



Research Article

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A Scenario of Agricultural Technologies Practiced in Haor Area of Sunamganj District in Bangladesh



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Abstract

The study was carried out at Sunamganj sadar upazila of Sunamganj district during November 2014 to July 2015 to see the uses of agricultural technologies in haor area. A total number of 65 farmers were randomly selected by using random sampling technique. Data were collected from the sampled farmers' through direct interview method using a semi-structured questionnaire. In this experiment was observed that 31 rice, 5 mustard, 19 vegetables varieties were cultivated in haor area. Boro-Fallow-Fallow was the major cropping pattern in the study area. The farmers' of the area are not using balanced fertilizers for their crop production. Farmers' of the village used traditional practices in rice fields in case of other production technologies. Proper management is needed to livestock rearing could be a potential resource in haor area. In haor area, different culture methods are used for fish production, as- monoculture practice and polyculture practice at seasonal or homestead ponds. Between them polyculture practice is more beneficial methods. In recent year, cage culture practice was done shown in haor area. Cage culture for producing fish is more suitable practice utilizing open water. Different types of traditional fishing gear were used in the haor area. Modern agricultural technologies are less available for crop production, livestock and fisheries in haor area.

Keywords: Agricultural; Technology; Varieties; Cropping pattern; Haor

Introduction

Bangladesh is densely populated and agricultural based country. Farmers' are engaged in producing field crops and homestead farming like vegetables and fruit production, fish culture, livestock and poultry rearing along with some other non-farm activities. These activities are interlinked and together they constitute integrated farming. Integrated farming is a concept and principle of two or more farm enterprises in a farm having strong cohesive and interactive relationship for production and consumption activities and in sharing and utilizing resources [1]. Haor is basin like structure where water remains either stagnant or in flash flooding condition during the months of June to November and mainly boro rice is grown in the Rabi season taking advantage of longer moisture retentivity of the soil and surface water stored in the nearby ditches [2]. A total of about 0.71 million ha of net cultivable land is available in haor area, which produces more than 5.25 million tons of paddy each year. These 373 haor cover an area of about 859,000 ha which is around 43% of the total area of the haor region. Out of these, 95 haors are in Sunamganj district of which about 70% area has now been turned into cultivated land [3]. Boro-Fallow-Fallow, Fallow-B. Aman-Fallow and Fallow-Fallow-T. Aman are the major cropping patterns practiced in the area. Almost 80% of haor surrounding area of Sunamganj district is covered by boro rice, while

only about 10% area is covered by T. Aman production. Modern technologies are considered as pumps for irrigation, power tiller for tillage, weeder for weeding, sprayer for spreading, thresher for threshing and so on. One of the major reasons for nutrient stress is the use of imbalance fertilizers. Among the improved cultural practices, to insure proper growth, large amount of chemical fertilizers is applied in different crops field [4]. Judicious and proper use of fertilizers can markedly increase the yield and improve the quality of rice [5]. Livestock production is a major component of Bangladesh and goes well beyond direct food production. Disease control is the main constraint for the development of livestock sector. Among the diseases, foot and mouth disease (FMD) is one of the most threatening diseases to animal health seriously and affecting economic and nutritional status of the rural population in Bangladesh. Bangladesh is blessed with vast water resources in the form of rivers, haors, baors, beels, lakes, canals, ponds and estuaries. Vast water bodies are enriched with aquatic diversity containing 260 species of freshwater fish, 12 species of exotic fish, 475 species of marine water fish, 24 species of freshwater prawn and 36 species of marine water shrimp [6]. Modern technology is related with modern and scientific culture and management of farm enterprises. It is a process through which the individual agri-

cultural activities can be improved up to a certain limit to increase the efficiency of farmers' activity for optimum crop production. Modern agricultural production technology means the technological relationship between inputs and outputs. The technological progress can be distinguished by new inputs types and changes in input quality [7]. The government of Bangladesh gave special emphasis to increase production through expansion of HYV seed-fertilizer-irrigation technology after 1960s. An increase in the rate of diffusion of modern technology has been observed to influence area, production and yield growth of food grain crops. The scientists of BAU, SAU, BARI, BRRI, BINA, BARC, etc. working in different disciplines are paying attention towards development and identification of technology to increase agricultural productivity of Bangladesh. The agricultural production increase and make high profit for the farmers. The objective of the study to see the uses of agricultural technologies in haor area.

