Asian Journal of Agricultural Extension, Economics & Sociology

38(11): 119-129, 2020; Article no.AJAEES.62852
ISSN: 2320-7027

Farmers Attitude towards Use of Trichocompost

S. Bagchi[1], M. N. Islam[2*], M. M. Riad[3], S. M. Mohsin[4] and M. Y. Uddin[5]

[1]Rural Development Academy, Bogura, Bangladesh.
[2]Graduate Training Institute, Bangladesh Agricultural University, Mymensingh, Bangladesh.
[3]Department of Basic Science, Patuakhali Science and Technology University, Patuakhali, Bangladesh.
[4]Directorate General of Food, Ministry of Food, Government of the Peoples Republic of Bangladesh.
[5]Assistant Professor, Udgari Degree College, Sirajganj, Bangladesh.

Authors' contributions

This work was carried out in collaboration among all authors. Author SB designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors MNI and MMR managed the analyses of the study. Authors SMM and MYU managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2020/v38i1130461
Editor(s):
(1) Dr. Zhao Chen, University of Maryland, USA.
Reviewers:
(1) Subhrajyoti Panda, GIET University, Odisha, India.
(2) Subhash Chand, ICAR-National Institute of Agricultural Economics and Policy Research, India.
Complete Peer review History: http://www.sdiarticle4.com/review-history/62852

Original Research Article

Received 10 September 2020
Accepted 17 November 2020
Published 12 December 2020

ABSTRACT

This purpose of this study was to assess the farmers attitude towards Trichocompost use, to determine and describe the socioeconomic characteristics of the tricho-compost farmers and identify the problems being confronted towards using Trichoderma by the farmers. Data were collected from 66 randomly selected farmers from Kamarpara, Chupinagar Union, Shajahanpur Upazilla and the Vasubihar, Juanpur, Katabaria, Maria, Chalapara, Charpara, Chakpahari, Mirpara, Panai, Birkedar, Ghashuria, Mirzapur, Adamzamur, Chomorpathalia, Khidiehashra, Chowkibari, Chalkjaphu, Majbari project site of water saving project in Bogura district in Bangladesh during January to March 2020. The findings reveal that, majority of the respondents (59 percent) were middle age category and 39 percent respondent were having secondary level education. Most of the respondents were under small family category (45 percent) and majority (64 percent) of them had a small farm size and 78.8 percent of the respondents had high agricultural knowledge. A quarter of them (24 percent) were found into medium income group and 29 percent farmers received short training and two-third

**Corresponding author: E-mail: islambau@gmail.com, noormd.rda@gmail.com;*

majority of the farmers (68 percent) had high knowledge on Trichoderma. As far as their attitude towards tricho-compost was concerned, majority of the farmers were positive towards good soil health condition, easy application, cheap production cost and more effective than traditional compost and found to have a negative attitude towards its adoption as it is untraditional compost.

Keywords: Attitude; trichocompost; use.

1. INTRODUCTION

1.1 Background of the Study

Some three quarters of the world's absolute poor live in rural areas, and their livelihoods are most often linked to agriculture. Like other developing countries, the economy of Bangladesh draws its main strength from agriculture because of the potentiality to produce multiple effects on the growth of the economy. It is the principal source of livelihood for most of the poor and has a key role in building their household food security. While the country's economy is progressively diversifying, agriculture still contributes 24 percent of the Gross Domestic Product, employs 66 percent of the workforce and accounts for roughly 15 percent of export earnings [1]. Despite increases in shares of fisheries, forestry and livestock, traditional crops alone account for 70 percent share of agricultural output [2]. Thus, crop production remains central to the country's agriculture. Growth in crop production, especially the production of food grains shaped the performance of the agriculture sector over the last three decades; however, a gap still exists between total food production and the total food requirements of the country. Hence, the Government of Bangladesh has to import about one million metric tons of food grains, mainly rice and wheat in each fiscal year to fulfill the gap [2].

