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Perception of haor farmers about the innovative features of floating farming

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ABSTRACT

The main objective of the study was to determine and describe perception of the farmers about floating vegetable farming in the haor areas of Bangladesh. The study was conducted in four villages of South Sunamganj Upazila under Sunamganj district. Data were collected from the sampled respondents during August-November 2014 using pretested interview schedule. Overwhelming majority of the respondents (96 %) had highly to very highly favorable perception regarding floating vegetable production. Relative advantage and trailability of floating agriculture were found significantly higher among other perceived characteristics. Reuse of floating bed compost as organic fertilizer during dry season crop production, quick growing of crops in floating method and scope of increasing area under crop production were the top perceived relative advantages by the respondents. So, there is a great opportunity to popularize this practice in haor areas. For proper adoption of this practice, other features need to be communicated to the prospective farmers.

Key words: Farmer, haor, perception, floating farming, vegetable.

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INTRODUCTION

Floating farming, locally referred to as "vasomanchas" is similar to hydroponics, which is a scientific method whereby the plants are grown in the water and uptake their nutrients from the water instead of soil. A floating bed is prepared with the biomass using water-hyacinth, aquatic algae, water-wart and the other water born creepers, straws and herbs or plant residues. The size and shape of the bed vary according to the farmers' choice, demand and economic capacity but small bed is easier to manage and better for crop production. It has many advantages: environmental friendly because no additional fertilizers and manure is required unlike in the conventional agricultural system, the area under floating bed is more fertile compared to the traditional land, and crops and fish can be cultivated at the same time. Nonetheless, during the floods it can be used as a shelter for poultry and cattle. After harvest of crops the biomass generated can be reused as organic fertilizer in the field during dry season. So, it has been an alternate farming for some of the farming communities in the coastal area of Bangladesh. It is also reported that cost benefit ratio of vegetable cultivation in the floating bed ranges from 1:1.6 to 1: 2.6. Having an immense prosperity of floating agriculture in Bangladesh, its practice is still limited; only few vegetables and spices are grown on the floating system sporadically across the areas.

The practice of vegetable cultivation on floating beds is not at all new practice to the haor farmers. But due to some socio-economic constraints this practice has not been so popular to farming community of haor areas. In this context, steps were taken under EEP/Shiree-Unnoti project to promote this practice along with other promising technologies to the haor farmers by HELVITAS. HELVITAS is working under the mandate of collaboration of British-Bangladesh governments. In order to eliminate extreme poverty from the haor region through the promotion of agriculture,

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livestock and fisheries technologies HELVITAS is playing an important role through providing technical assistance to the farmers on floating farming. With the assistance a good number of farmers grew different types of vegetables such as Red amaranth, Stem amaranth, Kangkong, Indian spinach, Okra, Tomato, Gourds etc. in their floating farms. But they use their conventional wisdom, knowledge and techniques in cultivation of these vegetables in the floating farms. As a result, they could not be benefited so much by floating farming and diffusion of this practice had been stagnant. Rogers (1995) identified two major factors which were responsible for diffusion rate of any agricultural technology/practice. Firstly, the characteristics like relative advantage, compatibility, complexity, trial-ability and observe-ability of that innovation and secondly, how the client system perceived these characteristics at their own situations. In fact, farmers are less likely to adopt any innovation before they could develop favorable perception. Proper adoption of floating agriculture can change the overall crop production figure/scenario in Bangladesh in terms of food quality and quantity. This additional production with minimum cost will play a vital role to attain food security in Bangladesh. As a consequence, now it has been an issue to popularize this practice to get maximum benefit by bringing more low lands for crop cultivation. So, it was necessary to understand the farmers' actual perception about floating agriculture. Keeping in this view, the present study was conducted with the following specific objectives: i) to determine overall perception level of the farmers regarding floating farming, ii) to assess innovative features of floating farming and iii) to explore the relationship between the selected characteristics of the farmers with their perception.

MATERIALS AND METHODS

The study was conducted in four villages of South Sunamganj upazila under Sunamganj district. A total of 100 farmers were selected through proportionate random sampling from four sample villages i.e. Mahamudpur, Ronsi, Badullapur and Purba Pagla. A well structured pretested interview schedule was developed keeping in the objectives and variables under study. The respondents were contacted personally for data collection during August-November 2014.

