

Reprint

ISSN 1991-3036 (Web Version)

International Journal of Sustainable Crop Production (IJSCP)
(Int. J. Sustain. Crop Prod.)

Volume: 6

Issue: 2

August 2011

Int. J. Sustain. Crop Prod. 6(2): 12-22 (August 2011)

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M.L. HAIDER, M.E. HAQUE, A.K. DAS AND SK.H.R. AHMED



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IJSCP** issn 1991-3036, HQ:19-10 cantral place, saskatoon, saskatchewan, s7n 2s2, Canada

EFFECT OF INTEGRATED PEST MANAGEMENT (IPM) CLUB ACTIVITIES ON FARMER'S SOCIO-ECONOMIC CHANGE AND COMMUNICATION SKILL IN RICE PRODUCTION SYSTEM

M.L. HAIDER¹, M.E. HAQUE², A.K. DAS³ AND SK.H.R. AHMED⁴

^{1,3&4} Department of Agricultural Extension, Khamarbari, Farmgate, Dhaka-1215; ²Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur-1706.

Corresponding author & address: Dr. Md. Latiful Haider, E-mail: latifulhaider@yahoo.com

Accepted for publication on 10 August 2011

ABSTRACT

Haider ML, Haque ME, Das AK, Ahmed SKHR (2011) Effect of Integrated Pest Management (IPM) club activities on farmer's socio-economic change and communication skill in rice production system. *Int. J. Sustain. Crop Prod.* 6(2), 12-22.

A study was conducted during June to November, 2008. The purpose of the study was to determine the extent of change in farmer's socio-economic and communication skill in rice production before and after joining the Integrated Pest Management (IPM) club activities. Status of the respondents was measured by some indicators such as access to resources, participation in social activities, communication exposure, technology adoption, technology dissemination and income generating activities. The study revealed that the indexes of the said parameters significantly improved after joining the IPM club activities. Computed t-test value indicated that ARI changed from 32.36 to 56.11%, PSAI 33.60 to 66.09%, CEI 43.15 to 62.36%, TABI 38.29 to 61.25%, TDBI 38.34 to 66.65%, and PIGAI 38.20 to 60.76%. These changes indicated that the IPM club programs substantially contributed to the improvement in socio-economic status, communication and technological skill of the IPM farmers in rice production.

Key words: *Integrated Pest Management (IPM), Focus Group Discussion (FGD), Participatory Rural Appraisal (PRA), Access to Resource Index (ARI), Participation in Social Activity Index (PSAI), Communication Exposure Index (CEI), Technology Adoption Behavior Index (TABI), Technology Dissemination Behavior Index (TDBI), Participation in Income Generating Activities Index (PIGAI)*

INTRODUCTION

Agriculture is the backbone of Bangladesh's economy, which contributes about one-third to the country's gross domestic product. Among the crops, rice occupies about 75 percent and vegetables about 1.39 percent of the total cultivated area (Anonymous 2002). Although there has been an increase in the food grain production in recent years, reaching a level of about 30 million metric tons, the country has to further increase its food grain production on a sustainable basis to feed the ever increasing population. One of the main constraints to increasing agricultural production is the insect pests, diseases, rodents, weeds and other vertebrate pests that cause serious yield loss. According to an estimate, annual yield loss due to insect pests alone is 16 percent for rice and 25 percent for vegetables (Anonymous 2002). Over dependence on synthetic pesticides to control the pests and diseases, is not only expensive but also leads to negative environmental consequences in addition to increased health hazards to the growers and consumers of crop products. Integrated Pest Management (IPM) system, which embodies a combination of many environmentally friendly techniques of managing the crops and the pests, will help reduce crop losses due to pest and diseases and lead to sustainable agriculture. Therefore, to organize and empower the farmers of Bangladesh to work with IPM technologies for a sustainable agriculture, IPM club is considered an effective approach in the recent past.

The learning approach in IPM club is very crucial for a sustainable agriculture. This approach is based on the principles of adult education and discovery based learning technique. Its main objective is to educate farmers in a way so that they are better equipped to learn than they were before (Stock 1995). The IPM approach follows a learning cycle in which farmers systematically observe a situation, critically analyze their observations and then plan to take appropriate action. The action in turn begins a new cycle of experience-based learning. The experience that the farmers gain at each step in the learning cycle lays down the foundation of new learning. Gradually farmers begin to understand how to learn from a situation. Due to this enhanced capacity to learn farmers become able to analyze and understand a new situation and accordingly take appropriate decisions. This ability of the farmers to take decisions independently makes them more and more confident of their own socio-economic, technical and communication skill and abilities. At this stage of development, a farmer would not always look for outside assistance. Rather, his confidence would direct him towards taking independent initiatives to solve problems, to confront and combat an unfavorable situation through communication and adoption of improved technologies. Thus, the IPM club is an 'eye opening' process of developing self confidence on socio-economic and technological development skill among farming communities of Bangladesh. Keeping all these things in consideration the present study was taken i) to determine the variations in socio-economic and communication skill of farmers in rice production before and after joining the IPM club.

