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IDENTIFICATION AND USE OF INDIGENOUS TECHNICAL KNOWLEDGE BY THE FARMERS IN CROP CULTIVATION

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Abstract: The main focus of the study was to identify the Indigenous Technical Knowledge (ITK) in crop cultivation and to examine the extent to which the farmers were using the identified ITK. The study also explored the relationships between farmers' selected characteristics and their extent of use of the identified ITK. Data were collected from 108 crop growers from three selected villages of Dumuria *Upazila*, Khulna District, Bangladesh, during December 2003. Only 1.85% of the farmers were high users, 13.89% moderate users, 47.22% low users and 37.04% are very low users of ITK. The family size and farm size were negatively related to their extent of use of ITK and the remaining characteristics did not have any significant relationship with the extent of use of ITK in crop cultivation.

Key words: ITK, crop, farmer, Bangladesh

Introduction

Agriculture is the mainstay in the economy of Bangladesh as it contributes about 25% to the country's GDP of which the contribution of crop sub-sector alone is about 23%. Crop sub-sector employs about 68.5% of the country's total labor force, which is about 90% of the labor force being employed by the agriculture sector. Although, there has been a gradual decline in the contribution of agriculture to GDP over the years, yet it will continue to play a vital role in national economy (Anonymous, 2001). All these rapid changes, in economic, technological, and demographic conditions along with creation of new market opportunities, promotion of chemical inputs, and financial constraints have led or forced the farmers of Bangladesh to seek short-term profits and pay less attention in keeping their agriculture in balance with the ecological conditions. Modern crop cultivation with high-level mechanization along with enhanced research and extension activities have contributed to an overall increase in the country's crop production but have created imbalanced situations in the agro-ecosystem (Islam, 1996). In these circumstances, considerable attention is being given to the farmers' wisdom or indigenous or local knowledge systems in different parts of the world.

Indigenous knowledge provides a basis for identifying ecologically sustainable options of resource use. These are cheap sources of identifying ideas, where lies considerable scope for commercial exploitation in agriculture after value addition (Talawar and Singh, 1992). These priorities the exigency of a growing interest in documenting local technologies and drawing the attention of researchers, development workers, and financial agencies to the advantages of preserving and improving them in order to achieve higher crop production. The present study was undertaken considering the objectives of observing the extent of use of ITK by the farmers and exploring its relationship with the selected characteristics of the farmers in the study area.

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Materials and Methods

Three villages (Baratia, Shovna and Kharnia) under Dumuria *Upazila* of Khulna District, Bangladesh, were purposively selected for the study during December, 2003. Firstly, a list of the farmers comprised 1081 farmers of the villages was collected. To make a representative sample, 10% of the population was selected following proportionate stratified random sampling technique and thus the sample so drawn was 108. The data were collected from the selected farmers through personal interview using a pre-designed and pre-tested questionnaire.

Measurement of the variables: The independent variables of the study were age, education, family size, farm size, duration of work/day, annual income, cosmopoliteness, organizational participation, and media exposure. The dependent variable of the study was the extent of use of ITK by the farmers in crop cultivation. Attempt was made to assess the extent to which the farmers of the study area were using these ITK. However, a 4-point scale was used to measure the extent of use of 28 ITK items by the farmers. The weights were assigned to the scale as 3 for 'frequently', 2 for 'occasionally', 1 for 'rarely' and 0 for 'not at all'. Thus, score on the "extent of use of ITK" for a farmer was calculated by the summing up the scores for all enlisted ITK (28) and the score ranged from 0 to 84. Besides measuring the "extent of use of ITK", Indigenous Technology Use Index (ITUI) was also computed for each item by using the following formula:

$$ITUI = N1 \times 3 + N_2 \times 2 + N_3 \times 1 + N_4 \times 0$$

Where, N_1 was number of farmers used the ITK frequently, N_2 was number of farmers used the ITK occasionally, N_3 was number of farmers used the ITK rarely, N_4 was number of farmers not at all used the ITK. Thus, the ITUI for each of the ITK ranged from 0 to 324.

The independent variables of the study such as age, education, family size, farm size, duration of work/day and annual income of the farmers were measured by putting numerical scores. The other characteristics such as cosmopoliteness, organizational participation and media exposure of the farmers under study were measured through selected scales.

