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Use of Indigenous Technical Knowledge in Farming for Sustainable Development

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Abstract

The study was undertaken to determine the extent of use of Indigenous Technical Knowledge (ITK) by the farmers in agriculture for sustainable development and to explore the relationships between the selected characteristics of the farmers and their extent of use of ITK. Data were collected through personal contact by using interview schedule from a sample of randomly selected 105 farmers out of a total population of 1050 during February to March 2008. Correlation Co-efficients were computed to examine the relationship between the concerned variables. Extent of use of ITK was computed in three separate dimensions of farming by using Indigenous Technical Knowledge Use Index (ITKUI). In case of crop, among the 35 identified ITKs, 'setting up bamboo sticks and branches of trees in rice fields to let the birds sit and eat away insects' had highest extent of use by the farmers. In case of fishery, applying cowdung in the pond to feed the fish ranked first. Finally, ITKUI for livestock, poultry and duckery indicated that feeding rice mixed with $KMnO_4$ to chicken to cure poul cholera ranked first as ITK. About half (47 percent) of the respondents was moderate users of ITK followed by 40 percent as low users. Only 13 percent of the farmers were high user of ITK. Age, family size and organizational participation of farmers towards the use of ITK were positively related to their extent of use of ITK. On the other hand, level of education, cosmopoliteness, extension media contact and rationality were negatively correlated with their extent of use of ITK.

Keywords: *Use, indigenous technical knowledge, farming, sustainability.*

Introduction

Agriculture still is the main occupation of the majority people in Bangladesh. Agriculture alone served the dwellers of this area in challenging days when the other means of social survival had been forced out of the economy by colonial interest. The farmers of Bangladesh are prehistorically experienced with the indigenous technical knowledge for minimizing risk within their own domain using the existing facilities. These technologies are the means of survival over times for all the natural and induced catastrophes like flood, drought, cyclone, hailstorm, tornado, lack of input distribution and pricing which are regular phenomena of this country. The conventional technologies which are most useful for the small and marginal farmers need special attention by the scientists and extension workers.

Presently, considerable attention is being given to the farmers' wisdom or indigenous or local knowledge systems in different parts of the world. For some, this knowledge provides a basis for identifying ecologically sustainable options of resource use. For others, these are cheap sources of identifying ideas which have considerable scope for commercial exploitation in agriculture after value addition (Talawar and Singh, 1992). Moreover, through a proper understanding of the technological,

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sociological and other relevant aspects of ITK, the degree and direction of planned change for the client system could be properly assessed through formal research (Verma and Singh, 1969). Thus, a wide investigation by the scientists to recover, improve and utilize the conventional technologies would be beneficial for the farmers. These priorities the exigency of a growing interest in documenting these local technologies and drawing the attention of researchers, development workers, and financial agencies to the advantages of preserving and improving ITK in order to achieve higher production. However, the major objectives of the study were: to determine and describe the extent of use of Indigenous Technical Knowledge (ITK) by the farmers in farming for sustainable development; and to explore the relationships between the selected characteristics of the farmers and their extent of use of ITK in farming.

Methodology

The study was conducted at Nowhata pourosava of Paba upazila under Rajshahi district during February to March 2007. Sontospur, Baya and Vugrail mauzas were selected purposively from the pourosava for conducting the study. A total number of 1050 farm households (Sontospur-310, Baya-320 and Vugrail-420) who were directly involved in farming (production of crops, fisheries and livestock) constituted the population of the study and 10 percent of the population was selected randomly. Thus, the sample size so drawn stood 105. The researcher developed a complete and precise structured interview schedule in view of the research problem, characteristics of the populations and locale of the study.

The study includes ten independent variables (age, level of education, family size, duration of work/day in farming, annual income, farm size, cosmopoliteness, organizational participation, extension media contact and rationality) and one dependent variable (extent of use of ITK by the farmers in agriculture). Attempt was made to assess the extent to which these ITKs were being used by the farmers in the study area. The method adopted in dealing with the variable was as follows: ITKs which were used in crops, fishery and livestock, poultry and duckery production were considered to measure their extent of use.