So the farmers use chemical fertilizers as a supplemental source of nutrients to increase crop production but they do not apply in balanced proportion [3]. The organic matter content of Bangladesh soils continuously decreased [4]. Due to intensive crop cultivation using high yielding varieties of the crop with imbalanced fertilization soil health is destroyed. However, today chemical fertilizer has become essential to modem agriculture to feed the growing population but it has become evident that they have many negative consequences and have become beyond the reach of ordinary farmers. For instance, Usman and Dosumu [5] reported that chemical fertilizers and pesticides although contribute greatly to enhance soil fertility but they are also major sources of farmland pollution and contamination by heavy metals. Usman and Dosumu [5] contend that these metals pose a dual threat, directly through their toxic effect on crops and soil organisms and indirectly posing an adverse health risk to human beings and animals who consume the ultimate products.

Use of chemical in modern farming activities strips the soil of nutrients, destroys critical soil microbes, contributes to desertification and climate change and saturates farmlands with toxic pesticides, herbicides, and fertilizers that then migrates into groundwater, rivers, lakes and oceans. Repeated applications may result in a toxic buildup of chemicals such as arsenic, cadmium, and uranium in the soil. These toxic chemicals can eventually make their way into fruits and vegetables. Long-term use of chemical fertilizer can change the soil pH, upset beneficial microbial ecosystems, increase pests and even contribute to the release of greenhouse gasses [6]. Deepali and Gangwar [7] reported that increasing use of chemical fertilizers in agriculture makes a country self-dependent in food production but it deteriorates the soil and causes harmful impacts on living beings. Instead of harmful effects of chemical fertilizers, the farmers of Bangladesh rely continuously use of chemical fertilizers to increase crop yield because soil nutrients have been depleted due to incessant continuous tillage.

So integrated soil fertility and nutrient management is an alternative to maintain soil fertility and to enhance crop productivity. Although it is an age-old practice, its importance was not very much realized in the pre-green revolution era due to the low nutrient demand of the existing subsistence agriculture in Bangladesh.

This approach aims for efficient and judicious use of all the major sources of plant nutrients in an integrated manner, so as to maintain and improve the soil's organic matter for sustained

crop productivity. This is all done without any deleterious effect on the physio-chemical and biological properties of the soil on a long term basis [8]. The major components of integrated soil fertility and nutrient management system are fertilizers, farmyard manure/compost, green manure, crop residues/recyclable wastes and biofertilizers like Trichocompost. So the use of Trichocompost possess great diversity in terms of chemical and physical properties, nutrient release efficiencies, positional availability, and crop specificity and farmers' acceptability [9]. Integrated management of soil fertility and plant nutrients by Trichocompost is an important prerequisite for boosting up crop production and sustaining higher yield over a period of time.

1.2 Justification of the Study

Future strategies for increasing agricultural production will have to focus on using available natural resources more efficiently, effectively and sustainably than in the past [8]. Since there is no scope to increase the net cultivable land, intensive cropping through integrated soil fertility and nutrient management could be one of the important means by the use of Trichocompost to further increase of crop production in Bangladesh [9]. This system helps farmers to make a decision regarding proper way of farm management which enhances high crop yields and improves the soil fertility in the long run. Assessing farmers' attitude is an important means to evaluate their knowledge level on Trichocompost, as attitude refers to an individual's current appraisal or opinion of an object or program. Some researchers conclude that people show their attitude on past experience and knowledge; therefore, if a person has limited knowledge and experience about Trichocompost then they can not accurately show their attitude towards it or to form an opinion about it. Therefore, this study will be done to investigate farmers' attitude towards trichocompsot use and application.

1.3 Scope of the Study

Some research has been conducted about attitude; including issues related to sustainable agriculture such as environment, soil conservation and information sources. To date, very little research has been formulated to determine farmers' attitude about Trichocompost. So if this research is taken it will provide a clear conception or perception of attitude of farmers what they are thinking and how they are adopting this compost for use in the field to increase crop production so that it might be helpful to the concerned policy makers to have the field level idea during their policy makings about trichocompsot.

1.4 Objective of the Study

The objectives of the study were as follows:

a) To determine and describe the selected socio-economic characteristics of the farmers.
b) To determine farmers' attitude towards Trichocompost use in agricultural fields as compared to chemical fertilizers;
c) To assess the constraints of Trichoderma use by the farmers.
d) To identify the problems being confronted towards Trichoderma use by the farmers.

