



## Cultivation of mixed vegetable crops on artificially raised platform

Bangladesh - মাচায় মিশ্র সব্জির চাষ

**Cultivation of mixed vegetable crops on artificial platform temporarily built on floodplain paddy land for better livelihood through crop diversification and practising crop rotation.**

This vegetable crop production technology is local knowledge-based and a recently innovated land use practice in Brahmaputra floodplain. The land user, Mr. Jinal Abedin has been practising this farming system for the last 4 years, where he used to grow paddy in this same piece of land extending about 0.5 acre that he and his fore-fathers owned the land. He is practising mixed vegetable cultivation when he felt that paddy production declined gradually and when the cost of production was higher than the income of output. Moreover, access to market coupled with increased demand of vegetables for the growing population of the expanding township and also easy access to major market in Dhaka and Chittagong including high prices of vegetables prompted the land user to adopt this cropping technology. He cultivates the whole piece of land in March by using spade engaging hired labour and mixes compost thoroughly with the grinded soil. Then, he raises the beds of 6-9 inch height. These raised beds are of 5-6 feet wide and 30-40 feet long. This practice of raised bed facilitates the whole piece of land to drain out excess water during the rainy season through many small drains, where these drains are connected to comparatively a deeper ditch of about 1 foot deep and 1-1.5 feet wide constructed before the rainy season starts. Then he makes pits throughout the field at an interval of 3 feet on the bed and sows 2-3 seeds of desired crops per hole and irrigates the land if there is no rainfall during that period. When the seeds germinate and crops grow up to 4-6 inches he applies about 100-150gm of mixed fertilizers of Urea, TSP and MP at 3:2:1 ratio and provides support for the climbers with split bamboo. After 15-20 days, he makes the platform made of bamboo poles of 4 feet height. He also uses some live poles of *Lannea* sp. along the boundary between the bamboo poles. Then he ties or fixes all the poles along the boundary with galvanized iron wire (26 gauge). Then he ties nylon rope connecting the poles across and along the field at an interval of about 1 foot. This makes a desired platform for the planted climbing vegetable crop that creeps along some live pole and nylon fibre. Harvesting starts in June and continues up to October. He uses organic pesticides made from tamarind leaf extracts. If it does not work, he sometimes uses chemical insecticides for leaf defoliator and fruit borer insects. He practices hand pollination of flowers, specially for *kakrol* (*Momordica cochinchinensis*). After harvesting of *kharif* vegetables like *kakrol*, bitter gourd, snake gourd, *chai kumra*, cucumber etc., he cultivates climbing bean as relay crop in *rabi* (winter) season using the same platform. This rotational practice of vegetable cultivation continues for 3-4 years and when he feels that soil fertility is rejuvenated then switches over to staple food crop of paddy cultivation. From this practice of vegetable cultivation, he earns US\$1500 per year, whereas he earns US\$150 from the paddy cultivation per year.

The main purpose of this farming technology is to enhance livelihood through land use change and diversification of income source. The area was developed on Brahmaputra alluvium intercepted with Madhupur Terrace. Different types of horticultural and forest crops are concentrated around the homesteads. There is no natural forest in and around the area. Occasionally heavy downpours damage their crops. Sometimes flood, cyclone or nor-wester cause heavy loss of lives and crops. The human environment is that most of the land users own their cultivable land. They mostly depend on agriculture. At present, their lands are under threat of industrialization and other non agricultural use.

**left:** Overview of mixed vegetable crop cultivation on artificially built platform (Khisa, SK.)

**right:** Close view of vegetable crop (*Kakrol* *Momordica cochinchinensis*) (Khisa, SK.)



**Location:** Khundapara, Narsingdi District, Bangladesh. AEZ-9 (Old Brahmaputra Flood Plain)

**Technology area:** >1kms

**Conservation measure(s):** Agronomic

**Land use type:** Cropland

**Stage of intervention:** Prevention of land degradation and restoration of soil fertility and productivity.

**Origin:** Through land user's initiative (Innovation, traditional).

**Climate:** Sub-humid, sub-tropical

**BANCAT database reference:** QT BAN10

**Agro-ecological zone:** 9 (Old Brahmaputra floodplain)

**Related approach:** QA BAN 10: Local initiative for more income generation and better livelihood







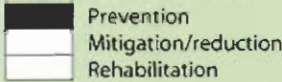
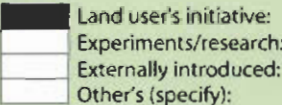
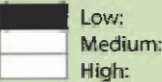
**Compiled by:** Ms. Farzana Hossain, Ms Raiyna of Department of Soil, Water and Environment (SWED), University of Dhaka; Md. Abul Hasnat, Mr. Bishwajit Sutradhar, Md. Imrul Hossain of Institute of Forestry and Environmental Sciences, Chittagong University (IFESCU), Bangladesh.

