

Farmers' Perception of Utilizing Nutrient Sources for Integrated Plant Nutrient System towards Sustainable Crop Production

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Abstract

The study was carried out to determine farmers' perception of utilizing nutrient sources for integrated plant nutrient system (IPNS) towards sustainable crop production and exploring the relationships of their selected characteristics with their perception of utilizing nutrient sources for IPNS. Data were collected during September 2007 to March 2008 through pre-tested interview schedule from randomly selected 232 respondents from Gouripur union of Gouripur Upazila under Mymensingh district. The selected 16 characteristics of the farmers were considered as the independent variables and their perception of utilizing nutrient sources for IPNS constituted the dependent variable. A four-point rating scale was used to measure the perception of the farmers. The observed perception score ranged from 23 to 73 against a possible range of 0 to 75, with an average of 54.3 and standard deviation 9.01. Majority (63.4 percent) of the respondents had favorable perception, 31.9 percent had moderately favorable perception and only 4.7 percent had unfavorable perception towards utilizing nutrient sources for IPNS. Education, training received, access to manure, participation in IPNS practice, daily time use, credit received, organizational participation, utilization of information source, production orientation, planning orientation, attitude towards use of agro-chemicals and environmental pollution awareness of the farmers showed positive and significant relationship with their perception of utilizing nutrient sources for IPNS.

Keywords: Perception, nutrient sources, IPNS, sustainable crop production.

Introduction

Soils of Bangladesh has lost its fertility to a great extent due to exhaustion of nutrients for continuous cropping with unbalanced use of chemical fertilizers and almost no use of organic manure. As a result, the productivity of the soils is low and decline in crop yields has been reported in many areas in Bangladesh (Hasan *et al.*, 2005). Use of chemical fertilizers in Bangladesh is widespread. Judicious use (i.e. recommended rates, split application, banding) of inorganic fertilizers is needed to sustain satisfactory crop yields and maintain an optimum balance of nutrients. Continuous use of relatively high rates of nitrogenous fertilizers can reduce soil pH

(acidification) and seriously reduce soil fertility (Lloyd and Antony, 1999). A good soil should have at least 2.5 percent organic matter, but in Bangladesh most of the soils have less than 1.5 percent and some soils even less than 1 percent organic matter (BARC, 2005).

To increase soil fertility as well as soil texture and structure etc., it is essential to use manure in the soil. Sustainable crop production can not be achieved by using inorganic fertilizer alone and similarly, it is not possible to obtain higher crop yield by using organic manure only (Bair, 1990). The technique of integrated use of inorganic fertilizer and organic manure is quite

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promising not only in providing greater stability in production, but also in maintaining soil fertility (Nambiar, 1991). Thus the approach of integrated plant nutrient system (IPNS), a combination of organic manure and chemical fertilizer, bears great significance in the context of sustainable crop production towards sustainable agricultural development. IPNS practices are being suggested to help restoring and sustaining soil fertility and productivity (Kanjana *et al.*, 2007). It is an important component of sustainable agricultural intensification as well as crop, pest, soil, and water management. IPNS is a modern system of nutrient management providing balance nutrition for a crop (Sayeed *et al.*, 2003).

The primary function of perception is to make sense of the information taken in by the process of sensation. The study of perception is, therefore, expected to reveal how the farmers interpret the IPNS for sustainable crop production. It seems logical to assure that perception of the farmers on utilizing nutrient sources for IPNS towards sustainable crop production might have relationship with their various social, cultural and psychological factors. However, the study specified the objectives as to: determine farmers' perception of utilizing nutrient sources for IPNS, measure the selected characteristics of the farmers and explore the relationship between the selected characteristics of the farmers and their perception of utilizing nutrient sources for IPNS.