MATERIALS AND METHODS

The research was conducted by taking great care for using appropriate methods in all aspects of investigation.

1. Research Design

The research design of the study was a descriptive survey research. To achieve the aforesaid objectives, the study was conducted in different steps. Firstly, the selected characteristics of the respondents were studied and secondly, the extent of farmer's achievement in IPM club was determined by investigating before joining and after joining IPM club situation. To collect relevant information from different sources (e.g, respondents and secondary sources), several methods (such as interview, focus group discussion and systematic study of available records) were used.

2. Study area

Among the eight districts under Rajshahi region three districts *viz.*: Rajshahi, Natore and Pabna were purposively selected as because rice is widely grown in these districts. Finally, six upazilas two from each district were randomly selected as the locale of the study.

3. Unit of analysis

Integrated Pest Management (IPM) club members in rice production were treated as the unit of analysis for this study.

4. Population and Sampling design

Two upazilas from each district were selected. IPM clubs those have been established in the year 2006 and have received financial support from Strengthening Plant Protection Services Project (SPPS) project in the six selected upazilas were taken purposively. The total number of such IPM clubs was 21. Fifteen IPM clubs out of these 21 were selected randomly. All members of these 15 IPM clubs under six selected upazilas were the population of the study. However, representative sample from the population were taken for collection of data through simple random sampling method. A list of 365 IPM club members was collected from six Upazila Agriculture Officer. One hundred and fifty farmers (IPM club members) were then selected using random sampling technique taking 10 farmers from each IPM club.

5. Development of Interview Schedule

The interview schedule was designed to gather information related to socio-economic, demographic as well as empowerment aspects of farmers.

6. Validity

Validity of a test refers to the accuracy with which it measures that which intended to measure (Babbie 1998). In order to test the validity the instrument were sent to a panel of 12 experts from BSMRAU, SAU, BARC, FAO and DAE seeking opinions, corrections, modifications and comments. Thus the instrument was finalized. Pre-testing in collecting data also enhanced the validity and quality of the study.

7. Reliability

Reliability, on the other hand, means the extent to which a measure, procedure or instrument yields the same results on a repeated trials (Babbie 1998). Test, retest and split-half methods were used to confirm the reliability. A positive and significant correlation was found that indicates the test was reliable.

8. Final version of the interview schedule

The final version of the instrument was revised on the basis of reliability, opinion, suggestions and comments of the experts.

9. Data collection

Before going to the respondents for interview, they were duly informed earlier with the help of Sub Assistant Agriculture Officer (SAAO), so that they might be available at their respective residence during the schedule time. Interview schedule was used for this purpose. In addition to the direct interviewing, PRA (Matrix ranking), FGD (Focus Group Discussion) and few case studies were used to collect qualitative data to interpret the result.

RESULTS AND DISCUSSION

Access to resources

Farmers in Bangladesh play a major role in economic production. Generally the farmers having more income and assets are more empowered.

Table 1. Distribution of the respondents according to their extent of access to resources

Resource items	Level of access to resources (% respondents)							
	Before Joining IPM club				After Joining IPM club			
	No	Low	Med.	High	No	Low	Med.	High
Access to agril. inputs								
i. Use of balanced fertilizer	10.0	29.3	66.0	4.7	2.0	12.7	42.3	43.0
ii. Irrigation facilities	0.0	48.4	49.6	2.0	0.0	10.7	33.3	56.0
iii. Use of quality seed	12.7	60.7	26.6	0.0	0.0	22.0	55.3	22.7
iv. Judicial use of pesticides	14.7	43.3	42.0	0.0	0.0	5.3	62.7	42.0
Access to agril. machineries	0.7	29.3	46.0	24.0	0.0	7.3	46.0	46.7
Access to agril. training	2.0	51.3	32.0	14.7	0.0	0.0	34.7	65.3
Access to agril. credit facilities	2.0	42.0	43.3	12.7	0.0	0.0	48.7	51.3
Access to local extension agents	6.7	60.7	28.0	4.7	0.0	5.3	62.7	32.0
Access to GO & NGO offices to obtain agril. services	6.0	48.7	43.3	2.0	0.0	2.0	86.0	12.0
Average	6.09	45.97	41.87	7.20	0.22	7.26	52.41	41.22

The findings of the study reveal that, farmers were highly marginalized in terms of access to the resources in before situation (Table 1). On an average, majority (46%) of the respondents had low access, 42% had medium access, 7.20% had high access and 6.09% had no access to the resources. The situation was worse in case of their access to agricultural inputs. Incase of local extension agents 6.7 percent had no access and incase of GO & NGO offices 49 percent had low access to obtain agril. services and 43 percent had medium scope to receive credit facilities. But the overall situation regarding farmer's access to resources was improved in after joining IPM club where majority (52.41%) of them achieved medium access and 41.22 percent achieved high access to the resources. On the other hand, the percentage of farmer had no access to the resources was approximately nil (0.22%) which was just reverse to the before situation. Among the six resources, the respondents achieved better access to agricultural training followed by irrigation facilities.