**Date:** 12.7.2008

**Editors comments:** Documentation was carried out during practical exercise of a training workshop for the University students organized jointly by Soil Resources Development Institute (SRDI) and BANCAT. The editors think that this technology is worthy of publication by BANCAT. The document was peer reviewed and edited by Khisa, SK, Coordinator, BANCAT and Shoab, JU, Chief Scientific Officer, SRDI, Dhaka Bangladesh.

## Classification

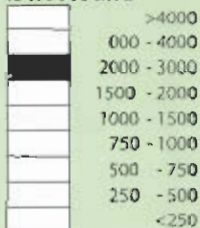
**Land use problems:** Mainly fertility decline in rice base cropping pattern, low production of rice, low organic matter.

Land use	Climate	Degradation			Conservation measure(s)
 Annual crops Vegetables like kankrol, bean	 Subhumid subtropics	 Water erosion: loss of top soil	 Chemical: fertility decline and reduced organic matter	 Biological: quantity decline	 Agronomic: conservation agriculture
<b>Stage of intervention</b>		<b>Origin</b>			<b>Level of technical knowledge</b>
					
<b>Main causes of land degradation:</b>					
<ul style="list-style-type: none"> <li>- soil mismanagement</li> <li>- over exploitation of vegetation for domestic use</li> <li>- heavy rainfall</li> <li>- population pressure</li> </ul>					
<b>Main technical functions:</b>			<b>Secondary technical functions:</b>		
<ul style="list-style-type: none"> <li>- control of raindrop splash</li> <li>- improvement of surface structure</li> <li>- increase in nutrient availability</li> </ul>			<ul style="list-style-type: none"> <li>- increase of biomass</li> <li>- soil management</li> <li>- pesticide management</li> </ul>		

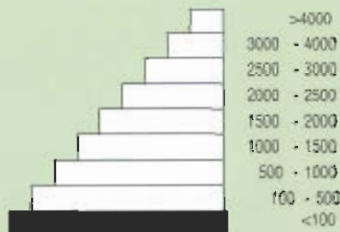
## Environment

### Natural Environment

**Average annual rainfall (mm)**  
available data  
is not found



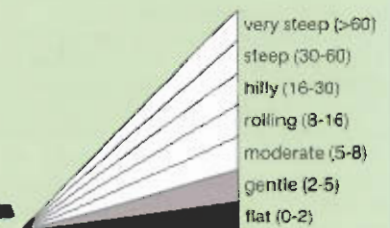
**Altitude (m a.s.l.)**



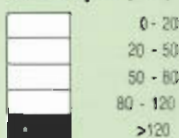
**Landform**



**Slope (%)**



**Soil depth (cm)**



**Growing season(s):** 2

**Soil texture:** Loam

**Soil fertility:** Medium

**Topsoil organic matter:** Low (<1%)

**Soil drainage/infiltration:** Medium

**Soil water storage capacity:** Medium

**Ground water table:** 5-50m

**Availability of surface water:** Good

**Water quality:** Good drinking water

**Biodiversity:** Low

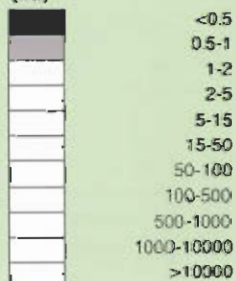
**Tolerant of climatic extremes:** Sensitive.

**Sensitive to climatic extremes:** Sensitive to increased temperature, seasonal rainfall, droughts, storms.

**If sensitive, what modifications were made / are possible:** Options for irrigation during drought, ditches for excess water drainage, raised beds.

### Human environment

(\*Type of) land per household (ha)



**Land user:** Mainly men, small scale land users

**Population density:** >500 persons/km<sup>2</sup>

**Annual population growth:** 1-2%

**Land ownership:** Individual, titled

**Land/water use rights:** Individual, land users have their own land and the water use right is open access.

**Relative level of wealth:** Average-50%; poor-30%; rich-20%

**Importance of off-farm income:** 10-50% of all income (land user earns from business)

**Access to service and infrastructure:** high access to off-farm employment due to roads and transport, moderate access to health, education and low to financial services.