2. METHODOLOGY

2.1 Study Area and Sample Size

The study was conducted in Kamarpara, Chupinagar Union, Shajahanpur Upazilla and the Vasubihar, Juanpur, Katabaria, Maria, Chalapara, Charpara, Chakpahari, Mirpara, Panai, Birkedar, Ghashuria, Mirzapur, Adamzamur, Chomorpathalia, Khidiehashra, Chowkibari, Chalkjaphu, Majbari project site of water saving project in Bogura district. The respondent was 66. Among them 12 respondent was selected from Kamarpara village and 3 respondent were selected from each project site village of water saving project to make a total of another 66 respondent. Primary data were collected by direct field surveys through face to face interview and 5 focus group discussion where the farmers have the experience regarding the use of trichcompost in their agricultural lands. The characteristics of people which included age, education, family size, farm size, annual income, training experience, agricultural knowledge and Trichoderma knowledge, farmers attitude towards compost, constrains were the independent variables whereas attitude towards tricho-compost use by the farmers were the dependent variable. The measurement of the independent variables were done according to standard scoring system as follows:

Age of the farmers was measured in-terms of complete years from his birth to the time of

interview. Education was measured by the highest grade or the number of years of formal school and score 1 was given for each year of completed. Family size was scored as number of family members included in the family, farm size of the respondents referred to total land in hectare under the farmers' possession. Training experience was measured by total number of days a person received training, annual income of a person was determined in terms of thousand taka by total income earning from agriculture, non-agriculture, business and service by a respondent. Agricultural knowledge of a respondent was measured by asking 10 questions related to different aspects of agriculture and each questions had a full score of 2, if a person can answer he will receive a full score and for partial answer he will receive 1 and for wrong or no answer he will receive a score of 0. The total score range would be 20 to 0. The Trichoderma knowledge was measured in the similar method. However, the attitude towards use of tricho-compost use by the farmers determined through putting 10 statements against 2 point rating scale as perceived as same opinion and not same opinion.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of the Farmers

Age of the respondent ranged from 16-70 years with a mean and standard deviation of 40.37 and 10.60 respectively. Based on their age score, the respondents were classified into three categories, namely young (up to 35 years), middle (36 to 50 years) and old (above 50 years) as shown in the Table 1. The findings indicate that majority (52.09 percent) of the respondents were in the middle age category compared to 35.41 percent young and 12.5 percent old. Similar findings were supported by Huda [10].

The education scores of the farmers ranged from 0 to 13. The average was 11 with sd of 8.22. Table 2 indicate that 39 percent fell in the secondary level category while 30 percent of the farmers fell in the primary level category, 23 percent of the farmers fell in can sign only, 10 percent of the farmers had upper secondary qualification and there is no single one illiterate.

The family size score ranged from 4 to >6 with a mean and standard deviation of 5 and 2 respectively. Data presented in Table 1 indicate that majority of the respondents fell into small family category (45 percent) while similar proportion (43 percent) of them belonged to medium size family category. Only 12 percent were under the large family category. The average size of households in Bangladesh has been decreasing gradually, coming down to 4.06 in 2016 from 4.90 in 2001, according to the recently released Household Income and Expenditure Survey (HIES, 2016) conducted by the Bangladesh Bureau of Statistics (BBS).

The farm size of the farmers varied from 6-507 decimal. The average farm size was 170 decimal with a SD of 128.The farmers were classified into three categories (Table 4) based on their farm size namely landless marginal farm (6-50 decimal), small farm (51-247 decimal) and medium farm (above 247 decimal). Data reveals that 24 percent of the farmers fell in the medium farm category while approximately two-thirds (64 percent) of the farmers belonged to small farm category, 12 percent of them fell in the marginal farm category.

As far as agricultural knowledge is concerned, data show that 1.5 percent of the respondents had low knowledge while 19.7 percent fill into medium knowledge categories and majority (78.8 percent) of the respondents fell in the high knowledge categories. Better knowledge on agriculture facilitates agricultural productivity for better income and improved livelihoods of the farmers. Annual income of the respondents ranged from Tk. 100 thousand to over than 300 thousand. On the basis of their family annual income the farmers were categorized into four classes' namely low, medium, high and very high income group.