Among the respondents 86 percent had medium access to GO and NGO officers to obtain agril. services. Again, 62.7 percent had medium access to judicial use of pesticides and local extension agents. Only 22.7% respondents had high access to quality seed use. But it is evident that, farmer's access to all forms of resources was increasing.

Access to Resource Index (ARI) was calculated by using the formula given by Biswas (2004). The range of access to resources index (ARI) for before and after situation was 19.74 to 46.06 percent and 39.17 to 81.05 percent respectively. The computed t-test (31.174) showed that average ARI was significantly improved from 32.36 percent in before situation to 56.11 percent in after joining IPM club situation that seems to be remarkable improvement of farmers in their empowerment. The distribution of the farmers based on their access to resources index (ARI) indicates that, there exists a big difference between each category of respondents regarding their access to resources before and after situation (Figure 1). A substantial proportion (80.67%) of them had low access and only 19.33 percent had medium access to resources before joining IPM club. Their level of access to resources in after joining IPM club was significantly improved where 34.66 percent of them hold high to very high access to resources, 64.00 percent hold medium access to resources and only 1.33 percent hold very low access to resources. The reason might be that, farmers after joining IPM club have improved their access to all forms of resources, because the farmers now earn and spend money, produce and sale their farm products, attend formal and informal training, get credit facilities and increase their communication network.

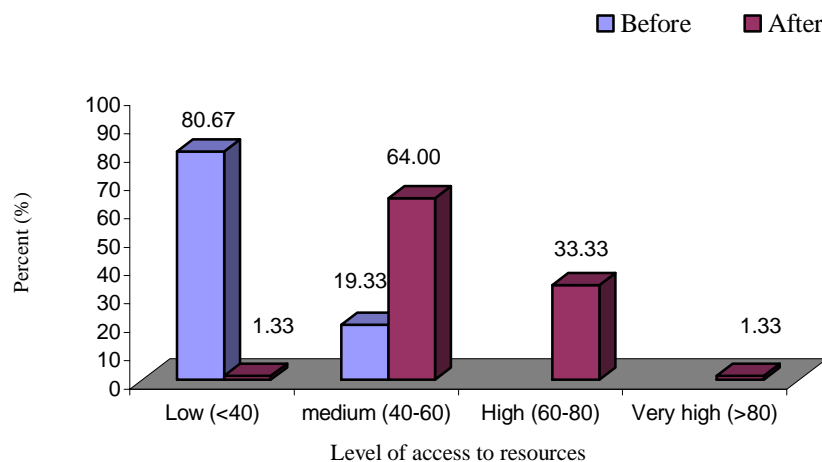


Figure 1. Distribution of the respondents according to their access to resources index (ARI)

Participation in social activities

Participation in social activities is an important indicator of farmer's empowerment. Participation in social activities facilitates farmers to develop social networks through communication, interaction, kinships and mutual understanding. It also inspires farmers to involve in the decision-making process. Thus they become socio-economically empowered. Moreover, there exists a positive relationship between participation of farmers in the development activities and their empowerment (Schuler and Hashemi, 1995). Eight social activities namely, (i) Participation in vaccination campaign, (ii) Participation in sanitation campaign, (iii) Participation in tree plantation campaign, (iv) Participation in adult literacy program, (v) Participation in cultural program management, (vi) Participation in disaster management program, ((vii) Participation in social functions such as marriage, chehnam, etc, (viii) Arbitration in family quarrel of neighbors and relatives were taken into consideration in order to measure the extent of farmers participation in social activities. The respondents under the study were requested to express their opinion regarding these activities with their frequency of responses.

Table 2. Distribution of the respondents according to their extent of participation in social activities

Items	Level of participation in social activities (% respondents)							
	Before joining IPM club				After joining IPM club			
	Not at all (0)	Seldom (1)	Occasionally (2)	Frequently (3)	Not at all (0)	Seldom (1)	Occasionally (2)	Frequently (3)
Participation in vaccination campaign	9.3	65.3	24.7	0.7	1.3	22.7	54.7	21.3
Participation in sanitation campaign	11.3	60.7	28.0	0.0	0.7	4.0	65.3	30.0
Participation in tree plantation campaign	6.7	72.7	20.7	0.0	0.0	2.7	34.0	63.3
Participation in adult literacy program	11.3	66.0	22.7	0.0	0.0	2.7	53.3	44.0
Participation in cultural program management	14.0	70.0	16.0	0.0	0.0	0.7	77.3	22.0
Participation in disaster management program	7.3	41.3	51.3	0.0	0.0	7.3	42.7	50.0
Participation in social functions such as marriage, chehnam etc.	12.7	35.3	51.3	0.7	0.0	9.3	57.3	33.3
Arbitration in family quarrel of neighbors and relatives	11.3	66.0	18.0	4.7	0.0	0.0	67.3	32.7
Average	10.49	59.66	29.09	0.76	0.25	6.18	56.49	37.08

