Food and Agriculture Organization of the United Nations

ADAPTATION TO EXTREME WEATHER CONDITIONS: THE EXAMPLE OF THE FLOATING GARDENS

Presented by

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Policy of Bangladesh Government on climate resilience and agricultural development

- **Bangladesh Delta Plan 2100 (Ministry of Planning, GoB)**
- **Vision 2041: Perspective Plan of Bangladesh (2021-2041)**
- **Eight Five Years Plan (2020-2025)**
- **United Nations Sustainable Development Goals (2016-2030)**
- **National Agricultural Policy (2018) (Ministry of Agriculture, GoB)**
- **Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 (BARC)**
- **Agricultural Research Vision 2030 and Beyond (BARC)**
- **Existing Policy/Plan of the Ministry of Agriculture, GoB**

Floating Agricultural Practices in Bangladesh

- **Local farmers have been practicing from 250 years ago**
- **Originated from the flood prone part of Bangladesh (Southern part)**
- **Flooded or waterlogged areas are used for growing vegetable and spice crops as well as its seedlings**
- **Considered as climate smart agriculture technology.**
- **In Bangladesh, currently area under floating garden practices is about 1255 ha but it was 273 ha in 2014 (DAE, 2020-21).**

CLIMATE CHANGE SCENARIO IN BANGLADESH

- **According to Global Climate Risk Index 2019, Bangladesh is the seventh most affected country in the world due to "extreme weather events" over the last 20 years from 1998 -2017 (Eckstein *et al*., 2019).**
- **Anticipated climate change impacts like**
  - **salinity intrusion,**
  - **sea level rise,**
  - **flood,**
  - **drought,**
  - **cyclone**
- **Bangladesh's population at risk of sea level rise is predicted to grow to 27 million by 2050.**

Flash flood affected people's livelihoods in different areas of Bangladesh

Submerged fallow lands in low-lying areas of Bangladesh

Nationally Important Agricultural Practices (NIAP) in Bangladesh

Floating Garden Practices

Sorjan Method (Tidal flooded area)

Dyke Cropping (Flooded area) (Creeper Vegetables)

Pyramid agriculture for creeper vegetables cultivation in low-lying area

Vegetables cultivation through raise bed technique

Rooftop vegetables and fruit cultivation in urban area

Vegetables cultivation on fisheries boundary

Jhum crop cultivation in hilly areas

Traditional Floating Agriculture Practices

Vegetables and spices seedling production on floating bed

Seedlings: Cucurbits, legumes, spices, papaya, etc.

Vegetable and spice crops cultivation on floating bed

Ready-made floating bed for selling

Floating bed preparing materials

Floating food shop

Livelihoods of local people in GIAHS site of Bangladesh

Scenario of seedlings marketing at the local floating market

- **Primarily seedlings sold at local floating market and then transported for marketing in different palaces of Bangladesh.**

- **Farmers can earn average USD 140/bed (50-55m long) in a monsoon through selling their seedlings at local floating market.**

Agro-economic and ecological benefits of floating garden

Agricultural benefit

- Additional space for vegetable cultivation and seedling raising.
- Early winter seedling preparation.
- Fulfillment local demand of vegetable.
- Utilize water logged fallow land for crop production.
- Decomposed floating bed can be used as compost that reduce the use of chemical fertilizers for subsequent crop production.

Socioeconomic benefit

- Enhancement of food/nutritional security.
- Relatively organic and save food production.
- Increase in household income
- Facilitation of employment for local people (men and women).

Ecological benefit

- Climate smart technology for adaptation to climate change.
- Enhance the biodiversity of plants.
- The technology is eco-friendly in nature, which save the environment.
- Eco-tourism at the GIAHS site.