The average income of the respondents was 72.65 thousand taka with a standard deviation of 31.10 thousand taka. Data show that 24 percent fell into medium income group, 13 percent into low income group, 14 percent farmers belonged to high income group and 15 percent farmer were under very high income group. In the study area the farmer's annual income mostly come from agriculture as well as business, service and day laborer.

Table 1. Personal and socio-economic characteristics of the farmers

Farmers categories		Number	Percent	Mean	Standard Deviation
Age	Young (upto 35 years)	16	24	42.28	11.02
	Middle aged (36-50 years)	39	59		
	Old aged (>50 years)	11	17		
Education	Illiterate (0)	3	6.26	11	8.22
	Can sign only (0.5)	23	29.16		
	Primary education (upto 5)	13	22.92		
	Secondary education (6-10)	17	25.0		
	Higher secondary education (11-12)	8	12.50		
	Graduation (13-14)	2	4.16		
Family size	Small family (upto 4)	30	45	5	2.00
	Medium family (5-6)	29	43		
	Large family (>6)	8	12		
Farm size	Marginal (6-50 decimal)	8	12	170	128
	Small (51-247 dec)	42	64		
	Medium (248-507 dec)	16	24		
Agric. knowledge	Low knowledge (upto 10)	1	1.50	16.93	2.22
	Medium knowledge (11-15)	13	19.7		
	High knowledge (>15)	52	78.8		
income	Low income (up to 100)	13	19.7	253.56	233.04
	Medium income (101-200)	24	36.36		
	High income (201-300)	14	21.21		
	Very high income (>300)	15	22.73		
Training experience	No training (0)	29	44	2.17	3.00
	Short training (1-3)	29	44		
	Medium training (4-6)	5	7.6		
	Long training (>6)	3	4.4		
Trichoderma knowledge	Low knowledge (upto 10)	2	3	16.77	2.85
	Medium knowledge (11-15)	19	29		
	High knowledge (>15)	45	68		

Training experience of the respondents ranged from 0 to >6 days with an average and standard deviation of 2.17 and 3.0 respectively. Based on their training experience, respondents were classified as no training received (0 days), short training received (1-3 days), medium training received (4-6 days) and long training received (>6 days). Data presented in Table 1 depicts that a significant proportion (29 percent) of the farmers did not have any training experience. Same proportion of farmers (29 percent) received short training and a few of them (7.6 percent and 3 percent) received medium and long training, respectively which helped them improve their agricultural productivity. This training course has also improved their knowledge about judicious use of Trichocompost and other agricultural technology.

Knowledge on Trichoderma had a mean and standard deviation of 16.77 and 2.85 respectively. Data presented in Table 1 show that little portion of farmers (3 percent) had low knowledge on Trichoderma and majority of them (68 percent) have high knowledge on Trichoderma and a little less than one-third of them (29 percent) had medium knowledge on Trichoderma. The farmers got medium and high knowledge on Trichoderma because they got proper training on Trichoderma and

Trichocompost. The result indicates that training has positive impact on knowledge level of respondents and therefore it can be concluded that majority of the respondents were having low knowledge before the training while after the training majority of the respondents were having high knowledge and some of them were found in the category of medium level of knowledge.

3.2 Farmer's Attitude towards Trichocompost

Farmers were found to have highly accepted and adopt the Trichocompost technology. There may be the several reason they do not want to burn waste material and they are highly satisfied with the performance, they were also found that the decomposition time was very low than natural compost. On the other hand, the other reasons for accepting Trichoderma or other activators were: compost fertilizer was good for their crop and can save cost on fertilizer. It is to be noted that saving on the use and cost of fertilizer was the common reason for the farmers for using Trichocompsot.

Fertilizer is one of the most important inputs in agriculture production and prices of inorganic fertilizers are always higher. Therefore, farmers became more eager for organic fertilizers like Trichocompost and other options to reduce fertilizer costs. This is one of the reason for favorable attitude towards using Trichocompost.