A 4-point rating scale ranging from 'frequently' to 'not at all' were developed to measure the extent of use of ITK by the farmers. Employing the above rating scale, score on the 'extent of use of ITK' for an individual respondent was calculated by summing up the scores for all the 50 enlisted ITKs. The 'extent of use of ITK' score for an individual respondent could range from 0 to 150 where, 0 indicates no use of ITK and 150 indicate the use of maximum level.

Besides having calculated the 'extent of use of ITK' score for all the 105 respondents, an effort was also made to compute the Indigenous Technical Knowledge Use Index (ITKUI) separately for crops, fishery and livestock, poultry and duckery production to analyze their relative position. The following formula was used for this purpose:

$$ITKUI = N_fX3 + N_oX2 + N_rX1 + N_nX0$$

Where,

ITKUI= Indigenous Technical Knowledge Use Index

N_f = Number of farmers used the ITK frequently
N_o = Number of farmers used the ITK occasionally
N_r = Number of farmers used the ITK rarely
N_n = Number of farmers not at all used the ITK

The ITKUI for each of the ITKs could range from 0 to 315, 0 indicating no use of ITK and 315 indicating regular use of ITK in agriculture.

For exploring the relationships between selected characteristics of the farmers with their extent of use of ITKs, zero order co-efficient of correlation (r) was used. Five-percent (0.05) level of probability was used as a basis for rejecting any null hypothesis.

Findings and Discussion

Extent of Use of ITKs by the Farmers in the Study Area

Farmers' use of ITKs in farming was considered in three separate dimensions such as crops; fisheries and livestock, poultry and duckery. Brief descriptions of the above three components are presented here in different heads.

Crop Component

It was revealed that in case of crop component, among the 35 identified ITKs, 'Setting up bamboo sticks and branches of trees in rice fields to let the birds sit and eat away insects' had highest extent of use by the farmers. The 2nd, 3rd, 4th and 5th highest extent of use ITKs were 'Soaking boro rice seeds in water for 1-3 days before sowing in the bed for rapid germination', 'Drying mature bottle gourds (*Lagenaria vulgaris*) in the sun and storing the seeds inside it without rupturing the fruits', 'Using earthen containers and drum to store grains' and 'Keeping rice seedlings under shed for 1-2 days before transplanting for the purpose of increasing tolerance' respectively. The value of ITKUI showed that farmers use ITKs more regarding seeds issues followed by pest management and other intercultural operations. However, findings demonstrated in Table 1 (a) that the farmers were very much concerned about seed and crop health and crop management practices as a whole.

Fisheries Component

ITKUI presented in Table 1(b) indicated that farmers in the study area kept deep attention for feeding their fishes rather than other management practices and applied cowdung as feed regularly (ranked first) in their ponds for economic fish culture followed by excreta of poultry birds, banana leaves, oil cakes and rice kura. In addition to fish feeds, findings showed that farmers were more interested to keep their pond clear and thus they apply lime in the pond to clear the unclean water regularly (ranked second).

Livestock, Poultry and Duckery Component

Data exposed in Table 1(c) that farmers in the study area frequently uses different ITKs for pest management and feeding purposes. However, out of 9 ITK_s considering rank order, feeding rice mixed with $KMnO_4$ to chicken to cure poul cholera ranked first. The second, third and fourth important ITK_s were feeding Jat bichi kala (Musa sp.) to livestock for curing loose motion, feeding the Katanate grass to livestock for improving lactation and feeding the flesh of molluscs and snails to ducks for better growth respectively.