The FAO has recognized the "Floating Garden Agricultural Practices" of Bangladesh as "Globally Important Agricultural Heritage System (GIAHS)" on 15 December, 2015

Bangladesh Government Initiative for GIAHS conservation, improvement and dissemination

BARI conducting research on Floating Agriculture Systems

- Improvement of traditional floating bed
- Production of quality seedlings of vegetables and spices on floating bed
- Crop diversification on floating bed
- Improvement of agronomic practices for floating bed
- Nutrient management on floating bed
- Development of year-round vegetable production model
- Integrated vegetables and fish cultivation on floating bed
- Insects pest and disease management
- Diversified use of decomposed water hyacinth (e.g. compost, seedling ball etc.)
- Determination of water and soil quality due to floating agriculture garden practice

Quality seedling production of vegetable and spice crops

Development of "Floating Bed Cum Trellis (Non-Tidal Model)" for Creeper Vegetables Cultivation

- **Creeper vegetables can be planted on the floating bed but their growth and development take place on the wide trellis (width 3-6 meter).**
- **Short duration vegetables like red amaranth, spinach, radish, coriander leaf can be grown on floating bed with creeper vegetables.**
- **However, the improved FBT technology needed 50-60% less amount of water hyacinth compared to the traditional floating garden system.**

Adaptive trial of summer tomato on floating bed

Variety	BARI Hybrid Tomato-4
Yield	14.74 t/ha

Turmeric cultivation on floating bed

Variety	Yield (t/ha)
BARI Halud-4	40.40

Chili cultivation on floating bed


Variety: Hybrid (Yield: 7-8 t/ha)

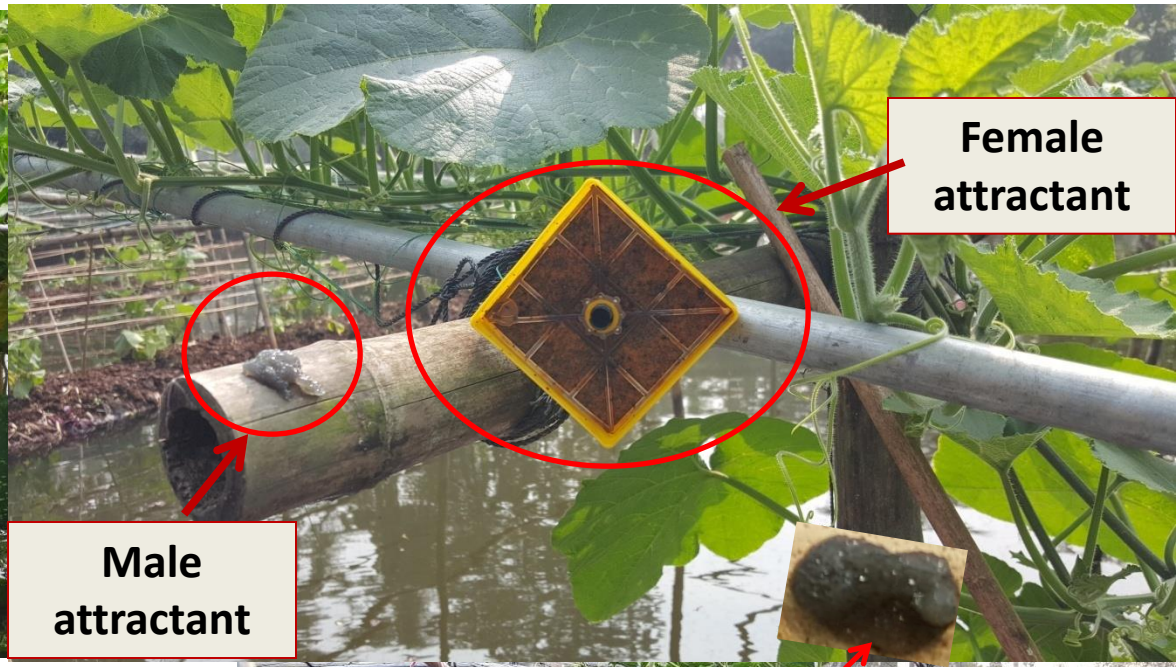

Variety: BARI Morich-1 (Yield: 5-6 t/ha)

Winter vegetables cultivation on floating bed


Cabbage


Bush bean

Use of sex pheromone traps and bio-pesticides for insect pests management of vegetables grown on floating bed