Materials and Methods

The study was carried out at Sunamganj sadar upazila of Sunamganj district during November 2014 to July 2015 to see the agricultural technologies in haor area. List of all farmer of the selected village was prepared with the help of local village leader and SAAO. There were 230 households are situated in the Bahadurpur village. Sample farmers were selected following simple random sampling method. The numbers of sample farmers were 65. A semi-structured questionnaire was used as the data gathering instrument based on the objectives of the study. The questionnaire contained both open and closed form of questions. The questions in the schedule were simple, direct and easily understandable by farmers. Prior to final data collection, the questionnaire was pre-tested in the study area in the actual field situation. Based on their reactions the questionnaire was then finalized and multiplied to collect data. All possible efforts were made to explain the purpose of the study to the farmers' in order to get valid and pertinent information from them. While starting interview with a farmer, the researcher took all possible care to establish rapport with him so that he did not feel hesitant or hostile to provide responses to the questions and statement in the questionnaire. In some cases the investigator failed to meet the farmers' at their homes for interviews. However, this problem was resolved by repeating the visit. Only a single questionnaire was carried out with each farmer. Data collections were based on the agricultural technologies in haor area. The collected data were compiled, tabulated, farmers categories, means and percentage according to objectives of the study.

Results and Discussion

Cropping pattern

There are 16 cropping patterns identified in the Bahadurpur village (Table 1). The higher number of cropping pattern was Boro-Fallow-Fallow (100%) followed by Sweet Gourd-Fallow-Fallow (18.46%) and Brinjal-Fallow-Fallow (15.38%). Result showed that the major cropping pattern was Boro-Fallow-Fallow (100%) due to low land area because boro rice is the major crop. Islam et

al. [8], where the authors found that Crop-Livestock-Poultry-Fish-Homestead, Crop-Livestock-Poultry-Homestead, Crop-Livestock-Fish-Homestead, Crop-Homestead-Fish-Poultry, and Crop-Livestock-Homestead were the major farming systems in Dingapota haor area of Netrokona district. This finding was similar of the findings of Hossain et al. [9,10].

Table 1: Cropping pattern of sampled farmers' land use in Sadar upazila of Sunamganj district.

Cropping Pattern	Frequency	% of Respondent
Boro-Fallow-Fallow	65	100
Potato-Boro-Fallow	12	18.46
Mustard-Fallow-Fallow	5	7.69
Seedling-Coriander-Fallow	2	3.08
Sweet gourd-Fallow-Fallow	3	4.62
Radish-Fallow-Fallow	7	10.77
Seedling-Amaranth-Fallow	4	6.15
Onion-Fallow-Fallow	6	9.23
Country Bean-Fallow-Fallow	8	12.31
Brinjal-Fallow-Fallow	10	15.38
Tomato-Indian Spinach-Fallow	2	3.08
Garlic-Fallow-Fallow	4	6.15
Ladies Finger-Fallow-Fallow	3	4.62
Snake Gourd-Fallow-Fallow	7	10.77
Sponge Gourd-Fallow-Fallow	8	12.31
Chili-Fallow-Fallow	5	7.69

Varieties cultivated in haor area

Haor is deeply flooded (5 to 7m) from May to October while winter is the single cropping season. The major crops are boro rice, vegetables and some others. Data found from the haor, it was revealed that 31 rice, 5 mustard, 19 vegetables varieties were cultivated in haor area under Sunamganj district, respectively (Table 2). Singh [11], and Hossain et al. [12], also supported this result.

Table 2: Biodiversity of crops and trees in haor area under Sadar upazila of Sunamganj district.

Crop (Rice, Field Crops)		Vegetables	Agroforestry and Plantation
Rata boro	BRRI dhan28	Cabbage	Mango
Tapi boro	BRRI dhan29	Cauliflower	Guava
Begun bichi	BRRI dhan50	Bottle Gourd	Coconut
Atobshail	BRRI dhan58	Sweet Gourd	Litchi
Gochi	BRRI dhan63	Tomato	Papaya
Laphaia	Binadhan 8	Eggplant	Jujube
Birun	Binadhan 10	potato	Ber

Laldinga	Binadhan 14	Sweet potato	Jamboline
Khaia boro	Binadhan 18	Bean	Hijal
Bichibaro	Hybrid SL-8H	Coriander	Karoch
Sona rata	Hybrid Hira	Cucumber	Mehogony
Pashushail	BRRI hybrid dhan 2	Bitter Gourd	Acacia
Rangilatapi	BADC 1 (Sorisha)	Red amaranth	Mangium
Kali boro	SAU Sorisha 3	Stem amaranth	
Kalojira	BARI Sorisha 11	Radish	
Lalkhai	BARI Sorisha 14	Spinach	
Chinigura	BARI Sorisha 15	Snake gourd	
BR 16		Ridged gourd	
BR18		Yard long bean	

Fertilizers used in haor area

The farmers' of the area are not using balanced fertilizers. The reason behind that was lack of knowledge about balanced fertilizers (Table 3). Farmers' of the village started use of fertilizers about 12 years before only which is late in respect to other areas of the country (Table 4). The farmers' of the area generally do not use organic matter in their rice field. Survey showed that only medium (3.08%) and large (1.54%) farmers' were applied cowdung in boro rice cultivation (Table 5). Similar result was observed by Ahmed [13], and Jahiruddin et al. [14].