The findings of the study reveal that, the participation of farmers in social activities was much higher in post joining IPM club situation than pre joining situation (Table 2). On an average, about 29 percent of the respondents participate occasionally, about 60 percent of the respondents participate seldom and about 10 percent of the

respondents had no participation. The situation was worse in case of frequent participation in pre joining IPM club situation. On the other hand, about 37 percent of respondents had frequent participation, about 56 percent of the respondents had occasional participation, about 6 percent of the respondents had seldom participation and approximately zero percent of the respondents had no participation. Among the different items, achievement was relatively better in tree plantation campaign followed by disaster management program where about 63 percent and 50 percent respondents had frequent participation respectively in post joining situation.

The participation in social activities index (PSAI) was calculated by using the formula given by Biswas (2004). The participation in social activities index (PSAI) implies that, there was a big difference between pre and post situations of farmers regarding their participation in social activities. The computed t-test (24.755) showed that the average index value was 33.60 percent in pre joining IPM club situation that was improved significantly to 66.09 percent in post joining IPM club situation, which indicates a considerable progress of farmers towards socio-cultural empowerment. Awareness, interest, attainment in monthly and weekly meeting and self-realization inspired farmers to participate more in the social activities. The range of participation in social activity index (PSAI) in before and after joining IPM club situation was 6.96 percent to 65.68 percent and 39.27 percent to 88.71 percent respectively. The distribution of farmers based on their social activity index (PSAI) also indicates that, there was a visible change in each category of respondents in terms of their participation in social activities before and after joining IPM club situation (Figure 2).

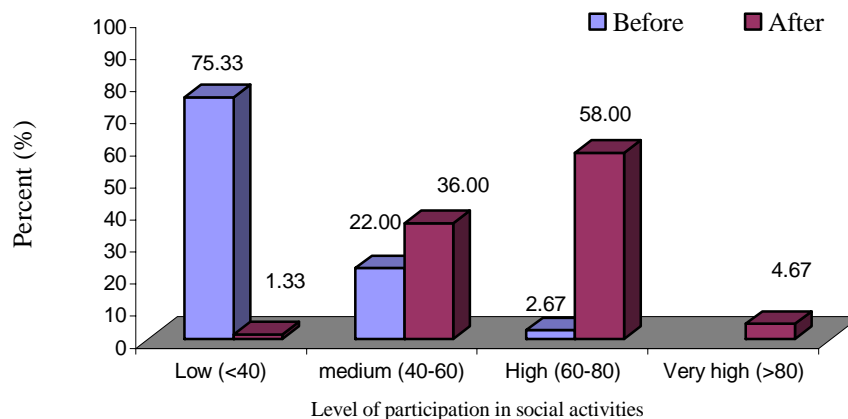


Figure 2. Distribution of the respondents according to their participation in social activities

It was evident that, about 75 percent farmers had low level of participation, 22 percent had medium level and about 3 percent had high level of participation in social activities in before joining IPM club situation. On the other hand, extent of farmer's participation in social activities was improved where about 58 percent of farmers had high level of participation, about 5 percent of farmers had very high level of participation, 36 percent of farmers had medium level of participation and only about 1 percent of farmers had low level of participation in social activities in after joining IPM club situation. The reasons might be that IPM club encourages the farmers getting involved into various social activities like vaccination, sanitation, tree plantation program, disaster management etc.

Communication exposure

Communication exposure of an individual referred to his/her extent of exposure to different communication methods. It was assumed that the more the contact of an individual, the more would be the influence of communication to him/her and he/she would be more empowered. Three types of communication exposure namely, (i) Individual media, (ii) Group media and (iii) Mass media were taken into consideration in order to measure the communication exposure of the farmers. The respondents under study were requested to express their opinion regarding these media with their frequency of responses. The findings of the study reveal that, the communication exposure was much higher in post joining IPM club situation than pre joining situation (Table 3). On an average, about 12 percent of the respondents communicate sometimes, about 30 percent of the respondents communicate occasionally, about 35 percent of the respondents communicate rarely and about 24 percent of the respondents had

no communication exposure. The situation was worse i.e. approximately zero in case of frequent communication exposure in pre joining IPM club situation.