Perception was measured on the basis of 26 statements (16 positive and 10 negative) which were furnished on relative advantage, compatibility, complexity, trialibility and observability of floating vegetable production. Each respondent was asked to indicate his extent of agreement or disagreement against each statement along a 5-point scale: 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree'. For positive statements weights assigned to these responses were 5, 4, 3, 2, 1 and for negative statements 1, 2, 3, 4, 5 were assigned. The total score of a respondent was determined by summing up the weights for responses against all the 26 statements. Perception score of a respondent could, thus, range from 26 to 130. On the other hand, perception index for each statement was calculated by using Perception Index (Roy, 2009) as follows:

Perception Index (PI) = 5×SA + 4×A + 3×U + 2× DA + 1×SDA (for positive statement)
Perception Index (PI) = 1×SA + 2×A + 3×U + 4× DA + 5×SDA (for negative statement)

SA = Total number of respondents expressing their opinion 'Strongly agree' for the statement
A = Total number of respondents expressing their perception 'Agree' for the statement
U = Total number of respondents expressing their perception 'Undecided' for the Statement
DA = Total number of respondents expressing their perception 'Disagree' for the statement
SDA = Total number of respondents expressing their perception 'Strongly disagree for the statement

The frequency, percentage, mean, standard deviation and posthoc test were employed for drawing the inferences.

RESULTS AND DISCUSSION

Overall perception of the farmers

The perception score of the farmers regarding floating agriculture varied from 30 to 71 against the possible range of 26 to 130. The farmers were classified into three categories on the basis of their perception scores that are presented in Table 1.

Table 1
Overall perception of the farmers regarding floating farming.

Category	Frequency	Percent	Mean	Standard deviation
Favorable (up to 43.66 score)	4	4.0	56.22	6.89
Highly favorable (43.67 to 57.32 score)	46	46.0		
Very highly favorable (57.33 and above)	50	50.0		
Total	100	100.0		

Table 2
Categorization of respondents depending upon perception regarding relative advantage floating farming.

Characteristics	Perception categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Relative advantage	Low (Up to 2.95)	19	19	3.34	0.39
	Medium (2.96 to 3.73)	61	61		
	High (3.74 and above)	20	20		
	Total	100	100		

Table 3
Categorization of respondents depending upon perception regarding compatibility of floating farming.

Characteristics	Perception categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Compatibility	Low (Up to 1.98)	14	14	2.41	0.43
	Medium (1.99 to 2.84)	66	66		
	High (2.85 and above)	20	20		
	Total	100	100		

Table 4
Categorization of respondents depending upon perception regarding complexity of floating farming.

Characteristics	Perception categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Complexity	Low (Up to 2.15)	20	20	2.48	0.33
	Medium (2.16 to 2.81)	69	69		
	High (2.82 and above)	11	11		
	Total	100	100		

Table 5
Categorization of respondents depending upon perception regarding trialability of floating farming.

Characteristics	Perception categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Trialability	Low (Up to 2.91)	6	6	3.39	0.48
	Medium (2.92 to 3.87)	78	78		
	High (3.88 and above)	16	16		
	Total	100	100		

It is revealed from the Table 1 that overwhelming majority (96%) of the respondents had highly to very highly favorable perception regarding floating vegetable cultivation. Since favorable perception towards any innovation paves the way of its adoption, it may be concluded that proper motivational works like training, demonstration and incentives at any form will have positive impacts in enhancing the adoption process of floating cultivation to the farmers of the haor area.

Features of floating agriculture as an innovation

Relative advantage

The perception scores of the farmers regarding relative advantage of floating agriculture ranged from 2.5 to 4 against the possible score of 1 to 5 with mean of 3.34 and standard deviation of 0.39 as shown in Table 2.

It is revealed from the Table 2 that majority of the respondents (61%) had medium level of perception about relative advantage of floating agriculture. On the other hand, 20 % of the respondents had high level of perception while 19 % had low level perception about the relative advantage characteristics. This is somewhat deviated from the finding reported by Roy (2009) that 55 % of the farmers had high favorable perception, 23.75 % had low favorable perception and 21.25 % had medium favorable perception about the effect of IPM in sustainable crop production.