Table 3: Limitations of using balanced fertilizers by the farmers of haor area.

Sl. No.	Reasons not to use Balanced Fertilizers	Frequency	% of Respondent
1	Lack of knowledge about balanced fertilizers	65	100
2	Traditional fertilizers practices	56	86
3	Balanced fertilizers crisis in the local market	35	54
4	Balanced fertilizers high price in the local market	43	66
5	Farmers' economic problem	38	58

Table 4: Years of fertilizers used of sampled farmers' land in haor area.

Farmers Category, No.	No. of Farmers		
	Below 8 Yrs	Between 8-12 Yrs	Above 12 Yrs
Landless, 10	4	5	1

Marginal, 16	7	6	3
Small, 18	6	7	5
Medium, 15	5	6	4
Large, 6	-	4	2
Total, 65	22 (33.84)	28 (43.08)	15 (23.08)

Table 5: Used of organic fertilizers in the rice fields of sampled farmers' land in haor area.

Farmers Category	No. of Farmers	Cowdung (%)
Landless	10	-
Marginal	16	-
Small	18	-
Medium	15	-3.08
Large	6	-1.54
Total	65	-4.62

Figures in the parentheses indicate percentage

History of uses of agricultural technology for rice cultivation

Uses of agricultural technology of sampled farmers' were power tiller, water pump, threshing machine and Japanese rice weeder, fertilizers and insecticides use since 7, 12, 5, 1, 20 and 10 years. Farmers' of the village used traditional practices in rice fields in case of other production technologies (Table 6). Result showed that modern agricultural technologies are less available in Bahadurpur village for boro rice cultivation. Regmi [15], observed that when HYVs of paddy are harvested with a sickle, the straw length is usually 50-100 cm. Threshing could be done by hand beating in the field by hired labour. In hand beating threshed grain loss ranged between 5 to 10 percent with additional loss of another 5 percent due to shattering of the grain in the threshed area during hand beating. [16-20] also supported this result.

Table 6: History of uses of agricultural technology of sampled farmers' rice field in haor area.

Uses of Agricultural Technology/ Implement	Time Line of Technology Use (Years)
Power Tiller	7
Water Pump	12
Threshing Machine	5
Japanese Rice Weeder	1
Fertilizers Use	20
Insecticides	10
Plough	Traditional practices
Ladder	Traditional practices
Yoke	Traditional practices
Rake	Traditional practices
Spade	Traditional practices
Sickle	Traditional practices
Cheuti	Traditional practices
Dul	Traditional practices

Livestock technologies used in haor

Poultry rearing in haor areas, considering environmental fluctuation, fayoumi chicken shows bit of well performer in term of weight gain, egg production and livability than sonali and local chicken. Proper management is taken, duck rearing could be a potential resource in haor area. In some extent Jinding duck performs better than of local and Khaki Campbell in terms of body weight, growth rate, egg quality and livability. Sheep rearing especially garole sheep have miraculous performance for fulfilling protein demand to rural people in haor areas because of excellent body weight gain and prolific nature. Due to proper vaccination and deworming program is taken, withstanding from worse challenge and growth performance is ameliorating with the advancement of time. Along with, beef fattening program opens up a new hope for local people inhabited in haor areas, gaining a noticeable financial support. Although several unpredictable environmental conditions most gingerly flood causes a significant handicap, aforementioned livestock technology is going to be a new era for contribution of national economy and withstanding poverty in haor areas (Table 7). Sonali females produce about 180 eggs per year [21]. LIFCHASA [22], agreed this finding where the highest body weight gain observed in Sonali chicken (4.56g/day) and the lowest in Indigenous chicken (2.26g/day). Similar results were found in the report of Pervin et al. [23].

Table 7: Livestock technologies used in haor area under Sadar upazila of Sunamganj district.

Technology	Uses/Benefit
Cattle Breed (Local)	Milk and meat production
Poultry Breed (Local, Fayoumi, Sonali)	Egg and meat production
Duck Breed (Local, Jhindin, Khaki Cambell)	Egg and meat production
Vaccination Program	Reduces the mortality of livestock and poultry
Baby Chick Ranikhet Disease (BCRDV)	
Ranikhet Disease Vaccine (RDV)	
Duck Plague Vaccine (DPV)	
Foot and Mouth Disease (FMD)	
Deworming Program	Reduce the parasitic disease and increase the productivity. Increase the growth performance of livestock
Beef Fattening Program	Meat production
Garool (Sheep) Rearing Practice	Increase the economic status than the normal sheep rearing practice
Feeds	Conventional feed, Balance ratio with local ingredient, cattle fattening, Milch cow feed management-use of urea-molasses with concentrate

