

Floating Cultivation: an indigenous technology for adapting to water logging situation towards sustainable livelihood security in the low lying areas of Bangladesh

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Abstract

The southern, southwestern and the coastal areas of Bangladesh remain submerged for long periods every year, especially during the monsoon season. People in these areas have been coping with submerged/flooded conditions for generations. The people of these areas depend on agriculture. They have adopted a method of cultivation, locally referred to as "Vasoman Chash," meaning floating agriculture, since the time of their forefather's. This system is similar to hydroponics, which is a scientific method whereby the plants are grown in the water and they derive their nutrients from the water instead of from the soil. The production rate is high from this kind of agricultural practice. Floating agriculture is a possible local knowledge based technology which would help in attaining sustainable livelihood security in the vulnerable areas like waterlogged areas in Bangladesh.

Keywords: Waterlogging/flood coping strategy, sustainable livelihood, indigenous practices

Introduction

In Bangladesh, about 8,000 hectares of waterlogged lands in Khulna and Jessore district areas. If the sea level rises due to global warming more areas of Bangladesh will undergo waterlogging and more lands will become unavailable for crop production (BARC, 1991). The combined effect of higher sea water levels, subsidence, siltation of estuary branches, higher riverbed levels and reduced sedimentation in flood protected areas will impede drainage and gradually increase water logging problems (Ali, 1996). This will decrease arable areas and may lead to migration of people to other parts of the country. To cope with the changed situation local knowledge based best practices may prove to be vital for sustainable livelihood security.

Floating agriculture is a farmers' innovation that is being practiced in low lying areas of middle and southern districts of Bangladesh. Floating agriculture has several advantages: (1) the fallow waterlogged area can be cultivated and the total cultivable area can be increased, (2) no additional fertilizers and manure is required unlike in the conventional agricultural system, (3) after cultivation, the biomass generated can be used as organic fertilizer in the field, (4) during the floods it can be also used as a shelter for the poultry and cattle, and (5) the fishermen can cultivate crops and fish at the same time in same area. All the activities of the practice are environment friendly and can prove to be an alternative livelihood option.

Floating agriculture by using naturally grown water hyacinth is an indigenous knowledge and technique of local farmers for growing vegetables, seedlings and flowers in waterlogged areas. In this paper we will discuss the potentiality of this practice for sustainable livelihood security in low lying areas of Bangladesh.

Farming procedure of Floating Cultivation

The soil-less cultivation system was first introduced in Gopalganj, Pirojpur and Barisal district in Bangladesh. Recently this farming system is practiced in water logged areas of Keshabpur of Jessore District. The cultivation procedures are not identical in all areas. The hydroponics farming technique of Gopalganj is quite different from that of the Pirojpur technique. Considering the uniqueness of the technique involved only the Gopalganj method is mentioned below:

i) Floating bed (Dhap) preparation

After harvesting the Aman (cultivated in the monsoon season) paddy, water hyacinth is collected in May to July from the nearby river, canals, ditches, lagoons and from the wetland where it grows profusely. Straw and rice stubble are also used for the same purpose.

The depth of the water bodies is not so significant for preparation of bed. They can be made and managed in any depth of water. Farmers put a long bamboo on the mass of fully matured water hyacinths. Then a man stands on the bamboo and gathers immature hyacinth over mature one. He starts to pull the water hyacinths from the both sides of the bamboo and flatten them under foot. In this process he proceeds towards the end of the bamboo. This process is continued until the desired height and length of the bed is attained. Farmers again dump water hyacinths after 7-10 days later from the first dumping and then the bed is left for decomposition before sowing or planting of seedlings. The upper layer is comprised of deposits of small and quick-rotting waterworts (or small duck weed type of plant), which degrade quickly and make for good manure. It requires 15-20 days from the collection and preparation of the water hyacinth and other materials or the floating bed before cultivation can begin. Farmers carry this bed by rowing to the desired area.

ii) Shape and size of the floating bed

The size and shape of the bed is not fixed. Farmers make the bed as their desired size and shape. Generally, the dimension of the bed is 50-155 ft. long, 5-7 ft. width and 2-3 ft. height. The distances between beds depend on length of land. The narrow strip shaped bed is made so that it can be easily made by gathering water hyacinths easily, can be easily carried to desired places and harvesting of crops is convenient.

iii) Cultivation procedure

Sometimes farmers make a small ball called 'Tema' which is made by aquatic plant locally known as Dulali lata along with compost material. After making the ball farmers put sprouted seeds into it. They make seedbed on raised land around their homestead areas and put the Tema on seedbed.