Female attractant

Male attractant

Pheromone for female + abamectin

Pheromone for male + abamectin

Attract & Kill Method: Improved IPM technology against fruit fly

Diversified use of decomposed water hyacinth for winter vegetables cultivation

Knolkhol

Mixed vegetables

Broccoli

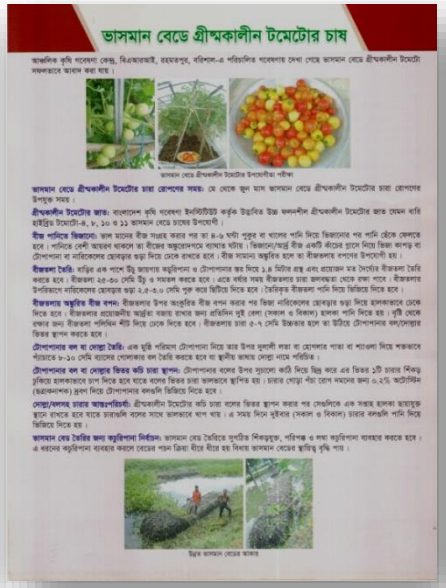
Red amaranth + Tomato

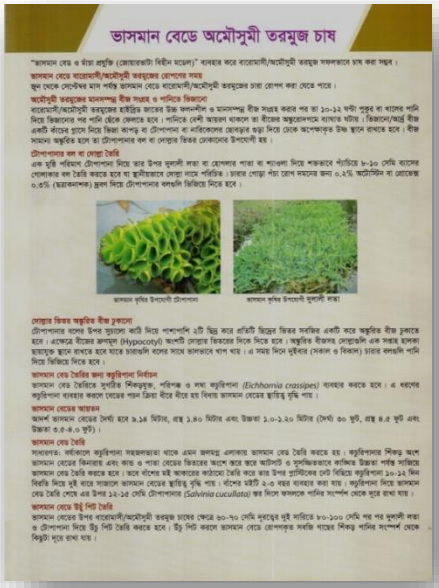
Country bean

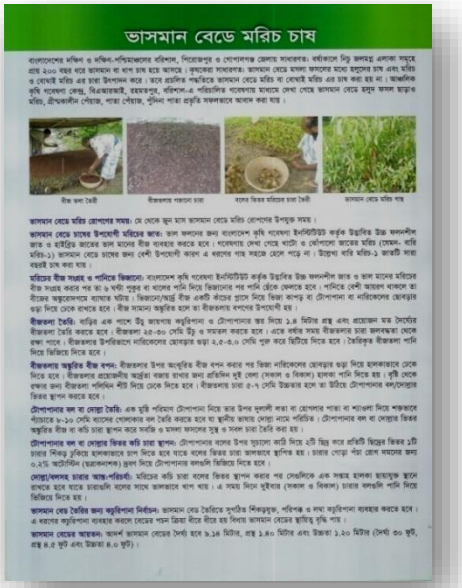
Bitter gourd

Floating Agriculture Based Modern Technology

- **Creeper vegetables cultivation using “Floating Bed cum Trellis (Non-Tidal Model)”**
- **Summer tomato cultivation on floating bed**
- **Off-season watermelon cultivation on floating bed**
- **Chilli cultivation on floating bed**







Policy Recommendations for GIAHS Management

- **Some fruit (e.g. strawberry, melon), flower, fodder crops can be introduced for sustaining the GIAHS technology**
- **Conservation of biodiversity for floating bed components like water hyacinth (*Eichhornia crassipes*), dulalilata (*Hygroryza aristata*) and topapana (*Salvinia cucullata*)**
- **To protect the floating bed materials embankment should be maintained properly in coastal area**
- **Access of digital and modern agricultural technologies including marketing system to the GIAHS stakeholders for their awareness and capacity building**
- **Commercialization of floating agriculture systems through producing and exporting organic produces for International market.**
- **Encourage of private sector for investment in GIAHS site for income generation and livelihood improvement of the vulnerable people.**
- **Sharing of knowledge and experiences among the stakeholders regarding GIAHS management through visiting the GIAHS areas of the world.**

Way Forward for Floating Agriculture in Bangladesh

- **Floating Agriculture based cropping systems for different land categories of Bangladesh.**
- **Development of complete production packages for the recommended crops**
- **Introducing flower, fruit (e.g. strawberry) and fodder crops under floating agriculture systems.**
- **Seeking alternate materials of water hyacinth for making floating bed**
- **Improvement of integrated management of floating crops**
- **Integrated nutrient management of floating agriculture systems for different land categories of Bangladesh.**
- **Determination of qualitative traits and heavy metals of floating agriculture produces in different areas of Bangladesh.**
- **Commercialization of floating agriculture systems through producing and exporting of organic produces for International market.**


THANK YOU