Fisheries technologies used in haor

In haor area, different culture methods are used for fish production, such as- monoculture practice using one species or

polyculture practice using more than one species periphery of haor area at seasonal or homestead ponds. Between them polyculture systems are more beneficial methods, because in polyculture systems, surface, column and bottom feeder fishes are cultured together and, in this system, feeds are properly utilized and give higher production. On the other hand, in recent year, cage culture practice was done shown in haor area. This practice is an improved technology for haor areas people. Bangladesh is blessed with haor, baor, river, beel, lake, ditch etc. In haor water retain 6-7 months in rainy season and during this time seasonal ponds are submerged. At that moment, cage culture for producing fish is more suitable practice utilizing open water. For higher fish production, supplementary feeds viz. rice bran, wheat bran, mega feed, mustard oil cake and fish meal etc. are offered. Fertilizer such as cow dung, urea, TSP and MoP etc., are used fortnightly to increase production and when natural feed is available in ponds then stop fertilizer application. Growth promoter probiotics (Rapid grow, biozyme, miracure, safe gut etc.,) are used to increase fish production. Sometimes water qualities are tested by water quality test kit (Table 8). The primary productivity of a water body depends on the physical, chemical and other factors of water [24]. Roy & Wahab [25], who recorded temperature ranges from 25.9 to 34.5 °C in rearing of Chinese and Indian major carps and other small fish species at different densities in freshwater pond. Cage aquaculture is a rising technology to increase fish production. A widespread and profitable culture of fish and prawns in cages has already been developed successfully in Asia, Europe and America. Similar results also obtained by [26,27].

Table 8: Fisheries technologies used in haor area under Sadar upazila of Sunamganj district.

Technology	Uses/Benefit
Monoculture	Practices in seasonal or perennial ponds to increase production
Polyculture	Practices in seasonal or perennial ponds to increase production
Case culture	Case culture practice in haor region
Feeds	Floating feed, Rice bran, Wheat bran, Mustard oil cake
Cowdung, Urea, TSP, MoP, etc.	Fertilizer used during pond preparation or increase production
Quick Lime, Fostoxin Tablet, Poison, Rotenone	To remove predatory fish
Growth Promoter Used in Fish Culture	Safegat, Rapid grows, Mercury, Probio-aqua, Zymetic, Super biotic, Biozyme.
Lime, KMnO4, Mithyle blue, Mithyle red, Tetracycling for bacterial disease	Disease affected fish/pond are treated
Dissolved oxygen (Do meter), pH (pH test kit/ pH meter), Alkalinity (Alkalinity test kit), Hardness (Hardness test kit), NH3 (NH3 test kit), Temperature (Termometer)	Water quality tested

Fishing gears operated in haor area

Table 9: Different types of fishing gear recorded in haor area.

Category	Types of Gear	Name of Gears	Mesh Size (mm)	Target Species	
Fish Nets	Seine net	Ber jal	5-30 mm	All	
	Lift net	Dharma jal	5-150 mm	All	
		Khora jal	10-15 mm	All	
	Cast net	Jhaki jal	50-120 mm	All	
	Big cast net	Uttar jal	150-300 mm	All	
	Push net	Thela jal	3-30 mm	All	
	Gill net	Current jal or	Chela jal	50-360 mm	All
			Koi jal	200-210 mm	Koi
		Bata jal or	200-600 mm	Big fish	
		Cotor jal			
Fish Traps		Dori	-	SIS	
		Chai	-	SIS	
		Plastic chai	-	SIS	
		Gui	-	SIS	
		Ronga	-	SIS	
		Polo	-	Big fish	
		Ucha	-	SIS	
Hook and Line		Borshi	-	Carnivore	
		Hand borshi	-	Carnivore	
Wounding Gear		Koach	-	All	
Fish Aggregating Devices (FADs)		Dhol	-	All	
Others	Hand picking and dewatering		-	Small indigenous species and all	

Various types of fishing gear were found to operate in the haor area. Most of them were traditional type and some of were unique for the particular locality. In total 22 types of gear under six categories were found to be used by the fishermen for harvesting fish from Dekar haor (Table 9). Sayeed et al. [28], reported that 15 types of fishing gears of five major groups were found to be used by the fishermen for harvesting fish from Hakaluki haor during their study period. Sayeed [29], noted that thirty-four different gears in six categories were observed in Chalan beel during the study period. He also stated that capture fishery in Chalan beel is decreasing day by day. One of the major causes is the indiscriminate killing of small fishes in the early stages by various illegal fishing gears. This results also supported by Holder [30].

Conclusion

A haor is a wetland ecosystem in the north eastern part of Bangladesh which physically is a bowl or saucer shaped shallow depression, also known as a back swamp. Boro rice-Fallow-Fallow is the major cropping pattern. Modern agricultural technologies are less available for crop production, livestock and fisheries in haor area.

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- 76

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