Data presented in Table 2 indicates that all the farmers (100 percent) show positive attitude towards the good soil health condition and an overwhelming majority (94 percent) did not accept it due to untraditional compost, only 6 percent of them had a positive attitude.

The majority of farmers expressed their neighbours were not aware of that and they did not use it but some of them had identified that one or two neighbors are now using Trichoderma because they observed the positive benefits.

Majority of the farmers (92 percent) told that Trichocompost can be easily applied in the field like traditional compost because it is odorless and colorless and it looks like tea dust and not so moistened. As far as its cost is concerned, and overwhelming majority of the farmers (97 percent) had negative feedback because they think that it can be easily prepared and the waste material is easy to get for making the compost.

Majority of the farmers (95 percent) expressed that the Trichocompost was found to be stronger than natural compost because nutrient leaching and vaporization to the air is a common factor in natural compost. So farmers cannot get expected result by using natural compost. On the other hand in case of Trichocompost no nutrient leaching occurs because it is prepared under shade condition and no rain or sunlight can hamper the production process.

So Trichocompost becomes enriched in nutrient. But needs more campaign for promotion of this new technology as expressed by 94 percent farmers. As it is very simple to make, only by digging a pit (1×1×0.5) meter is enough for making this compost and source of waste material is available at framers house and farmers can easily make it with the help of their family members. So most of the farmers (55 percent) show positive attitude towards its production process.

Table 2. Farmers attitude towards use of Trichocompost

Statements	Same Opinion	Percentage	Not same opinion	Percentage
Good soil health	66	100	0	0
Non acceptable due to untraditional compost	62	94	4	6
Easy application of Trichocompost	61	92	5	8
Very expensive product	2	3	64	97
Stronger than natural compost	63	95	3	5
Need promotion for popularization	62	94	4	6
Easy to production than natural compost	36	55	30	45
Cheaper than natural compost	20	30	46	70
Effective nutrient supplement material	53	80	20	80
Low use due to information gap	66	100	0	0

Four-fifths of the farmers (80 percent) showed positive attitude towards the role of Trichocompost because they think that it has high beneficial effect on water holing capacity, reduction of soil borne disease etc. While a little portion of farmers (20 percent) had negative feedback about its role. This may be the reason that they are not still habituated with its use or they have lack of knowledge about its use.

Although there are growing acceptance of Trichocompost among the farming community but the scale of use is still low due to information gap as this opinion expressed by all farmers (100 percent) because they think that the farmers do not know about it totally or maybe they are not eager to use it. The natural habit of the farmers is to see the performance first of new technology and then take decision to use it. Another reason may be that extension people are not aware about the technology and therefore it is not being disseminated at a desired pace.

3.3 Constraints of Trichocompost

Data presented in Table 3 depicts that the Trichocompost is still unknown due to unavailability as opined by majority (95 percent) of the farmers. This may be the reason as it is a new technology and still not disseminated in a wider scale. Other reason may be the unawareness of farmer about this compost or they do not know where it is found. All the farmers are agreed they always use decomposed cow dung as organic manure for fertilization rather than Trichocompost.

The role played by the agricultural extension workers in Bangladesh however are not promising and well organized in regard to extension of Trichocompost. They do not provide them any innovative techniques, practical demo or necessary inputs for preparing such a beneficial compost. Even they don't have that skill and expertise on improved techniques of composting. As usual the agricultural extension workers are advocating to the farmers for improvement their soil health by application of compost, green manuring as well as vermicompost and cowdung as organic manure source.

Most of the farmers (95 percent) don't think that financial problem is major crucial issue to make Trichocompost. As the Trichocompost is made by Trichoderma fungus but this fungus is still unknown to many farmers and they are not quite aware about this. Meanwhile, some farmers still believe that natural is better than rapid decomposition. The technology was foung to be still new to them and they are now aware about how long it would take for rapid decomposition from fungi. Therefore it has still not been accepted as per expectation as exprseed by majority of the farmers (92 percent) while only little portion (8 percent) had opposite opinion.

One of the important barriers often were faced by majority (92 percent) of the farmers were lack of attending training regularly due to they had to cover a long distance. Training brings desirable change in human behavior in terms of knowledge, skills and attitude. As majority of the farms are still not aware of this technology, therefore, they need intensive training on the subject matter.