Results

Extent of use of ITK by the farmers: The ITUI value of 28 ITK ranged from 12 to 324. A rank order was made on the basis of value of ITUI of each of the 28 ITK and presented in Table 1.

Table 1. List of identified ITK used by the farmers in the study area.

Sl. no.	ITK	Citations (N=108)					
		F	O	R	NAA	ITUI	Rank
1	Application of fish washing water in the gardens (especially in the cucurbits)	21	14	24	49	115	14
2	Splitting the stem of papaya and betel nut	37	33	03	35	180	12
3	Mixed cropping with potato	13	04	04	87	51	22
4	Practicing hand pollination in the cucurbitaceous vegetables	28	12	03	65	111	16
5	Practice smoking in cucurbitaceous vegetables	05	05	09	89	34	23
6	Preventing insects by leaf extracts	01	02	05	100	12	28
7	Cultivating Indian spinach/ red amaranth/ ladies finger/ bitter gourd with papaya	19	26	03	60	112	15
8	Repealing ants by kerosene	03	27	12	66	75	20
9	Mulch the garlic field with straw or water hyacinth	03	01	09	95	20	26
10	Sowing garlic leaving top portion of the clove above the soil	27	05	07	69	98	18
11	Splitting top 1/3rd of the onion during sowing	03	03	01	101	16	27
12	Application of cattle urine in vegetable field	18	07	26	57	94	19
13	Harvesting garlic after the emergence of flower	70	06	03	29	225	10
14	Application of ash in the vegetable field	32	25	23	28	169	13
15	Storing potato on sand	16	08	02	82	66	21
16	Growing potato, sweet gourd and chilli simultaneously	28	05	15	60	109	17
17	Leveling land during land preparation	104	00	01	03	312	03
18	Practicing frequent tillage in vegetable field	89	12	07	02	292	06
19	Cultivating quick growing vegetables	83	23	00	02	295	07
20	Application of more water when the plants mature enough	59	21	13	15	232	09
21	Application of less fertilizer during the early stages of plant growth	55	07	08	38	187	11
22	Growing crops in water hyacinth mass	04	03	04	97	22	25
23	Growing beans along the ridges of the field	105	00	00	03	315	02
24	Practicing racking operation	108	00	00	00	324	01
25	Application of organic fertilizers	98	07	03	00	311	04
26	Growing Dhaincha in the crop field	00	10	06	92	26	24
27	Giving irrigation with fresh water	97	08	02	01	309	05
28	Application of gypsum	93	08	03	04	292	08

Here, F = Frequently, O =Occasionally, R = Rarely, and NAA = Not at all.

Among the 28, 'Practicing racking operation during land preparation' had the highest (324) extent of use by the farmers. 'Growing beans along the ridges of the field', 'Leveling land during land preparation' and 'Application of organic fertilizers' have ranked 2nd, 3rd and 4th position respectively.

The scores on the extent of use of ITK by individual farmer in the study area ranged from 31 to 63 against a possible range of 0 to 84. On the basis of these scores, the respondents were categorized into very low user, low user, moderate user and high user categories. The distribution appears in Table 2.

Table 2. Distribution of the farmers according to their use of ITK.

Categories	Farmers (N = 100)	
	Number	Percent (%)
Very low user (31-40)	40	37.04
Low user(41-50)	51	47.22
Moderate user (51 – 60)	15	13.89
High user (above 61)	02	1.85
Total	108	100
	Range: 31-63	

Characteristics profile of the farmers: Characteristics profile of the farmers were determined and presented in Table 3 which indicates that most of the respondents (92.60%) were middle to young aged having varying extent of level of education. Majority (84.26%) of the farmers had medium to small family. From the study it was revealed that highest proportion (68.52 %) of the respondents had moderate working duration as compared to 17.59 % high and 13.89 % low. Majority (84.26%) of the farmers were moderate to low cosmopolite. As regard to organizational participation, 65.74% had low participation and about 29.63% had no participation with any organization. Most of the farmers (98.15%) maintained inadequate contact with various sources for getting agricultural information (Table 3).

Table 3. Socio demographic characteristics profile.