Table 1(a). ITKs used by the farmers in crop cultivation

ITKs	Citations (N=105)	
	ITKUI	Rank
Setting up bamboo sticks and branches of trees in rice fields to let the birds sit and eat away insects	306	1
Soaking boro rice seeds in water for 1-3 days before sowing in the bed for rapid germination	281	2
Drying mature bottle gourds (*Lagenaria vulgaris*) in the sun and storing the seeds inside without rupturing the fruits	280	3
Using earthen containers and drum to store grains	276	4
Keeping rice seedlings under shed for 1-2 days before transplanting for the purpose of increasing tolerance	270	5
Applying the excreta of poultry birds at the base bean and cucurbit plant for better yield	255	6
Pulling ropes across the Boro rice field early in the morning to keep the soil moisture by falling dew drops	253	7
Applying fish-cleaning water at bean and cucurbit plant bases	240	8
Planting banana plants near the rodent holes in the Aman rice fields to control them	230	9
Irrigating the rice fields by 'Done'	230	10
Using trap in the wheat and rice fields to control rodents	225	11
Spreading ash in vegetable field to control aphids	195	12
Using Neem leaves to store grains	170	13
Achra over the standing Aman rice (Seedling stage) plant to control weeds	170	14
Laddering over the standing wheat crop (local variety) about a month after the seeding is done for profuse tillering	169	15
Making narrow incisions on the stem of papaya plants for better fruiting	168	16
Drawing straw-made kerosenized rope across the Aaman rice fields to control insects	155	17
Using hand net to control insects in the Aus rice fields	130	18
Longitudinal incision at the base of gourd plants by sharp blade for early flowering	124	19
Detopping Aus rice plants when the vegetative growth is vigorous	110	20
Intercropping garlic and potato to minimize pest attacks	100	21
For preserving the tender shoots of jute plants for future use as vegetable they are slightly mixed with salts and dried in the sun	99	22
Sowing red-stained Aus rice seeds in the field so that they are not eaten by the bird	85	23
Using Bishkatali to store grains	80	24
Spraying cowdung mixed water in the rice field to prevent the attack of cattle and goat	76	25
Destroying the eggs of yellow rice stem borer in Boro rice field by striking with the branches of spiny trees	44	26
Spreading salt in the Aus rice fields to prevent the attack of cut worms when they cut roots of Aus rice	43	27
Mixing sands with pulses for long preservation	42	28
Applying the mixture of kerosene and urea in the Aman rice fields to control	33	29

ITKs	Citations (N=105)	
	ITKUI	Rank
stem borer and leaf hoppers		
Mixing grinned nepthalene with seeds for better germination	25	30
Spraying Neem solution to control insects in vegetables	22	31
Cutting of cabbage into small pieces, dried in the sun and then kept in polythene bags	22	32
Spreading tobacco dusts over the field to control insects	21	33
Fumigating Kakrol plants by igniting dhup to repel insects during flowering	20	34
Hand pollinating Kakrol flowers for large, round and uniform fruits	14	35

ITKUI= Indigenous Technical Knowledge Use.

Table 1(b). ITKs used by the farmers in fish culture

ITKs	Citations (N=105)	
	ITKUI	Rank
Applying cow dung in the pond to feed the fish	265	1
Applying lime in the pond to clear the unclean water	255	2
Applying the excreta of poultry birds in the pond to feed the fish	246	3
Using banana leaves in the pond to feed grasscarps	200	4
Applying oil cakes in the pond to feed the fish	170	5
Applying rice kura as fish-feed in the pond	130	6

ITKUI= Indigenous Technical Knowledge Use.

Table 1(c). ITKs used by the farmers in livestock, poultry and duckery

ITKs	Citations (N=105)	
	ITKUI	Rank
Feeding rice mixed with $KMnO_4$ to chicken to cure poul cholera	200	1
Feeding Jat Bichi Kala (*Musa sp.*) to livestock for curing loose motion	190	2
Feeding the Katanate grass to livestock for improving lactation	134	3
Feeding the flesh of molluscs and snails to ducks for growth	109	4
Feeding garlic mixed with cowdung to chicken to control "Ranikhet" disease	95	5
Feeding used water of ' Hukkah' to goat to control their hook worms	44	6
Using turmeric dust plus Hukka (indigenous smoking pipe) water to cure gas formation of livestock	44	7
Feeding Maya tablet (a birth control tablet) to Chicken to control "Ranikhet" disease	29	8
Using rotten Puti (Puntinus stigma) fish extracts to cure anorexia of the cow	14	9

ITKUI= Indigenous Technical Knowledge Use.