These barriers are mostly confronted by the small scale farmers and they felt doubt about the effectiveness of Trichocompost. the barriers faced by mostly by the small farmers in adopting Trichocompost include the use of cow dung as fuel, the inability to attend training regularly, the lack of Trichocompost preparation materials, lack of knowledge in applying balanced fertilizers, an absence of sufficient demonstration plots, a lack of training facilities to prepare and use Trichocompost and the lack of printed materials about Trichocompsot. In Bangladesh farmers mostly use chemical fertilizers to increase plant growth and yield but it plays a detrimental role on soil health and destroy the availability of organic matter in the soil.

Over application of inorganic fertilizers in agricultural fields also poses a risk of surface water and ground water pollution due to its leaching and runoff. In contrast to inorganic fertilizers, repeated or long-term applications of organic fertilizers augment the benefits to soil properties. Organic waste amendments in agricultural soils contribute positively by improving physico-chemical and microbiological activity thereby improving crop production.

But applying compost in amounts greater than the required rate did not increase vegetable yield and growth during the first crop. It actually showed no considerable differences in red pepper yield between chemical fertilizer and compost applications after the first cropping which was found in a study (Hernandez et al., 2016). Compost application did not influence phosphatase activity during the first crop; however, higher activity was observed during the second crop.

Table 3. Farmers opinion about constrains of Trichocompost

Statements	Same Opinion	Percentage	Not same opinion	Percentage
Unknown due to unavailability	63	95	3	5
Low use due to untraditional compost	66	100		
Financial problem	3	5	63	95
Non acceptance due to unknown fungal compost	61	92	5	8
Need intensive training	61	92	5	8
Dissemination problem due to slow effectiveness	40	60	26	40

The findings of (Hernandez et al., 2016) suggest that the decomposition of compost increases over time, thereby increasing the release of nutrients over time. So most of the farmers (60 percent) opined that as Trichocompost dissemination is low due to its release of nutrients into the soil are very slow.

3.4 Problems Encountered during Trichocompost Use

Data presented in Table 4 depicts the problem during Trichocompost use. All of the farmers (100 percent) opined that lack of knowledge about proper dosage of trichocopmpost is one of the important barriers for using Trichocompost. Another problem encountered by the most of the farmers (94 percent) is lack of knowledge about application in crop. Transport problem is still a major problem for the farmer who wants to collect Trichocompost from commercial compost farming. About 92 percent farmers expressed this opinion and only a little portion (6 percent) of farmer doesn't think it is a major problem. Most of the farmers prefer to buy compost at low price from nearby source or if they want to sell the excess compost they want a fair price in the market. So getting fair price of compost is one of the problems opined by the 97 percent of the farmer. As it is still not popular to farmers, and the technology is still new to them even they do not know how long it would take to decompose from fungi, so lack of trust on benefit of Trichocompost is one of the problem as opined by the 95 percent of the farmers.

In village area farmers still depend on natural composting of cow dung which takes only 5-6 months. They kept in an own place in their yard and the nutrient are leached out due to rainfall and also evaporation of nutrient due to heavy sunlight. But they are not aware of it. So most of the farmers are still dependant on natural compost which is one of the problem for using Trichocompost opined by 94 percent of the farmer. It is always a problem in rural area when any farmer start a new technology for their production increase, the neighbor farmers always provide negative comment that it will not work as opined by more than half (55 percent) of the farmers.

Lack of proper distribution channel is one of the major problems for Trichocompost use according to 70 percent of the farmers. As farmers are always busy with farming work and during farming work actually they don't get so time and labor to prepare compost. Moreover, it needs a shady place to make. So time, labor and space is a problem according to 80 percent of the farmers. When farmers use a new technology like Trichocompost they always fall in confusion about quality because it is directly linked to agriculture production according to 100 percent. Farmer always either misuse or abuse both of chemical and organic fertilizer. So lack of knowledge about applying balanced fertilizer as expressed by 95 percent of the farmer. Lack of technical knowledge about Trichocompost is always a major problem according 92 percent of the farmers. Heavy rainfall is one of the major problems during trichocompsot preparation (100 percent).

