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Research Article

THE SCENARIO OF SEEDLING PRODUCTION ON FLOATING BEDS IN FEW SELECTED AREAS OF BANGLADESH

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ABSTRACT

The study was conducted to reveal various seedling production scenario on floating beds including environmental aspects associating seedling production. Data of various seeding production were collected from total 50 households (HHs) of two villages at Nazirpur Upazila in Pirojpur district of Bangladesh by a pre-tested survey questionnaire. The study showed that 68% farmers did seedling production for business purpose, and 30% as both own and business. During floating cultivation on beds about 50% farmers used their own producing seed and 26% from market. The farmers cultivated 21 different types of vegetables and spices seedlings where highest number of seedling was Bottle gourd (19.11%) followed by Papaya (13.82%) and Chili (12.60%). They used urea as a common fertilizer on floating bed which enriched by TSP (46%) and DAP (40%) during cultivation. It was observed that 32% farmers did seedling cultivation solely as own source of money while 26% got the help from NGOs. After end of the cultivation, 25% beds were sold as compost fertilizer for winter cultivation, 5% were used as own field and 17% farmers utilized the fertilizer as both business and own purpose. The study also revealed that, about 64% of respondent farmers were not suffered by any environmental complications. Adopting modern agro-technology and minimization of initial cost through subsidy can make this traditional *Vasoman Chas h*as a sustainable agricultural practice.

Keywords: Climate change, Compost fertilizer, Vegetable, *Vasoman Chash,* Sustainable

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INTRODUCTION

The people of Bangladesh depend upon agriculture and have being coping with these conditions for generations (Hossain, 2014). The farmers of southern districts (Barisal, Pirojpur, Gopalgonj, Shatkhira etc.) of Bangladesh invented an indigenous cultivation practice (Haqet al., 2004; Irfanullah, 2013), known as floating cultivation referred to "*Vasoman Chash*" (Haq et al., 2016) an age-old traditional practice continuing for centuries. These methods are widely used in Lake Inle in Myanmar, the Tonle Sap in Cambodia, and various fresh-water wetlands in Bangladesh (Islam and Atkins, 2007).

For seedling production both natural and artificial floating beds are used (Slide et al., 2007; John et al., 2009; Mushatq et al., 2013) for agriculture in many tropical wetlands of the world. Water hyacinth is the major ingredient of soilless cultivation (Irfanullah et al., 2008; Irfanullah, 2013) and it is collected from May to July from the nearby river, canals, ditches, lagoons and from the wetland where it grows profusely to make floating bed locally known as *dhap*. Sometimes farmer use aquatic semi-decomposed plants such as *Topapana, Kutipana, Dulalilota, Indurkanipana* and immature small water hyacinth etc. There are two widely used methods for seed germination, one is ball (*guti, tema*) method another is to spread seed directly on the bed.

The seedling production helps to control weeds and enrich soil organic nutrients in dry season, utilization of women labor, provides food and nutritional safety. However, heavy rain fall and flood may flash out or break the beds, non-availability of quality seeds, scarcity of matured water hyacinth, lack of other aquatic weeds, harms of predator (Irfanullah et al., 2011).

Several studies have been conducted on floating agriculture in different districts of Bangladesh, but limited findings found specially for seeding production on floating bed. Therefore, this study was performed to know the vegetable seedling production on floating beds in few selected areas of Bangladesh.

MATERIALS AND METHODS

The survey work was performed in two villages at Nazirpur Upazila in Pirojpur district during October, 2017. The Nazirpur Upazila has an area of233.63 sq. km. The temperature ranges from minimum 19°C to maximum 29.9^{o} C, and annual rainfall 1975 mm. Nazirpur has an average literacy rate of 57.50%. Ownership of agricultural land classified as landowner 76.10% and landless 23.90%. The ecology of these villages of Nazirpur was almost same. Economy of Nazirpur was mostly based on farming and fishing. Most of the lands were lowland and marshy. Fishing wetlands for fishing were available in Mugarjhor and Manoharpur villages.

However, all the collected data from the survey of 50 households (HHs) from those two villages were checked, compiled and coded in MS Excel (Microsoft version 10,

Redmond, USA). Qualitative data were converted into quantitative form by means of suitable scoring and then conducted analysis. Descriptive statistics were performed using SPSS version 16 (SPSS Inc. Chicago, USA).