Methodology

The study was conducted in Gouripur Upazila of Mymensingh district. Members of SFFP demonstration groups, members of Farmer Field Schools (FFS) of IPM project and members of Integrated Crop Management (ICM) of Gouripur Upazila who received training on IPNS constituted the population of the study. There are 10 unions in Gouripur Upazila. Following random sampling procedure, out of 10 unions, Gouripur union was selected for the study. At the second stage, out of 17 villages in Gouripur union, five were randomly selected. At the third stage, 25 percent of IPNS trainees in each village were randomly selected. Thus, 232 farmers were selected as the sample of the study and 23 farmers were kept in the reserve list. Out of this 232 farmers, 93 were female as they were the group members of SFFP. Data were collected from September, 2007 to

March, 2008 through a pre-tested interview schedule.

Farmers' perception of utilizing nutrient sources for IPNS was the dependent variable and the sixteen selected characteristics of the farmers were the independent variables of the study. The selected characteristics were: age, education, family size, training received, access to manure, participation in IPNS practice, daily time use, farm size, annual family income, credit received, organizational participation, utilization of information source, production orientation, planning orientation, attitude towards use of agro-chemicals, environmental pollution awareness. These independent variables were measured employing prevailing standard methods developed by earlier authors with necessary modification whenever needed. A four-point rating scale was used to measure the perception of the

farmers. The scale Discrimination Technique which combines the advantages of Thurstone's "Equal-Appearing Interval Scale" and Likert's "Summated Ratings" and described by Edwards (1957), with slight modification in the procedure, was used for the construction of perception scale.

For measurement of farmers' perception of utilizing nutrient sources for IPNS, three separate aspects, such as manure, fertilizer and sustainability were considered. Hence, three separate scales like manure, fertilizer and sustainability were constructed with 10, 6 and 9 items, respectively. A farmer was asked to indicate his/her extent of agreement and disagreement in respect of each of the statements. Each respondent expressed his/her extent of agreement by checking against any of the four responses. Scoring was made in the following manner: strongly agree-3, agree-2, disagree-1 and strongly disagree-0.

Thus, the manure related perception scores of farmers could range from 0 to 30, zero

(0) indicating 'very unfavorable perception' and 30 indicating 'very favorable perception'. In the same way, the fertilizer related perception scores of farmers could range from 0 to 18, zero (0) indicating 'very unfavorable perception' and 18 'very favorable perception'. Lastly, the sustainability related perception scores of farmers could range from 0 to 27, zero (0) indicating 'very unfavorable perception' and 27 'very favorable perception'.

Attempts were made to describe the extent of perception of the farmers in three major perception aspects. In order to determine the overall perception scores of the farmers in respect of three aspects, the individual perception scores were added together. Thus, the overall perception scores of the farmers could range from 0 to 75. The computer software like Microsoft Excels and SPSS were used to analyze the data. For exploring relationships between any two variables Pearson's Product Moment Correlation (r) was used.

Findings and Discussion

Aspect-wise Farmers' Perception of Utilizing Nutrient Sources

The score for perception of manure aspect could range from 0 to 30. The computed perception score ranged from 8 to 30 with an average of 21.30 and standard deviation of 3.97. Based on their perception scores the respondents were classified into three categories such as unfavorable (up to 10), moderately favorable (11-20) and favorable (above 20) as shown in Table 1. Table 1 reveals that the highest portion (59.90 percent) of the respondents had favorable perception, 36.20 percent had moderately favorable perception and only 3.90 percent had unfavorable perception. Almost similar

findings were also reflected in the studies of Karim (2008).

The score for perception of fertilizer aspect could range from 0 to 18. The computed perception score ranged from 5 to 18 with an average of 13.05 and standard deviation of 2.35. Based on their perception scores the respondents were classified into three categories such as unfavorable (up to 6), moderately favorable (7-12) and favorable (above 12) as shown in Table 1. Table 1 reveals that highest portion (53.40 percent) of the respondents had favorable perception, 42.30 percent had moderately favorable perception and only 4.30 percent had unfavorable perception. Similar findings are reported by Mahalder (2007).