As in village level there is always scarcity of material for cooking purpose so farmers always use waste material for cooking purpose because collecting waste material is the one of the ways to make compost materials and this is one of the important barrier to make Trichocompost as opinion by 100 percent of the farmer. Farmers always try to find readymade compost and they have not enough time to prepare and storage of compost and they find to prepare Trichocompost as troublesome, labor intensive and time consuming according to 95 percent of the farmer.

Table 4. Problems encountered during Trichocompost use

Statements	Same Opinion	%	Not same opinion	%
Lack of knowledge about proper dosage	66	100	0	0
Lack of knowledge about application in crop	62	94	4	6
Transport problem	61	92	5	8
Pricing problem of Trichocompost	64	97	2	3
Lack of trust about its benefit	63	95	3	5
Mostly dependant on natural compost	62	94	4	6
Negative comment from neighbor farmers	36	55	30	45
Lack of proper distribution channel	46	70	20	30
Lack of time, labor and space for compost preparation	53	80	13	20
Confusion about quality	66	100	0	0
Lack of knowledge in applying balanced fertilizers	63	95	3	5
A lack of technical knowledge in preparing manures (compost, FYM etc).	61	92	5	8
Heavy rainfall at certain times of year makes preparing manure very difficult.	66	100	0	0
Waste material use as fuel	66	100	0	0
Preparation and storage of compost are labor intensive and time consuming.	63	95	3	5
Still excessive dependence on chemical fertilizer	62	94	4	6
Quick yield expectation	61	92	5	8
Fear about market price of the product	60	91	6	9
Availability of Trichoderma activator is low	66	100	0	0

In village area farmers are still heavily dependent on chemical fertilizer for agriculture production so new compost preparation and use of it is always not suitable option for farmers and it is one of the most important barrier for using Trichocompost as opined by 92 percent of the farmer.

As agriculture is one of the main income sources so farmers expect quick yield but due to slow effectiveness of compost they seem to be not so interested to use Trichocompost or any other compost was found as one or major barrier as opinion by 92 percent of the farmers. As many farmers are now using trichocompsot and they get better yield so there is always expectation they will get fair price. But the agricultural commodities price is not always same. So fear of better price of commodities that is produced by trichcompost use is one of the major problem according as opined by 91 percent of the farmer. As Trichoderma activator is one of the main components to make Trichcompost, so availability of Trichoderma is always a major factor to make this compost. But some times its availability becomes very low as expressed by 100 percent of the farmers.

4. CONCLUSION AND RECOMMENDA-TIONS

4.1 Active Extension Role of DAE at Field Level

Recent activities/programs on Tricho composting by agricultural extension workers in Bangladesh are not sufficient and well organized. As usual the agricultural extension workers are merely advocating to the farmers to improve their soil health by application of traditional compost, green manuring, application of cowdung and vermicompost. Also farmers are following their advice to prepare compost but the practicing technique of composting is quite traditional and insufficient. Extension workers however, do not have necessary skill and expertise on improved techniques of Trico-composting. It is recommended that DAE should take steps to ensure the adequate supply of Trichocompost realated materials and training to the extension worker so that they can aware of the latest technology and advice the farmers accordingly about the availability of alternate sources of fuel and the setting up of sufficient demonstration for the farmers. The authorities of DAE and other

organizations should also therefore promote different Trichocompsot related activities through training; field visits etc so that farmers can develop an insight and understand the technical issues of Trichocompsot more thoroughly and also appropriate extension campaigns may also be launched in order to motivate farmers to use more Trichocompost on their fields.

4.2 Capacity and Knowledge Build Up of Farmers

As the Trichocompost is made by Trichoderma fungus but this fungus is still unknown to many farmers and they are not quite aware about this. Meanwhile, some farmers still believe that natural decomposition is better than rapid decomposition. The technology is still new to them and they did not know how long it would take for rapid decomposition from fungi. One of the important barriers were being faced by the farmers that is inability to attend training regularly due to the long distance between training center and farmers residence, lack of availability of Trichocompost materials' and having doubt about the effectiveness of trichocompost, lack of Trichocompost printed materials about preparation of trichocompost, lack of demonstration by extension department etc. To overcome these barriers, it is necessary to arrange frequent training-teaching programs for farmers to help motivate them to take up new technology and improve their practical knowledge on Trichocompost. Activities of SAAO (i.e. the field-level extension worker of DAE) and NGO workers should be increased so that farmers maintain good contacts with extension agents in order to improve knowledge level of the farmers.