RESULTS AND DISCUSSION

Attributes, purpose and types of seedling production on floating beds

The attributes, purpose and types of seedling production on floating beds of the surveyed areas are shown in Table 1 and Fig 1. About 9 days required to prepare a floating bed after purchase for seedling production with a cost 4000 Taka per bed. As individual cost about TK 261 and TK 249 were required for bamboo and land rent per season, respectively. Cost of seed, *dulalilata*, *tupapana*, *bira*, *lata*, fertilizer, pest

Table 1. Attributes of floating seedling production

Variables	Min	Max	Mean	SD
Floating seedling production experience (y)	2	37	18.08	8.46
Bed preparing time (d)	5	14	8.68	2.25
Number of bed	4	30	12.54	7.06
Number of cycle	3	6	4.20	0.76
Each bed cost per season (TK)	4000	4000	4000	0
Bamboo cost per bed per season (TK)	200	320	260.90	33.92
Land rent per bed per season (TK)	170	334	248.68	35.59
Seed cost per bed per cycle (TK)	175	275	221.50	24.35
Dulalilata cost per bed per cycle (TK)	300	400	375.90	22.85
Topapana cost per bed per cycle (TK)	580	700	661.80	39.56
Bira cost per bed per cycle (TK)	0	150	96.80	61.29
Lata cost per bed per cycle (TK)	0	175	137.20	43.10
Fertilizer cost per bed per cycle (TK)	40	70	48.00	5.98
Pest cost per bed per cycle (TK)	200	350	240.20	23.26
Labor cost per bed per cycle (TK)	0	550	120.44	183.87
Total cost annually per farmer (TK)	44692	378390	158325.36	93097.60
Total income annually per farmer (TK)	52000	612000	228174.04	134294.44
Net income annually per farmer (TK)	5908	233610	69848.68	50319.42

and labor cost per cycle recorded as 221.50, 376, 662, 97, 137, 48, 240 and 120 TK, respectively. However, annual net income from seedling production found TK 69,849 while total cost and income identified, respectively, TK 1,58,325 and TK 2,28,174.The average size of 44 sq. m bed of this study was purchased at TK 4000 and including seedling preparation cost per square meter cost was about TK 287, and TK 127 net income per square meter. Hossain (2014) estimated about TK 95 per

square meter net income, which has similarity considering the time of present study. It was observed that 68% farmers did seedling production as business purpose, and 30% as both own and business (Fig. 2).

a) Seeds for germination

b) Germinated seeds

c) Floating beds to sow germinated seeds

d) Sowed seedlings on floating beds

e) Growing seedlings on beds

f) Selling vegetables from floating cultivation

Figure 1. Seedling production and floating vegetable cultivation on constructed beds

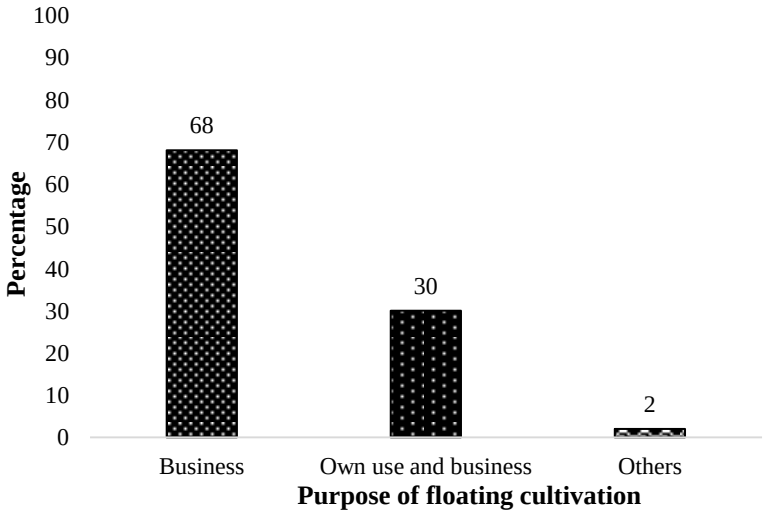

Figure 2. Purpose of seedling production on floating bed

There are 21 vegetables and spices seedlings (Fig.3 and Fig. 4) were cultivated among the surveyed farmers while highest number of seedling was Bottle gourd (19.11%) followed by Papaya (13.82%) and Chili (12.60%).The findings of IUCN (2009) were in agreement with the present study for total number of seedling production and noted 31 seedlings of various vegetables and spices in four districts of Bangladesh. In other studies, Pavel et al. (2014) found 17 types of seedling production on floating beds and Haq et al. (2004) found 28 types of seedlings. A study in Kotalipara Upazila in Gopalganj district (Haq et al., 2016) evaluated the yield performances of some vegetables and spice crops on floating bed and found the average growth of red amaranth, Indian spinach, okra and turmeric were 15.3-33.0 tha^{-1}, 34.00-59.88 tha^{-1}, 37.5-49.0 tha^{-1} and 34.20-36.10 tha^{-1}, respectively. They also compared the growth of red amaranth, Indian spinach, okra and turmeric 9.88-12.36 tha^{-1}, 49.40-74.10 tha^{-1}, 13.59-16.06 and 12-13 tha^{-1}, respectively, in high and medium high land of Bangladesh which were in agreed with the study of Ullah et al. (2010).