In Tungipara Upazila, Gopalganj farmers cultivate mixed crop on floating beds. At initial stage they cultivate Ladies finger, Cucumber and ribbed gourd in the same bed during June to August. Usually two rows of Ladies finger and one row of Cucumber or Ribbed Gourd are alternately cultivated. Crops are harvested from the month of August to October. The crops are harvested one after another till the next rainy season. Farmers use small country boat to move around the floating beds and pick up vegetables from the beds.



Figure 1. A newly built floating bed



Figure 2. A ready bed for planting



Figure 3. Red Amaranth and Okra in beds



Figure 4. A group of beds with crops



Figure 5. Intercultural operations in bed



Figure 6. Coriander and Okra in a bed

iv) Maintenance

Sometimes saplings on the floating bed turns yellow, to encounter the problem farmers chop the decomposed parts of the bed, roots of water hyacinth and put them underneath the seedlings or put the chopped materials on the floating bed one feet away from the edge of the bed. Thus, the seedlings get nutrients from the same and become healthy and start to grow. After planting saplings onto the

floating bed de-weeding becomes a regular job of farmers. Bamboos are used as anchorage of floating beds to keep them fixed in a place and prevent from floating away by wind or water current. During the monsoon, farmers use small country boats to manage the floating agricultural land.

v) Cost & Benefit Analysis of Floating Vegetable Cultivation

Following is a brief estimate of costs incurred and benefits accrued from a typical soil-less cultivation system in floating vegetable culture consisting of 10 Dhaps, each measuring about 45 feet x 06 feet = 270 sq. feet. Estimated cost for making 10 floating beds is BDT 10,000.00 while estimated income from 10 such beds is BDT 34,000.00; the gross benefit being BDT 24,000.00 per season (Table 1 & 2).

Potentials for Application

The floating agriculture practice in the southern parts of the country represents a traditional/indigenous agriculture system for the water logged or the submerged area in Bangladesh. The people of the southern parts of Bangladesh adopted the practice based on their traditions and the community's culture and wisdom. This is an environment-friendly and beneficial practice. People use the floating agriculture practice as a model in the pond and other water bodies in other parts of the country. It could be a sustainable and profitable practice in Bangladesh as well as for other countries facing a similar situation.

Table 1. Estimated Cost for making 10 floating beds during rainy season

Sl. No.	Cost Heads	Amount	Unit Cost (BDT)	Total Cost (BDT)*
1	Construction of hydroponics	60 man days	100.00	6000.00
2	Raw materials (water hyacinths & other aquatic weeds)	20 man days	100.00	2000.00
3	Seed & seedlings	10 beds	60.00	600.00
4	Nursing/maintenance, purchase of bamboo, insecticides & harvesting	10 beds	200.00	2000.00
Total Cost				10,000.00

Note: 1 US \$ = 70 BDT

Table 2. Estimated Income from 10 floating beds

Sl No.	Income Heads	Amount (Kg)	Unit Income (BDT)	Total Income (BDT)
1	Ladies finger	2000	6.00/Kg	12000.00
2	Ridged Gourd	400	6.00/ Kg	2400.00
3	Red Amaranth	600	8.00/Kg	4800.00
4	Taro, Indian spinach	-	60.00/Bed	600.00
5	Compost manure	30,000	0.50/ Kg	15000.00
Total Cost				34,000.00

Concluding remarks

Food, clothing, housing, health and education are the basic needs of the people of Bangladesh. Sea level rise becomes a threat to food security by affecting basic needs and other well-being securities. Bangladesh has been practicing floating agriculture since a long time (three to four hundred years). It is a useful method considering the economical, environmental and as well as social aspects. The production rate is high from this kind of agricultural practice. Floating agriculture is a possible local knowledge based technology which would help in attaining sustainable livelihood security in the vulnerable areas like waterlogged areas in Bangladesh.

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Citation for this Short Communication Paper:

Md. Altaf Hossain, 2014. Floating cultivation: an indigenous technology for adapting to water logging situation towards sustainable livelihood security in the low lying areas of Bangladesh. *J. Biosci. Agric. Res.* 01(01): 53-58.