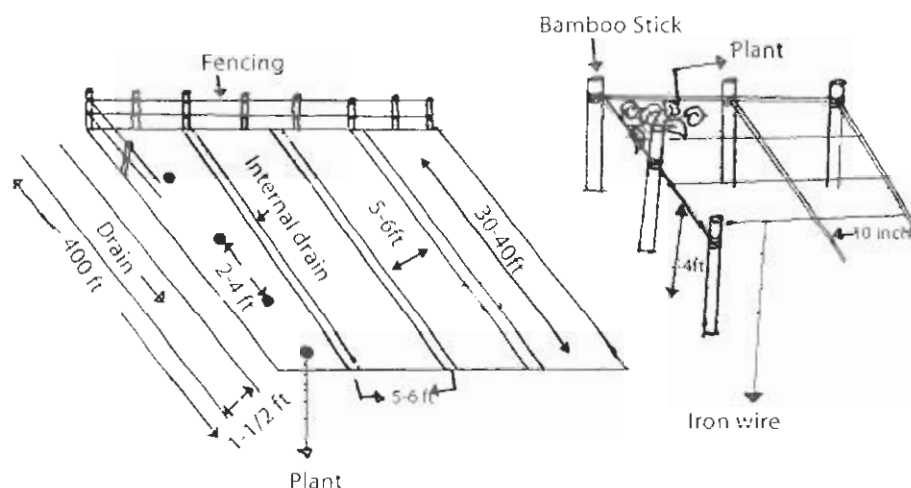
**Market orientation:** Mixed (subsistence and commercial)

**Mechanization:** Land cultivation is mainly performed by manual labour.

**Technical drawing :**  
(Ms. Farzana Hossain)

Insert 1: Planting Schemes : The spaces between the plants are 2-4 ft and the spaces between the internal drains are 5-6 ft.

Insert 2: The raised platform is 4 ft high from the ground.



### Implementation activities, inputs and costs

#### Establishment activities

1. Preparation of land with compost and watering the land
2. Sowing of seeds
3. Application of NPK fertilizers at each pits
4. Draining excess water from land by making ditches
5. Establishment of platform after 15-20 days of sowing seeds

#### Establishment inputs and costs per ha

Inputs	Costs (US\$ or local currency)	% met by land users
Labor ( 3 person days)	7	100%
Equipment		
- spade, machine hours	75	100%
Materials		
bamboo, nylon, iron wire, livepoles (Lannea sp.)	70	100%
Agricultural		
- seeds, compost, fertilizer	80	100%
<b>TOTAL</b>	<b>232</b>	<b>100%</b>

#### Maintenance/recurrent activities

1. Application of NPK fertilizers to maintain soil fertility
2. Application of pesticides to control pests & diseases

#### Maintenance/recurrent inputs and costs per ha per year

Inputs	Costs (US\$ or local currency)	% met by land us
Labor ( 3 person days)	7	100%
Equipment		
Materials	30	100%
- fertilizers, organic/chemical insecticides,		
Agricultural		
<b>TOTAL</b>	<b>37</b>	<b>100%</b>

**Remarks:** The technology is affected by high price and inadequate supply of fertilizers and pesticides. Use of pesticides poses health hazard to both users and consumers.

## Assessment

### Impacts of the Technology

#### Production and socio-economic benefits

+	+	+	Increased crop yield
+	+	+	Increased farm income
+	+		Reduced risk of production failure
+	+		Reduced expenses on agricultural inputs

#### Production and socio-economic disadvantages

-	-	-	Increased labor constraints
-	-		Increased demand for irrigation water

#### Socio-cultural benefits

+	+	+	Improved food security and self sufficiency
+	+		Community institution strengthening

#### Socio-cultural disadvantages

-	-		Increased health problems through use of pesticide

#### Ecological benefits

+	+	+	Increased nutrient recycling
+	+		Increased soil moisture
+	+		Reduced evaporation
+	+		Improved soil cover

#### Ecological disadvantages

-	-		Increased competition for nutrients

#### Off-site benefits

None

#### Off-site disadvantages

None

#### Contribution to human well-being/livelihoods

+	+	+	The technology has played a great contribution to improve livelihoods and well beings. It has increased the amount of profit of the land users and they have easy access to education, health etc.
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### Benefits/costs according to land user

Benefits compared with costs	short-term:	long-term:
Establishment	Very positive	positive
Maintenance/recurrent	Very positive	positive

**Comments:** When the farmer cultivates vegetables for 2-3 years, he gets the maximum profit but with time the production and profit per unit area declines and switches over to other farming system. US \$1= Tk. 70 and daily wage=US\$2.

**Acceptance/adoption:** 80% of land user families within the study area have adopted the same technology without any external technical support.

### Concluding statements

#### Strengths and → How to sustain/improve

Self driven initiatives → By giving training and making easy availability of agri-inputs.

Simple and easily adaptable → By increasing interaction between land users

Sustainable use of land → Maintaining sufficient soil cover

Increased crop production → Use of HYV, pest and disease resistant variety

#### Weaknesses and → how to overcome

Inadequate availability of fertilizers and insecticides → By taking initiatives to make available sufficient fertilizers and pesticides timely

High price of fertilizers and insecticides → Government should provide subsidy of agricultural inputs

Infestation of pests → Use of pest resistant varieties.

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