television. The study on determinants of adoption of organic farming in Bangladesh revealed that both public and NGO extension services are important in terms of

farmers' decisions regarding the adoption of organic farming. Hence, it was concluded that the adoption of organic farming systems is an information-intensive process and that there are likely to be opportunities for providing extension programs and localized information to increase the use of organic farming by Bangladeshi farmers¹².

The significant influence of extension variables such as visits by extension agents, credibility of the extension agents, availability of reading materials and continuity of receiving information about the technology can be explained by the fact that the farmers who have more access to reliable information, with more frequent contacts with extension agents, technicians and resource persons to assist them will be more willing to adopt. The knowledge of farmers can also be obtained from reading materials, media, experimentation or testing, farm tours and contact with other farmers. Awareness, evidences of the advantages of the technology obtained from demonstration trials, testing, and shared experiences of other farmers and observation of adopter farms will help in making decisions regarding adoption.

The continuity in receiving information as motivational factor of adoption relates to the finding that role of active information accumulation, which entails costs, provides a possible explanation to the often observed lag in adoption of innovations by smaller farmers¹⁹. These findings imply that a full support and cooperation among the extension agencies, for example the SUC and DA, are imperative so that the services of experts or technicians on natural farming and other technologies will be delivered to farmers.

When asked about the factors that could make them adopt natural farming, the reasons/conditions presented in Table 2 were mentioned by the respondents.

The relative advantage of the technology is emphasized by those who are willing to adopt by reason of less expenses and increased net returns. The findings indicate that economic reasons were stronger factors in motivating farmers to adopt natural farming. In a study on the influence of productivity enhancing farm practices on farmers income in the Nigerian Sudan Savanna, the researchers found positive relationship between the two variables and hence, recommended the adoption of productivity enhancing farm practices by farmers²⁰.

The simplicity of the technology was next reason as indicated by the perception on the materials and methods required. The usual question of farmers whenever a technology is being introduced to them about the complexity of materials needed and methods or procedures involved. It is common that farmers become more hesitant to adopt complex technology.

Table-1
Summary of results of chi square test on the relationship between independent variables and willingness to adopt natural farming

Independent variable	Computed χ^2 value	Critical χ^2 value	Significance
<i>Personal characteristics of farmers</i>			
Age	0.2645	3.84	Not significant
Educational attainment	7.5323	5.99	Significant
Number of years in the residence	2.5129	3.84	Not significant
Household size	1.4400	3.84	Not significant
Farming experience	0.0032	3.84	Not significant
Organizational affiliation	4.8223	3.84	Significant
<i>Socioeconomic</i>			
Farm size	5.8743	3.84	Significant
Income	4.7347	3.84	Significant
Availment of credit	3.4640	3.84	Not significant
Tenurial status	2.8082	7.48	Not significant
<i>Extension variables</i>			
Number of seminars attended	1.0286	3.84	Not significant
Visits by extension workers	5.0935	3.84	Significant
Credibility of the extension agents	5.8667	3.84	Significant
Availability of reading materials	4.9903	3.84	Significant
Continuity of receiving information about the technology	6.3603	3.84	Significant

The largest fixed capital needed in natural farming technology is the containers for fermentation- the earthen and plastic containers. For the variable input, molasses is the one not available in the farm or household and hence must be bought. It is also not usually available in public markets. These are being referred to when the respondents gave the condition “If all the materials are available”. An available amount to invest and a reliable source of molasses in the locality could motivate the farmers to adopt natural farming.

Five of the respondents mentioned that they will be willing to adopt natural farming if results of their trials will be found encouraging. It is important for farmers to actually see the relative advantage of the technology such as increased yield, production and income, or reduced inputs, expenses and risks.

Some of them go into testing the technology in small plots. Economic incentives are strong driving force to adoption.

The condition “If they have enough time” and the non-willingness reason “The preparation and application are laborious” and not “Natural farming inputs readily available for use” relate to the comments of some farmers addressing the extension agents “*Gumawa kayo at bibili na lang kami*” (You prepare and we will just buy). The findings that some respondents perceive that there will be no additional benefits in production or there will even be decrease in yield and that the technology is not yet proven effective imply that demonstration plots, experiments and trips to farms that are using natural farming will help show these doubtful farmers to see the advantages of the technology.

Table-2

Reasons/Conditions for willingness to adopt natural farming

Reason/Condition*	Frequency
Less expenses particularly on fertilizer	55
Increase in net returns	50
Most of the materials required are available in the farm	50
The methods involved in preparation and use are simple	48
If all the materials are available	47
If a technician will always be available to assist them	31
If I have enough time	20
The plants will be healthier	18
Desire to help and cooperate with the government	15
If I will find the result of my trials encouraging	5

* Multiple responses

For their non-willingness to adopt natural farming, the reasons given by the respondents are presented in Table 3. The most commonly mentioned reasons were that the preparation of natural farming inputs is laborious and that these inputs are not readily available. Being laborious is true to natural farming because the farmer has to assemble all the materials needed and follow the procedures for each fermented product. Even the application is laborious because most of the inputs have to be applied repeatedly following certain intervals unlike chemical fertilizers which could be applied only once or twice. The inputs are not readily available because there are durations of fermentation- the shortest was 7 days for FFJ and FPJ and the longest was for WCP which is 30 days. The farmer has to program and calendar every step or procedure in his farm.

Table-3

Reasons/Conditions for non-willingness to adopt natural farming

Reason*	Frequency
The preparation and application are laborious	21
Natural farming inputs are not readily available for use	20
Decrease in yield	10
Not yet proven to be effective	10
No additional benefits in production	4

* Multiple responses

Conclusion

The findings of this study underscore the role of farmers' organizations and extension agents, and the desirable characteristics of the technology in its adoption. Willingness to adopt and possibly the rate of adoption can be enhanced by farmers' joining organizations as this exposes them to interaction with extension agents, other farmers and other actors in technology transfer. It will be best to start with farmers with relatively higher income and larger farm size to have higher farm technology adoption rate among farmers. Education of farmers through visits by or to extension agents, consultation with technicians, availing of information in printed materials and other media such as trainings, field trips, radio and televisions could also serve as motivational factors where extension agencies can base their programs and projects in technology transfer.

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