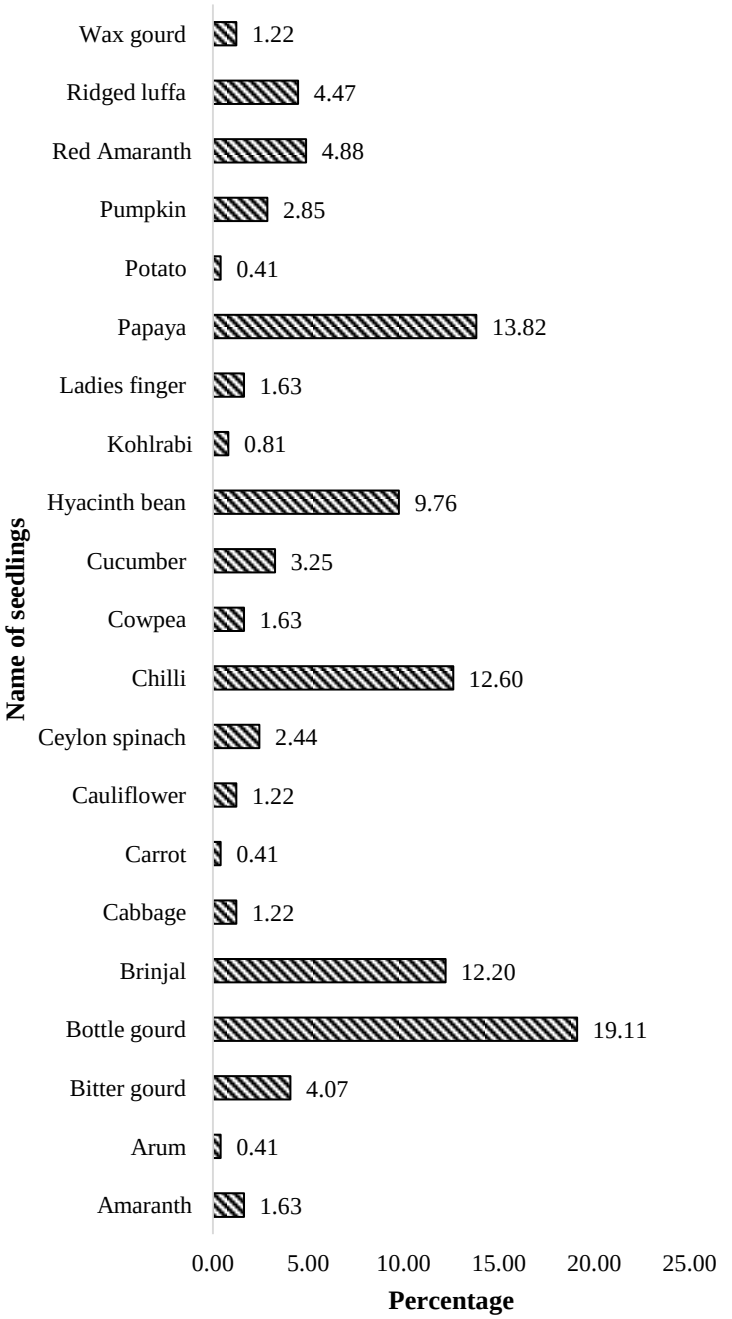

Figure 3. Name of the seedlings cultured by the farmers on floating beds

a) Red amaranth

b) Papaya

c) Chilli

d) Bottle gourd

e) Brinjal

f) Tomato

Figure 4. Types of different seedlings cultivated on floating beds

Investment source of seedling production and return from floating beds

The findings revealed that 32% farmers did seedling cultivation solely as own source of money while 26% got the help from NGOs (Fig.5a). During floating cultivation on

beds about 50% farmers used their own producing seed and 26% from market (Fig. 5b).

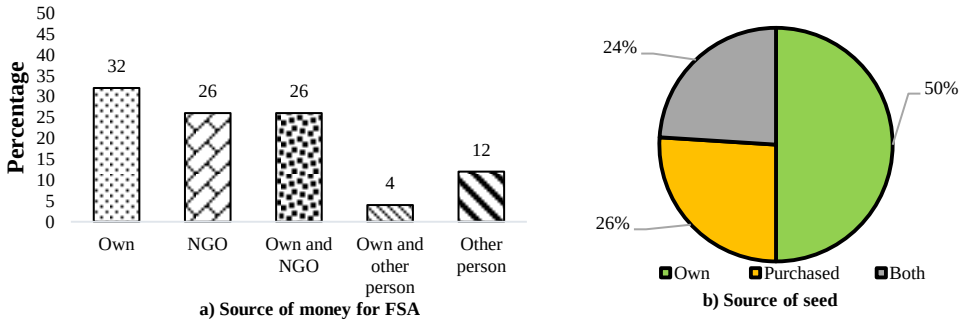

Figure 5. Investment sources of seedling production

Urea was a common fertilizer used on floating bed which enriched by TSP (46%) and DAP (40%) during cultivation (Fig.6). At the end of floating cultivation, the floating bed usually used as compost fertilizer. By this study, it was observed that 50% beds were sold by as compost fertilizer for winter cultivation, 10% were used as own field, and 34% farmers utilized the fertilizer as both business and own purpose (Fig.7). It also revealed from the survey that insecticide (Fig.8a) and rat killing trap (Fig.8b) were used in the floating cultivation beds.