Table 3. Distribution of the respondents according to their extent of communication exposure

Communication media	Level of communication exposure (% respondents)									
	Before joining IPM club					After joining IPM club				
	Not at all (0)	Rarely (1)	Occasionally (2)	Sometimes (3)	Frequently (4)	Not at all (0)	Rarely (1)	Occasionally (2)	Sometimes (3)	Frequently (4)
A. Individual media										
a. personal cosmopolite										
Sub assistant Agricultural Officer	5.3	43.3	47.3	4.0	0.0	12.67	22.00	26.00	30.67	8.67
Upazila level Agriculture Officer	13.33	38.00	32.00	15.33	1.33	6.00	32.67	16.67	34.00	10.67
Poultry Development Officer	24.00	42.67	16.00	17.33	0.00	2.67	20.67	32.67	20.67	23.33
Upazila Livestock Officer	28.00	24.00	45.33	2.67	0.00	7.33	23.33	25.33	30.00	14.00
b. Personal localite										
Local leader	22.00	34.67	31.33	12.00	0.67	11.33	23.33	26.67	29.33	9.33
Farm input dealers	21.33	35.33	32.00	11.33	0.00	9.33	34.67	24.00	27.33	4.67
Poultry feed dealer	14.67	44.67	28.00	12.67	0.00	6.00	21.33	24.00	28.00	20.67
Neighbors and friends	44.67	24.67	28.00	2.67	0.00	8.89	26.44	24.89	28.22	11.56
B. Group media										
Group meeting and discussion	20.00	32.00	32.00	14.00	2.00	1.33	22.00	26.00	30.67	20.00
Training programme	17.33	42.67	22.67	17.33	0.00	6.00	26.00	20.67	34.00	13.33
Method demonstration	26.67	30.67	38.67	4.00	0.00	2.67	20.67	28.00	20.67	28.00
Result demonstration	21.33	33.33	31.33	13.33	0.67	0.00	23.33	24.00	30.00	22.67
C. Mass media										
Radio	21.33	33.33	32.67	12.67	0.00	0.00	24.00	24.00	26.67	25.33
Television	14.67	44.67	30.00	10.67	0.00	0.67	34.67	21.33	27.33	16.00
Daily news paper	33.33	31.33	28.00	7.33	0.00	6.00	21.33	24.00	28.00	20.67
Leaflet/poster	42.67	22.67	17.33	17.33	0.00	2.22	26.67	23.11	27.33	20.67
Mass meeting	34.67	31.33	22.00	12.00	0.0	9.33	23.33	26.67	29.33	11.33
Average	23.84	34.66	30.27	12.31	0.27	5.44	25.08	24.59	28.37	16.41

On the other hand, the situation was reverse in post joining IPM club. About 16 percent of respondents had frequent communication exposure, about 28 percent of the respondents had sometimes communication, about 25 percent of the respondents had occasional and rare communication exposure and only about 5 percent of the respondents had no communication exposure. Among the different communication media, achievement was relatively better in method demonstration followed by radio program where about 28 percent and about 25 percent of the respondents had frequent communication exposure respectively in post joining IPM club situation.

The communication exposure index (CEI) was calculated by using the formula given by Biswas (2004). The communication exposure index (CEI) implies that, there was a big difference between before and after joining IPM club situations of farmers regarding their communication exposure. The computed t-test (15.876) showed that the average index value was 43.15 percent in before joining IPM club situation that was improved significantly to 62.36 percent in after joining IPM club situation, which indicates a considerable progress of farmers towards empowerment. Awareness, interest, attainment in monthly and weekly meeting and self-realization inspired farmers to participate more in the communication. The range of communication exposure index (CEI) in before and after joining IPM club situation was 16.41 percent to 62.61 percent and 36.73 percent to 80.17 percent respectively.

The distribution of farmers based on their communication exposure index (CEI) also indicates that, there was a remarkable change in each category of respondents in terms of their communication exposure before and after joining IPM club situation (Figure 3).

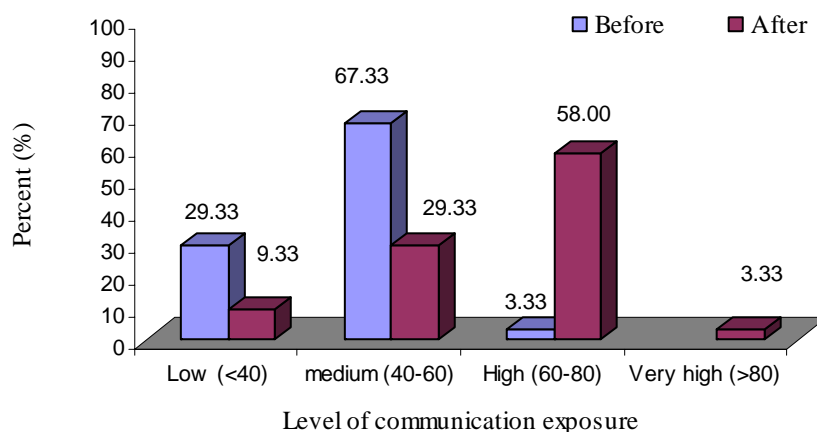


Figure 3. Distribution of the respondents according to their communication exposure index (CEI)

About 29 percent of the respondents had low level of communication exposure, about 67 percent of the respondents had medium level and only 3.33 percent had high level of communication exposure in before joining IPM club situation. Farmers of IPM club were more aware of communication exposure after joining IPM club situation. About 61 percent of them had high to very high level of communication exposure, about 29 percent had medium level of communication exposure and remaining 9.33 percent had low level of communication exposure. This was mainly possible due to increased awareness, confidence, self-realization and well communication network like individual communication, group communication and mass communication of the farmers through IPM club activities.