Compatibility

The average scores for the compatibility of floating vegetable production of the respondents varied from 1.29 to 3.43 against the possible range 1 to 5 having the mean of 2.41 and standard deviation of 0.43 as presented in the Table 3. It is evident from the table 3 that overwhelming majority (86 %) of the respondents had medium to high perception regarding compatibility on floating agriculture.

Complexity

Table 4 revealed that the averaged scores of the respondents regarding complexity ranged from 2.0 to 3.4 with the mean of 2.48 and standard deviation of 0.33.

It was observed from the Table 4 that majority (69 %) of the respondents perceived the complexity of floating cultivation method as medium followed by 20 % low and 11 % as high.

Trialability

The averaged scores of perception regarding trailability of floating agriculture of the farmers varied 2.33 to 5 against the possible score 1 to 5 with the mean of 3.39 and standard deviation of 0.48 as shown in Table 5.

About three-fourths of the respondents (78 %) had medium level of perception regarding trialability characteristic of floating vegetable cultivation. On the other hand, 16 % of the respondents had high level of perception while 6 % had low level of perception.

Observability

The averaged perception scores of the respondents regarding observaility statements ranged from 1 to 3.33 with the mean of 2.38 and standard deviation of 0.38 as presented in Table 6.

It is evident from the Table 6 that the majority (59 %) of the farmers had medium perception about the results of floating vegetable production followed by 30 % low and only 11 % high perception.

Comparative status of the features of floating agriculture

Posthoc test was employed to determine if there were any significant difference among the perceived scores of relative advantage, compatibility, complexity, trialability and observability of floating agriculture. Based on this test, the mean scores were categorized into homogenous subsets and presented in the Table 7.

Table 6
Categorization of respondents depending upon perception regarding observability of floating farming.

Characteristics	Perception categorization	Respondents		Mean	Standard deviation
		Number	Percent		
Observability	Low (Up to 2.00)	30	30	2.38	0.38
	Medium (2.01 to 2.76)	59	59		
	High (2.77 and above)	11	11		
	Total	100	100		

Table 7
Status of the features of floating farming in homogenous subsets.

Characteristics	Sample	Subset for alpha = 0.05	
		1	2
Observability	100	2.3764	
Compatibility		2.4100	
Complexity		2.4840	
Relative advantage			3.3389
Trialability			3.3895

It is evident from the Table 7 that the mean values of five major features of floating agriculture are not same. The mean values of observability (2.376), compatibility (2.41) and complexity (2.484) fall under subset-1 and relative advantage (3.3389) and trialability (3.3895) fall under subset-2. Although the values of a subset do not differ significantly to each other but have significant difference between the subsets. This indicates the facts that the relative advantage and trialability of floating agriculture were well communicated to the farmers. Continuation of technical supports would have impact in diffusion and adoption process of this practice where water remained stagnant up to five months long. The finding conforms the result that 96 % of the respondents have either high or very high favorable perception about floating vegetable cultivation.

Rank order of the statements furnished on features of floating agriculture

Perception score for each statement was calculated by using perception index (PI) and based on PI, rank order for these statements were made as presented in Table 8.

The top three perceived statement items of floating agriculture were belongs to its relative advantage. It was found that the PI score of the top most statement was 411 and with 41 % 'strongly agreed' and 37 % 'agreed' responses. This statement was about the reuse opportunity of compost materials that were needed for floating bed preparation. This indicates that the respondents had comprehensible perception about the additional benefit of floating cultivation method after harvest of crops. The next top ranked perceived feature of floating method was production of crop in short time. This may be due the facts that the vegetables generally grown in floating method were leafy vegetables which could grow faster in hydroponic condition than dry condition. The third top most perceived characteristic was the suitability of vegetable production on floating beds during inundation period when there was hardly any dry land for vegetable production.

Relationships of the selected characteristics of the respondents with their perception about floating agriculture

Coefficients of correlation were computed in order to explore the relationship between the selected characteristics of the respondents and their perception regarding floating agriculture. The findings are presented in Table 9.