4.3 Research and Development

Even though awareness and perception about Trichocomposting are important determinants of adopting the technology, the benefits that could be derived from its adoption are the most attracting factors for sustained adoption. Follow-on research as well as on-farm trials in producing and applying compost to the rice field and other crops would be necessary. In this way, farmers can have first hand information and experiences about the use and benefits of the technology. It would also aid the extension people fostering good working relationship with the farmers that would facilitate the adoption of the technology. Further research on how to minimize CH4 emission from rapid composting and the use of rapid compost for other crops would also be important inputs for environmental protection and sustainable agricultural development and also focus subsequent Trichoderma studies on non-farming members of the supply chain, including pesticide dealers. For future farmer survey work researcher should gather extensive information on the source of Trichoderma and application techniques, and perceived efficacy.

So according to the findings the following recommendation were made for policy implications:

a) To set up Laboratories at private or NGO level to make available of Trichoderma seed spore for farmers' use.
b) Arrangement of regular workshop and Seminar with Policy makers, Agri. Business men, Agro. Processors and other Stakeholders.
c) Arrangement of Training on Trichocomposting at farmers' level should be made on regular basis
d) Market development for selling pesticide free vegetable.
e) Advertisements through Radio, TV or any popular media.
f) Test and compare different formulations of Trichoderma, including Tricho-leachate, Trichocompost, talc formulations, liquid formulations and other solid forms for both effectiveness and suitability for both manufacturers and farmers.
g) Develop and distribute a low-cost technology that allows people with limited education to see whether or not their Trichoderma is effective, in cases where degradation may have occurred.
h) Create clear Trichoderma application guidelines for all forms of Trichoderma that are widely disseminated among IPM partners, and given to pesticide shops.
i) Create and disseminate clear guidelines for Trichoderma storage procedures, including temperature and expiration date.
j) Conduct training to pesticide dealers to educate them about proper storage techniques and expiration dates.

CONSENT

As per the international guidelines informed and written participant consent has been collected and preserved by the author.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. BBS Statistical year book of Bangladesh. Statistics Division. Ministry of Planning. Government of the People's Republic of Bangladesh; 2018.
2. Ministry of Agriculture. Annual report. Mymensingh. Government of the People's Republic of Bangladesh; 2018.
3. BARC. Land degradation situation in Bangladesh. Bangladesh Agricultural Research Council, Farm gate, Dhaka-1205. Bangladesh; 2005.
4. Bokhtiar SM, Sakurai K. Effects of organic manure and chemical fertilizer on soil fertility and productivity of plant and ratoon crops of sugarcane. Archiv. Agron. Soil Sci. 2005;325- 334.
5. Osman OAS, Dosumu, OO. Cadmium analysis in fertilizers and groundwater samples in Dass LocalGovernment Area of Bauchi State, Nigeria.Centerpoint (Science Edition). 2007;208-213.
6. Day J. The debate over organic vs chemical fertilizers. Renew. Sust. Energ. Rev. 2008;31:846-859.
7. Deepali A, Gangwar K. Biofertilizers: An eco-friendly way to replace chemical fertilizers. Ezekiel M, Fox K. 1959. Methods of Correlation and Regression Analysis: Linear and Curvilinear (3'd Ed.). New York, Willey; 2000.
8. Gruhn P, Francesco G, Montague Y. Integrated nutrient management, soil fertility and sustainable agriculture: Current issues and challenges. Vision Discussion Paper 32. Washington, D. C.: IFPRI; 2000.
9. Food and Agriculture Organizations of the United Nations. Land resource management. Rome, Italy: FAO Land and Water Development Division; 2004.
10. Huda MN. AIDS education through formal curriculum and texts in Bangladesh: A formative study, Mas- tar's Thesis, University of Dhaka, Dhaka; 2011.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/62852