Table 1 Distribution of the respondents according to their perception of utilizing nutrient sources regarding various aspects

| Aspects of IPNS | Range | | Respondents | | | Mean | SD |
|-----------------|-------|------|------------------------------|-----|------|-------|------|
| | Poss. | Obs. | Category | No. | % | | |
| Manure | 0-30 | 8-30 | Unfavorable (≤ 10) | 9 | 3.9 | 21.30 | 3.97 |
| | | | Moderately favorable (11-20) | 84 | 36.2 | | |
| | | | Favorable (>20) | 139 | 59.9 | | |
| Fertilizer | 0-18 | 5-18 | Unfavorable (≤ 6) | 10 | 4.3 | 13.05 | 2.35 |
| | | | Moderately favorable (7-12) | 98 | 42.3 | | |
| | | | Favorable (>20) | 124 | 53.4 | | |
| Sustainability | 0-27 | 6-27 | Unfavorable (≤ 9) | 13 | 5.6 | 19.92 | 3.98 |
| | | | Moderately favorable (10-18) | 96 | 41.4 | | |
| | | | Favorable (>18) | 123 | 53.0 | | |

The score for perception of sustainability aspect could range from 0 to 27. The computed perception score ranged from 6 to 27 with an average of 19.92 and standard deviation of 3.98. Based on their perception scores the respondents were classified into three categories such as unfavorable (up to 9), moderately favorable (10-18) and favorable (above 18) as shown in Table 1. Table reveals that highest portion (53 percent) of the respondents had favorable perception, 41.40 percent had moderately favorable perception and only 5.60 percent had unfavorable perception. This finding

has similarity with the studies of Kabir (2002).

Farmers' Overall Perception of Utilizing Nutrient Sources

The score for overall perception of utilizing nutrient sources ranged from 0 to 75. The computed perception score ranged from 23 to 73 with an average of 54.27 and standard deviation of 9.01. Based on their perception scores the respondents were classified into three categories such as unfavorable (up to 25), moderately favorable (26-50) and favorable (above 50) as shown in Table 2.

Table 2 Farmers category according to their overall perception of utilizing nutrient sources for IPNS

| Respondents | | | Range | | Mean | SD |
|------------------------------|-----|------|----------|----------|-------|------|
| Category | No. | % | Possible | Observed | | |
| Unfavorable (≤ 25) | 11 | 4.7 | 0-75 | 23-73 | 54.27 | 9.01 |
| Moderately favorable (26-50) | 74 | 31.9 | | | | |
| Favorable (>50) | 147 | 63.4 | | | | |

Table 2 reveals that highest portion (63.40 percent) of the respondents had favorable perception, 31.90 percent had moderately favorable perception and only 4.70 percent had unfavorable perception. The findings regarding the perception of utilizing nutrient

sources indicate that the farmers had favorable perception of utilizing nutrient sources for IPNS towards sustainable crop production. Akhter (2007) showed that an overwhelming majority of the respondents (92.6%) had highly favourable perception

compared to only 7.4 percent of them having moderately favourable perception of IPNS for sustainable crop production. The farmers attended to different training programs on IPNS and they had been practicing IPNS. They were much acquainted to different practical issues of IPNS and experienced benefits of it. Thus, they had favorable ideas towards IPNS. Therefore, most of the farmers had high perception of utilizing nutrient sources towards sustainable crop production.

Relationship between the Selected Characteristics of the Farmers and Their Perception of Utilizing Nutrient Sources for IPNS

The relationship between the selected characteristics of the farmers and their perception has been presented in Table 3.

Table 3 Relationships between dependent and independent variables

| Characteristics of the respondents | Computed 'r' value |
|---------------------------------------|--------------------|
| Age | 0.034 |
| Education | 0.407** |
| Family size | -0.049 |
| Training received | 0.614** |
| Access to manure | 0.655** |
| Participation in IPNS practice | 0.705** |
| Daily time use | 0.141* |
| Farm size | 0.005 |
| Annual family income | 0.048 |
| Credit received | 0.138* |
| Organizational participation | 0.577** |
| Utilization of information source | 0.540** |
| Production orientation | 0.474** |
| Planning orientation | 0.588** |
| Attitude towards use of agrochemicals | 0.434** |
| Environmental pollution awareness | 0.773** |