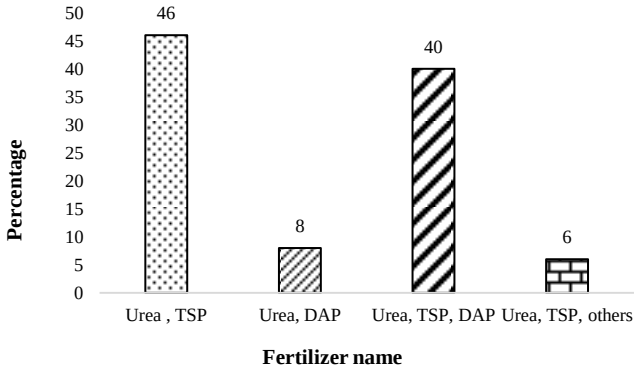

Figure 6. Different types of fertilizer used on floating bed for seedling production

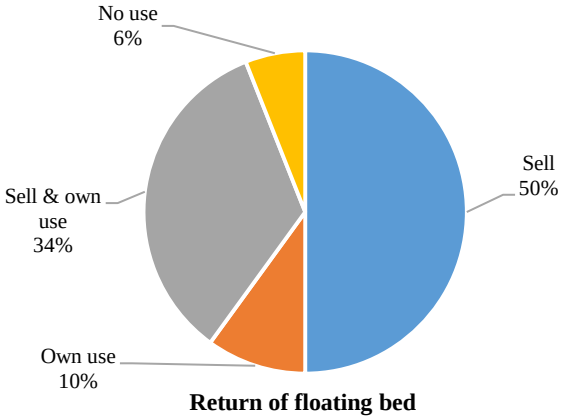

Figure 7. The byproducts (return) of floating beds

a) Insecticide spreading on beds b) Trap using on floating bed

Figure 8. Protection of floating cultivation by different methods

These results are indicated that seedling production in the surveyed areas are mainly covered by economic stable farmers having own produced seedlings rather than other sources which might be the reason of previous experience, economical beneficial and acceptability of farmers in last floating cultivations. Moreover, floating bed uses as good compost fertilizer in winter season on *Kandi* (a piece of high land for winter vegetable cultivation).

Constraints of floating seedling production

The problems on floating cultivation (FC) revealed various constraints including unavailability of government aid, higher interest rate and inadequate capital. Land scarcity and heavy rainfall were documented as major problems for floating cultivation in four district of Bangladesh (IUCN, 2009) which slightly agreed with this study. In additionally, it was also reported the problems of quality seed, lack of irrigation water, poor communication during marketing as barriers for floating cultivation. Infestation by predator, scarcity of matured water hyacinth, lack of

Salvenia (Indurkanilata), *Najaj* and *Dulalilata*, infestation of different aquatic weeds, frogs and birds eat seedlings and do great harms to the production were reported as the problems of floating bed seedling production by Haq (2009).

Floating seedling cultivation effective to climate change adaptation

About 64% farmers associating floating cultivation replied that climate change did not hamper seedlings production and 36% farmers replied various natural issues regarding their seedling production encompassing 6% flood, 4% heavy rain fall and 26% both flood and heavy rain fall. Irfanullah et al. (2011) in his study documented that devastating flood and excessive river current destroyed 23 floating bed in *haor* areas but Hoque et al.(2016) revealed that 74.3% respondents relied floating agriculture is effective to combat climate change which agree with the present study. Findings indicate that floating cultivation in *haor* area affected because they were novice about this technique. It is predicted that about 38 cm water rising from now by 2080 which will cover 22% of the world's coastal wetlands (Warrick, 1996; Nicholls et al., 1999). Scientists are clarifying the possible reasons and solutions including evaluating the socio-economic and ecological implications of such a rise in sea-level (Hoozemans and Hulsbergen, 1995).

CONCLUSION

Seedling production on floating bed is very economical and a good source of organic food which could be a good movement for the coming days and a solution of food insecurity. Geographical vulnerability and climate change issue are reducing the scope of seedling production. So a comprehensive study and research is needed to facilitate profitable and sustainable seedling raising one floating bed.

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