Technology adoption and dissemination

Technology adoption and dissemination is considered as a topmost priority for measuring farmer's empowerment. Technology is being generated in the research stations and the extension agents bring this technologies to the end users i.e. to the farmers. Farmers at the grass root level accept and adopt the technologies or they reject.

Technology adoption behavior

An attempt was made to analyze the technology adoption process under the study before and after joining IPM club situation (Table 4).

Table 4. Distribution of the respondents according to their technology adoption behavior

Type of technology	Level of technology adoption behavior (% respondents)							
	Before joining IPM club				After joining IPM club			
	Not at all (0)	Rarely (1)	Occasionally (2)	Frequently (3)	Not at all (0)	Rarely (1)	Occasionally (2)	Frequently (3)
Access to agril. information and communication centre	35.3	62.7	2.0	0.0	10.7	24.7	57.3	7.3
Use of quality HYV seed	16.7	73.3	10.0	0.0	6.7	28.0	56.7	8.7
Use of Hybrid seed	19.3	76.0	4.7	0.0	1.3	16.0	70.0	12.7
Use of chemical fertilizer	17.3	78.7	4.0	0.0	1.3	13.3	49.3	36.0
Proper water mgt facilities	9.3	90.0	0.7	0.0	1.3	6.0	39.3	53.3
Adoption of modern varieties like BRRI Dhan 28, 29, 33	12.0	78.0	10.0	0.0	0.0	0.0	60.0	40.0
Conducting demonstration of new technologies	5.3	71.3	23.3	0.0	0.0	12.0	64.7	23.3
Use of leaf color chart	14.7	62.7	18.7	4.0	0.0	12.0	66.0	22.0
Use of urea super granule	13.3	66.0	20.0	0.7	0.0	12.0	76.0	12.0
Average	15.91	73.19	10.38	0.52	2.37	13.78	59.92	23.92

On an average, about three-fourth (73.19%) of the respondents pointed out that they had rare opportunity and about one-tenth (10.38%) of the respondents had occasional opportunity to adopt modern technologies in before joining IPM club situation. The situation was worse in case of their frequent opportunity to adopt technologies, which was approximately zero. On the other hand, an overall situation was improved dramatically in after joining IPM club situation. On an average, about 84 percent of the respondents had occasional and frequent opportunity to adopt modern technologies. Only about 2 percent and 14 percent of the respondents had not at all and rare opportunity to adopt technologies respectively.

Technology adoption behavior Index (TABI) was calculated by using the formula given by Biswas (2004). The computed t-test (16.461) showed that the average value of technology adoption behavior index (TABI) was improved significantly from 38.29 percent in before joining IPM club situation to approximately double (61.25%) in after joining IPM club situation that seemed to be a considerable improvement of farmers towards empowerment.

The distribution of farmers based on their TABI also indicates a remarkable change between each category of respondents in terms of their technology adoption behavior before and after joining IPM club situation (Figure 4).

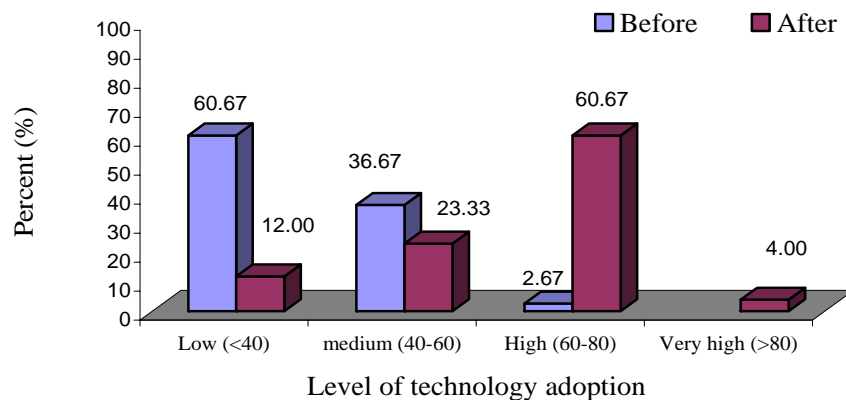


Figure 4. Distribution of the respondents according to their technology adoption behavior

About 61 percent of the respondents had low level of technology adoption, 36.67 percent had medium level and only 2.67 percent had high level of technology adoption in before joining IPM club situation. Farmers of IPM club were more aware of technology adoption after joining IPM club situation. About 65 percent of them had high to very high level of technology adoption, about 23 percent had medium level of technology adoption and remaining 12 percent had low level of opportunity. This was possible mainly due to increased awareness, confidence and participation of farmers in IPM club.

Technology dissemination behavior

An attempt was made to analyze the technology dissemination process under the study before and after joining IPM club situation (Table 5).