**Correlation is significant at 1% level of probability

*Correlation is significant at 5% level of probability

Dependent variable: farmers' perception of utilizing nutrient sources for IPNS

No significant relationship was found between age, family size, farm size, annual family income of the farmers and their perception of utilizing nutrient sources for IPNS. Thus, it could be said that these characteristics of the farmers were not considerably associated with their perception of utilizing nutrient sources. Relationship between perception and other twelve characteristics of the farmers i.e. education, training received, access to manure, participation in IPNS practice, daily time use, credit received, organizational participation, utilization of information source, production orientation, planning orientation, attitude towards use of agrochemicals and environmental pollution awareness were found positively significant. The findings indicate that educated farmers can acquire different relevant information about IPNS. So, with the improvement of personal education and training, their perception tended to be higher. IPNS advocates pest and nutrient management without disturbing the environment. Therefore, access to manure of the farmers was found to have significant influence on their perception of utilizing nutrient sources. The farmers spending longer duration in farming activities had higher perception of utilizing nutrient sources than that of the farmers spending shorter duration in farming activities. Higher participation of farmers in IPNS practice had better perception of utilizing nutrient sources. If a person spends longer time in different farming activities including IPNS, he will have better perception of those activities. With the credit money, the farmers can perform various activities related to IPNS. Therefore, with the increase of credit received by the farmers, their perception tended to be higher. The role of organization in modifying human behavior is unquestionable. Through

organizational participation the farmers are likely to be more rational and acquire cognitive components and thus, they might form favorable perception of IPNS.

To move towards integrated farming systems from conventional farming, the farmers need various information. This is why with the increase of information sources used by the farmers, their perception regarding IPNS became more favorable. The farmers having better orientation to the production had better perception. Effective planning is only possible when the planner has adequate knowledge on the subject matter. Similarly, a farmer having good perception of utilizing nutrient sources can plan effectively of his

enterprise towards sustainable crop production. With the increase of favorable attitude of the farmers towards use of agrochemicals, their perception of utilizing nutrient sources tended to be better. Farmers those who were aware of the environmental issues observed the condition of the locality before implementing IPNS practice. They, in the same way, observed the bad impact of agro-chemicals to soil fertility. Probably these made the farmers aware the positive environmental consequences and thus, formed favorable perception of utilizing nutrient sources. Similar relationship was also noted by Karim (2008), Sarker (2007), Uddin (2004) and Islam (2000).

Conclusion

Overwhelming majority (95.3 percent) of the farmers had moderately favorable to favorable perception of utilizing nutrient sources for IPNS. Care may be taken to transfer these ideas to other farmers in the locality. Still there were about one-third of the farmers who had unfavorable to moderately favorable perception. So, there remains scope to make their perception more favorable towards IPNS. Perception of the farmers was increased with the increase of their educational qualification and training exposure. Thus, illiteracy and low training experience might be responsible for unfavorable perception of the farmers. Remarkable proportion of the farmers was not affiliated with any organizations and they had low utilization of information sources. Thus, it could be concluded that increased level of organizational participation and utilization of information might be helpful for them to form better perception. Some other characteristics of the farmers namely access to manure, participation in IPNS practice, daily time use, credit received, production orientation, planning orientation, attitude towards use of

agro-chemicals and environmental pollution awareness were also significantly and positively correlated with their perception. Therefore, these characteristics were also important indicators in formulating any development programs concerning IPNS towards sustainable crop production.

To achieve this goal more and more informal and field oriented adult education programs should be launched in the villages by the concerned agencies. Planned strategic communication campaign is necessary involving different types of media such as personal contact by development workers, printed materials like leaflets, folders, booklets, posters etc. Therefore, DAE and other development agencies should focus on the above dimensions to increase farmers' perception of IPNS towards sustainable crop production. Step should be taken for providing training on IPNS, environmental pollution, production orientation etc. It is recommended that the farmers having low and medium organizational participation category need to be selected by DAE or other NGOs for motivational training on IPNS.

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