Table 8
Rank order of perception statements regarding floating farming.

Statements	Extent of agreement					PI	Rank Order
	SA	A	UD	DA	SDA		
Relative advantage							
During water logged in June-October floating culture is only method for vegetable production	2	27	32	30	9	283	15
Crops can be harvested shortly in floating method	34	43	15	8	0	403	2
Fallow water logged area can be turned under crop production	19	60	13	8	0	390	3
More yield can be achieved compare to dry land	0	25	52	17	6	296	11
No use of chemical fertilizers reduces production cost	0	18	70	12	0	306	10
Floating bedcompost can be reused as organic fertilizer during crop production in dry season	41	37	14	8	0	411	1
Vegetable produced in floating beds ensures higher market price for its better quality	18	62	15	8	0	293	12
Floating cultivation conserves environment	0	0	88	12	0	288	13
Compatibility							
Hill flash flood cannot hamper crops grown in floating beds	4	20	43	25	8	287	14
Excessive rainfall cannot disintegrate floating beds	0	3	30	29	38	198	21
Floating cultivation conforms to the social values and norms	0	0	36	26	38	198	21
Recession of water reduces yield of crops grown in floating beds	0	0	28	42	30	248	22
Water hyacinth for floating bed is available in the area	0	18	31	32	19	248	18
Labors are available for floating cultivation	7	25	43	22	3	311	8
Any vegetable can easily be grown in floating bed	0	20	38	34	8	270	16
Complexity							
Agronomic management of floating crops is not similar to other crop management	0	6	41	47	6	247	19
Creepers and straw for floating beds are not available	0	8	31	42	19	228	20
Specialized training is required	0	0	12	76	12	200	21
Storm waves hamper floating beds	6	21	57	15	1	316	7
Crop harvesting is difficult	0	0	64	24	12	251	17
Trialability							
Yields do not differ significantly on size of floating beds	5	27	46	19	3	310	9
Compare to fruit, cultivation of leafy vegetable is easier in floating beds	14	24	52	10	0	342	5
Open water body is more effective than small ponds	20	30	45	5	0	365	4
Observability							
Usually no disease and insect infestation observe in crops grown on floating beds	0	0	22	53	25	197	23
Can be used as shelter of poultry birds during flood	0	0	27	38	35	192	24
Crops and fish can be cultured simultaneously	0	36	56	6	2	326	6

Table 9
Relationship of selected characteristics of the respondents and their perception about floating agriculture (N=100).

Selected characteristics	Computed 'r' values
Age	-0.014
Level of education	0.149
Family education	0.029
Family size	0.203*
Family cooperation	0.349**
Farm size	0.161
Training	0.197*
Organizational participation	0.157
Contact with communication media	0.341**

** = Significant at $p<0.01$; * = Significant at $p<0.05$

It is evident from the Table 9 that family size, family cooperation, training and contact with communication media of the respondents had significant positive correlation with their perception about floating agriculture. Generally large families in the rural area have more scopes to take notice about new practices and likelihood of adoption. On the other hand, through intensive cooperation of family members floating agriculture might have possible by the respondents. As a result, respondents possessed very favorable perception towards floating agriculture. It was found that most of the respondents got training from HELVITAS that might have influenced formation of favorable perception towards floating agriculture. It is evident from the Table ($r = 0.341$; $df= 98$; $p<0.01$) that more the contact with communication media had more chances to broaden comprehensiveness about floating agriculture. Characteristics like level of education, farm size and organizational participation although viewed as important, showing a positive association with perception but they did not contribute significantly. It might be due to the indirect influence of other characteristics.

CONCLUSIONS

Farmers have considerable favorable perception about floating agriculture. Amongst other features, relative advantage and trailability of floating agriculture were well communicated to the farmers that have been reflected by their perception indices. So, there is a great opportunity to popularize this practice in haor areas. For proper adoption of this practice, other features need to be communicated to the prospective farmers. In the face of global environmental degradation, floating agriculture could be a good option not only for the farmers of the haor areas of Bangladesh but also for the farmers of world water logged areas as a means of crop production. Both Government and non-government organizations should come forward to make the practice popular among the farmers of haor area in sustainable way.

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