Table 5. Distribution of the respondents according to their technology dissemination behavior

Events	Level of technology dissemination behavior (% respondents)							
	Before joining IPM club				After joining IPM club			
Exchange of technical knowledge among different stakeholders	0.7	95.3	4.0	0.0	0.0	12.0	83.3	4.7
Disseminating results of demonstration to the neighboring farmers	7.3	92.0	0.7	0.0	0.0	12.0	72.0	16.0
Arranging field day for neighboring farmers	14.0	81.3	4.7	0.0	0.0	12.0	62.0	26.0
Field visit to other area for exchange & sharing of knowledge	33.3	64.0	2.7	0.0	0.0	12.0	56.0	32.0
Distribution of quality seed to the neighboring farmers	15.3	82.0	2.7	0.0	0.0	12.7	78.0	9.3
Group meeting about the new technology	16.0	54.0	30.0	0.0	0.0	12.0	56.7	31.3
Upazila level fairs and exhibition	16.0	61.3	22.7	0.0	0.0	2.7	94.0	3.3
Use of folk media for technology transfer	15.3	82.7	2.0	0.0	0.0	14.0	48.7	37.3
Motivational tours	24.7	64.0	11.3	0.0	0.0	18.7	80.7	0.7
Use of electronic media	24.7	42.0	33.3	0.0	0.0	14.0	86.0	0.0
Average	16.73	71.86	11.41	0.00	0.00	12.21	71.74	16.06

On an average, about three-fourth (71.86%) of the respondents pointed out that they had rare opportunity and about one-tenth (11.41%) of the respondents had occasional opportunity to disseminate modern technologies in before joining IPM club situation. The situation was worse in case of their frequent opportunity to disseminate technologies, which was approximately zero. On the other hand, an overall situation was improved dramatically in after joining IPM club situation. On an average, about 88 percent of the respondents had occasional and frequent opportunity to disseminate modern technologies. Only about zero percent and 12 percent of the respondents had not at all and rare opportunity to disseminate technologies respectively.

Technology dissemination behavior Index (TDBI) was calculated by using the formula given by Biswas (2004) which was described in the methodology chapter (page no. 69). The computed t-test (15.58) showed that the average value of technology dissemination behavior index (TDBI) was improved significantly from 38.34 percent in before joining IPM club situation to approximately double (66.65%) in after joining IPM club situation that seemed to be a considerable improvement of farmers towards empowerment.

The distribution of farmers based on their TDBI also indicates a remarkable change between each category of respondents in terms of their technology dissemination behavior before and after joining IPM club situation (Figure 5).

About 40 percent of the respondents had low level of technology dissemination, 56.67 percent had medium level and only 3.33 percent had high level of technology adoption in before joining IPM club situation. Farmers of IPM club were more aware of technology dissemination after joining IPM club situation. About 69 percent of them had high to very high level of technology dissemination, about 18 percent had medium level of technology dissemination and remaining 13.33 percent had low level of opportunity. This was possible mainly because of increased awareness, confidence and participation of farmers in IPM club activities.

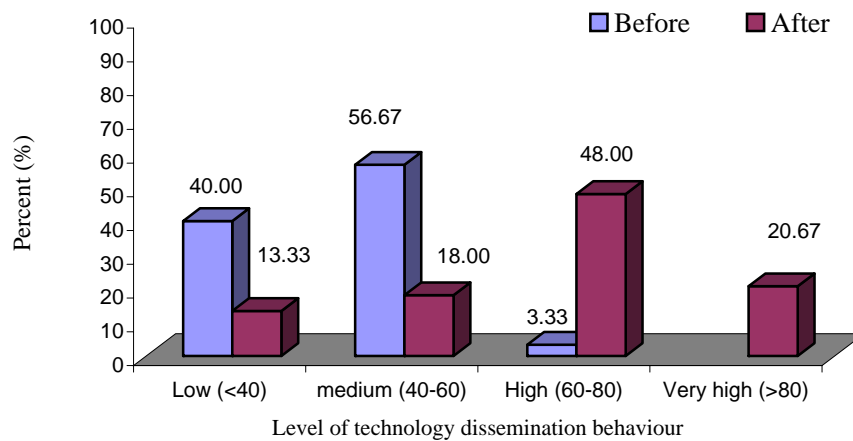


Figure 5. Distribution of the respondents according to their technology dissemination behavior

Participation in income generating activities (IGAs)

Participation in income generating activities was measured by asking statement about farmers' nature of participation in income generating activities. Nine income generating activities namely (i) Production and marketing of quality seed, (ii) Fish culture in the ponds, (iii) Cattle, goat and poultry rearing, (iv) Establishing nursery and selling of sapling, (v) Leasing land and pond for cultivation, (vi) Tree plantation, (vii) Homestead gardening, (viii) Beef fattening and (ix) Preparing and selling handicrafts were taken into consideration in order to measure the extent of farmers' involvement in income generating activities. The respondents under the study were requested to express their opinion regarding these income generating activities with their frequency of responses.