Variables	Measurement	Range	Categories	Respondents %	Mean	S.D.
Age	Years	20-75	Young (up to 34)	30.56	37.77	14.14
			Middle aged (35-54)	62.04		
			Old (> 54)	7.40		
Education	Rated score	0-14	Illiterate (0)	16.67	5.29	3.60
			Primary (1-5)	33.33		
			Secondary (6-10)	43.52		
			Above secondary (> 11)	6.48		
Family size	Rated score	2-15	Small (2-4)	31.48	5.92	2.78
			Medium (5-7)	52.78		
			Large (8 and above)	15.74		
Duration of work/day	No. of hours	1-11	Low (1-3.99)	13.89	6.13	1.96
			Moderate (4-7.99)	68.52		
			High (8 and above)	17.59		
Annual income	Computed score	10000-230000	Low (up to 25000)	20.37	53657.91	36835.82
			Medium (25001-75000)	64.81		
			High (75001-100000)	7.41		
			Very high (> 100001)	7.41		
Farm size	Hectares	0.14-3.38	Small (< 1.00 ha)	67.59	0.98	0.69
			Medium (1.1-2 ha)	23.15		
			Large (> 2 ha)	9.26		
Cosmopoliteness	Rated score	02-16	Low (2-5)	30.56	10.32	1.68
			Medium (6-10)	53.70		
			High (11 and above)	15.74		
Organizational affiliation	Rated score	1-11	No participation (0)	29.63	3.69	3.62
			Low participation (1-5)	65.74		
			Moderate participation (6 and above)	4.63		
Media exposure	Rated score	6-29	Low exposure (6-15)	57.41	14.94	5.32
			Medium exposure (16-25)	40.74		
			High exposure (16 and above)	1.85		

Discussion

The value of ITUI shows higher use of ITK by the farmers is related to soil fertility followed by other intercultural operations. These findings revealed that the farmers were very much concerned about soil health, crop health and crop management practices as a whole. It was found that the highest proportion

(47.22%) of the respondents belonged to the low user category as compared to 37.04 % in the very low user, 13.89 % moderate user and 1.85 % in the high user categories respectively. Thus, the respondents in the study area have provided no good footing in connection with their use of ITK. Characteristics profile of the farmers indicates that most of the respondents were middle to young aged with mostly secondary level of education who maintains medium to small family and the mean value is almost similar in compare to national average of 5.6 (Anonymous, 2002). Considering the farm size and annual income, the information indicates that majority of the farmers are poor farmers. Majority (84.26%) of the farmers were moderate to low cosmopolite.

From the relationship between the selected characteristics of the farmers and their use of ITK, it was found that, the family size has significant negative relation with extent of use of as the correlated value of 'r' was – 0.231 at 5% level. Okoro and Obibuaka (1992) found similar findings between family size of the respondents and their adoption of recommended management practices. A negative relationship was also found between the farm size and extent of adoption of ITK as the correlated value of 'r' was found to be -0.195 which was significant at 5% level. In the context of the foregoing observations, the null hypothesis may be rejected with the decision that farmers' use of ITK was related to their farm size. Small farm holders used more ITK than others. On the other hand age, education, duration of work/day, annual income, cosmopoliteness, organizational affiliation and media exposure had no relationship with the extent of use of ITK by the farmers of the study area (Table 4).

Table 4. Relationship between the selected characteristics of the farmers and their extent of use of ITK (summary of test of hypothesis).

Dependent variable	Independent variables	Correlation value of 'r'
Extent of use of ITK by the farmers	Age	0.028^{NS}
	Family size	-0.231*
	Education	0.089^{NS}
	Duration of work/day	0.122^{NS}
	Annual income	0.124^{NS}
	Farm size	-0.195*
	Cosmopoliteness	-0.064^{NS}
	Organizational affiliation	0.163^{NS}
	Media exposure	-0.052^{NS}

NS= Not significant, * Significant at 5% level

Conclusion

It may be concluded that relatively middle aged farmers used ITK to a higher extent that is a positive sign for future improvement. Medium families used ITK to a lower extent than smaller and bigger families. Small farmers used ITK to a lesser extent than the medium and large farmers. Extension media contact of the respondents in the study area is not satisfactory for addressing development efforts. On the basis of findings, it may also be concluded that with the increase of media exposure of the respondents, their extent of use of ITK can be increased. Computations on use of ITK by ITUI and by individual farmers revealed that no ITK had an ITUI score of zero and no individual respondent obtained a zero score in connection with his use of ITK. Therefore, it may be concluded that none of the farmers has completely excluded the use of ITK from his crop cultivation even today.

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