Overall Use of Indigenous Technical Knowledge (ITK) in Farming by the Farmers

It is understood from the data arranged in Table 2 that the highest proportion (47 percent) of the respondents belonged to the moderate user category as compared to 40 percent in the low user and 13 percent in the high user categories respectively. The overall statistics is that a great majority (87 percent) of the respondents' farmer were low to medium user of ITK in agriculture. Thus, the respondents in the study area provide no good footing in connection with their use of ITK in farming. Ali *et al.* (2008) conducted a study on adoption of selected ecological agricultural practices by the farmers and found almost similar findings. It is true that the crop land of

Bangladesh has been losing its fertility by using anti-natural practices like use of chemical fertilizers and chemical pesticides. Murakami (1991) stated that the anti-natural agricultural practices degrade the soil and ecological balance in many ways. The anti-natural practices increase the cost of production in one hand and decrease the microbial activities in the soil, on the other, which creates new hazardous situation in the entire crop production system including health hazards. Chemical fertilizers and chemical pesticides not only contaminate surface water, they also affect fish population and human health as well. So, step should have to be taken by the proper agencies for the use of ITKs in farming towards sustainable agriculture development.

Table 2 Use of indigenous technical knowledge (ITK) by the farmers in farming

Farmers' Categories according to their use of ITKs	Farmers (N=105)		Mean	SD
	Number	Percent		
Low user (57-69)	42	40	72.66	8.32
Moderate user (70-82)	49	47		
High user (above 82)	14	13		
Total	105	100		

Possible score range: 0-150 and observed score range: 57-93

Relationships between Respondents' Selected Characteristics and their Extent of Use of ITK

The relationship between the independent and dependent variables are presented in Table 3.

Age, family size and organizational participation of the ITK user farmers had significant positive relationships with their use of ITK in farming. This means that the use of ITK by the farmers increased with the increase of age, family size and organizational participation. On the other hand, degree of education, cosmopoliteness, extension media contact and rationality had significant negative relationship. In addition, extent of use of ITK by the farmers was independent with their duration of work per day, annual income and farm size. From the findings it is clear that educated farmers disliked use of ITK in farming, but it is obviously true that for sustainable development of agriculture, use of ITK is very essential

Table 3 Relationship between the selected characteristics of the farmers and their extent of use of ITK in agriculture

Independent variables	Observed 'r' value
Age	0.679**
Education	-0.556**
Family size	0.402**
Duration of work/day n farming	-0.116
Annual income	-0.076
Farm size	-0.080
Cosmopoliteness	-0.425**
Organizational participation	0.218*
Extension media contact	-0.227*
Rationality	-0.438**

* Significant at 0.05 level of probability (table value 0.192 at 103 df)

** Significant at 0.01 level of probability (table value 0.251 at 103 df)

Dependant Variable: Extent of use of ITK.

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Conclusion

Though environmental degradation, climate change and agricultural sustainability is a big issue now-a-days, yet, the findings of the study revealed that 87 percent of the respondents were low to medium user of ITKs and only 13 percent were high user of ITK in farming. Undoubtedly it is true that our environment has been facing much disturbance in many ways. It is, therefore, recommended that the extension service providers should take into active consideration of using ITKs in agriculture that may be helpful to remove environmental degradation and find out viable alternatives to the "green revolution" technologies, it is further recommended that the Department of Agricultural Extension (DAE) should pay due attention to the indigenous knowledge system of the farmers.

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