The findings of the study reveal that the participation of farmers in income generating activities was much higher in post joining IPM club situation than pre IPM club situation (Table 6). On an average, approximately zero percent of the respondents had frequent, about 19 percent of the respondents had occasional and about 71 percent of the respondents had rare involvement in income generating activities in before joining IPM club situation. On the other hand, about 21 percent of the respondents had frequent, about 76 percent of the respondents had occasional and only about 3 percent of the respondents had rare participation in income generating activities in after joining IPM club situation. Approximately zero percent of the respondents had no participation. Among the different activities, achievement was relatively better in fish culture in the pond followed by cattle, goat and poultry rearing where 94 percent and about 91 percent respondents participate occasionally.

Table 6. Distribution of the respondents according to their participation in income generating activities

Activities	Level of participation in income generating activities (% respondents)							
	Before joining IPM club				After joining IPM club			
	Not at all (0)	Rarely (1)	Occasionally (2)	Frequently (3)	Not at all (0)	Rarely (1)	Occasionally (2)	Frequently (3)
Production and marketing of quality seed	19.3	54.7	26.0	0.0	0.7	6.7	69.3	23.3
Fish culture in the ponds	7.3	66.7	26.0	0.0	0.7	4.7	94.0	0.7
Cattle, goat and poultry rearing	8.7	71.3	18.7	1.3	0.7	4.0	90.7	4.7
Establishing nursery and selling of sapling	2.7	85.3	12.0	0.0	0.0	0.7	70.0	29.3
Leasing land and pond for cultivation	6.7	82.0	11.3	0.0	0.0	3.3	87.3	9.3
Tree plantation	3.3	86.7	10.0	0.0	0.0	0.0	73.3	26.7
Homestead gardening	6.0	63.3	30.7	0.0	0.0	1.3	69.3	29.3
Beef fattening	15.3	72.7	8.0	4.0	0.0	2.7	74.0	23.3
Preparing and selling handicrafts	14.7	60.7	24.7	0.7	0.0	0.7	53.3	46.0
Average	9.33	71.49	18.60	0.66	0.23	2.68	75.69	21.40

The participation in income generating activities index (PIGAI) was calculated by using the formula given by Biswas (2004). The participation in income generating activities index (PIGAI) implies that, there was a big difference between before and after joining situation of farmers regarding their involvement in income generating activities. The computed t-test (20.749) showed that the average index value was 38.20 percent in before joining situation that was improved significantly to 60.76 percent in after joining IPM club situation, which indicates a considerable progress of farmers towards empowerment. The range of participation in income generating activities index (PIGAI) in before and after situation was 14.31 to 66.51 percent and 33.27 to 85.20 percent, respectively.

The distribution of farmers based on their participation in income generating activities index (PIGAI) also indicates that, there was a visible change in each category of respondents in terms of their involvement in income generating activities before and after joining IPM club situation (Figure 6).

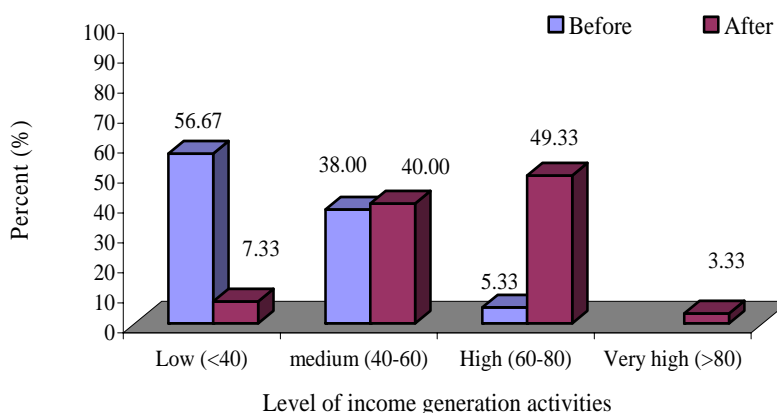


Figure 6. Distribution of the respondents according to their participation in income generating activities

CONCLUSION

The overall situation regarding farmer's access to resources was improved in after joining IPM club where majority (52.41%) of them achieved medium access and 41.22 percent achieved high access to the resources. The extent of farmer's participation in social activities was improved where about 63 percent of club members had high to very high level of participation, 36 percent of club members had medium level of participation in social activities in after joining IPM club. Farmers of IPM club were more aware of communication exposure after joining IPM club situation. About 61 percent of them had high to very high level of communication exposure, about 29 percent had medium level of communication exposure. Farmers of IPM club were more aware of technology adoption and dissemination after joining IPM club situation. About 65 percent of them had high to very level of technology adoption and dissemination, about 23 percent had medium level of technology adoption and dissemination. The distribution of farmers based on their participation in income generating activities index also indicates that, there was a visible change in each category of respondents in terms of their involvement in income generating activities before and after joining IPM club situation.

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