

Reprint

ISSN 1997-2571 (Web Version)

Journal of Innovation & Development Strategy (JIDS)

(J. Innov. Dev. Strategy)

Volume: 7

Issue: 3

December 2013

J. Innov. Dev. Strategy 7(3): 36-41 (December 2013)

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FISHERIES BASED INTEGRATED AGRICULTURAL PRODUCTIVITY STUDIES IN THE SOUTHERN COASTAL AREAS OF BANGLADESH

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Accepted for publication on 20 October 2013

ABSTRACT

Wahiduzzaman M, Haque JMA, Rashiduzzaman M (2013) Fisheries based integrated agricultural productivity studies in the southern coastal areas of Bangladesh. *J. Innov. Dev. Strategy*. 7(3), 36-41.

Studies were conducted Fisheries Based Integrated Agricultural Productivity Studies in the Southern Coastal Areas of Bangladesh with the objects of identifying the agri-component integrations important for improving its productivity in the target areas to know the fisheries production systems of the ber or sorjan method. The research activities were conducted covering the districts of Barisal, Jhalakathi, Patuakhali and Pirojpur. The professional categories included in the studies were fish farm owner, fish farm stakeholders/business and fish farm promoters and extension workers. The results showed that most of the soils were medium high to medium lowlands. The texture of the soils was silt loam to clay loam and the soil pH or reactions were slightly alkaline or slightly saline. As per professional involvements farm owners initiative recorded highest as responded by 39% as business, but very closely followed by extension promoters being 38%. The result shows that fish farmers were in shortage of land Govt. Khas land may be allotted for them for this specific purpose.

Key words: *integrated agriculture, ber-sorjan method, coastal areas, fisheries farming system*

INTRODUCTION

Some of the terms involved in the research are ber or water ditches: narrow housebound drains filled with natural water. At present similar types of Ber are made house attached lands for rearing seasonal fishes and growing vegetables and small tree fruit plants. This type of system is also practiced in the East Asian countries like Malaysia, Indonesia and Philippines which is known as Sorjan method. A vast area of agricultural land exists in the southern districts of coastal areas of Bangladesh where tidal flow of water occurs. In these areas different kinds of local vegetables and fruits like papaya, guava, banana etc. are grown using a special indigenous technology called ber technology. In the rainy season most of the lands in the coastal areas are lying submerged up to 6 months as reported many workers (CNRS 1996; Anon. 2008; and Khan 2008). So, farmers can't grow vegetable and fruits like other parts of Bangladesh. So they undertake this ber technology. In this technology, ridge or bed is made by excavating canals or bers. Bed is made one after another where vegetable and fruits are grown and the bers are used for fish culture setting bamboo screen on the open end. Bers are usually found 10/15 meter long and 2 meter wide having 1 meter depth.

According to many workers and reports (Avnimelech and Kochva, 1994; Bravo 2003; Das 1997) lateral overflow of waters from rivers or dhoba bring about changes in the physico-chemical environment that biota react by morphological, anatomical, physiological or ecological adaptations, or by change in community structure. The timing and duration of flooding are highly variable, greatly affecting growth and survival of fish when inundated, the plain contains higher concentration of habitats that provide shelter, breeding, nursery and feeding sites for a variety of fish species. Integrated agriculture helps farmer of the coastal and adjacent areas to improve their nutritional status and livelihood as well. Therefore if the farmers are provided with technical knowledge and skill they will be able to increase more productivity of integrated agriculture leading to the development of nutritional status of the southern coastal areas of Bangladesh. In the context, the present piece of research has been formulated with the following specific objectives: to i. identify the agri-component integrations important for the target areas, and to know the fisheries production systems affecting stakeholders interactions.

MATERIALS AND METHODS

The methods and materials followed in the present studies including site and sampling and questionnaire guideline are briefly mentioned here. The methods followed in the studies were designed considering the research approaches guided by CNRS (1996), Anon. (2008) and Khan (2008).

A. Sites sampling – Districts: Barisal, Jhalakati, Patuakhali, Pirojpur: 10 Upazila, 30 sites.

I. Respondent's Identity/Information

Name, Upazila, District, Site, Gender, Age, Education, and Homestead size

Profession/Category of respondents:

Fish Farm Owner, Fish Farm Stakeholders/business, Fish Farm Promoters

Experience in respective work in year: (Site character: Land type, soil pH, soil texture)

Total number of respondents 130 taking at least 15 from each District.

II. Pond information

1. Number of Ber/ Sorjan used: i) <2 ii) 2-3 iii) 3-4 iv) > 4

2. Size of the Ber/Sorjan (Length meter x width meter x Depth of water meter).
i) 1-5 cubic meter ii) 5-15 cubic meter iii) 15-30 cubic meter iv) > 30 cubic meter
3. Connection of the Ber/ Sorjan i) Canal ii) River iii) Lakes iv. Doba others
4. Species cultured: i) Tilapia ii) Sarputi iii) Mixed iv. Others
5. Fish feed used: i) No ii) Pellets iii) Home made raw iv) Others
6. Culture period: i) < 3 months ii) 3-6 months (iii) 6-12 months iv) > 12 months
7. Stocking density: i) 10-20/cu.m ii) 20-50/cu.m iii) 50-70/cu.m iv) >70/cu.m
8. Yearly harvest per cu. m: i) <1 kg ii) 1-2 kg iii) 2-3 kg iv) >3 kg

III. Pond information

1. Number of Bed/ridge used: i) <2 ii) 2-3 iii) 3-4 iv) > 4
2. Size of the Bed/ridge (Length meter x width meter, nos).
i) 1-5 sq meter ii) 5-10 sq meter iii) 10-15 sq meter iv) > 15 sq meter-nos
3. Plants on the Bed/ridge: i) Fruits ii) Vegetables iii) Agro- forest iv) Mixed
4. Fruit species cultured: i) Citrus ii) Guava iii) Papaya iv) Mixed
5. Vegetable cultured: i) Cucurbit ii) Leafy veg iii) Aroids iv) Mixed
6. Fertilizer used: i) No ii) Organic iii) Chemical iv) Mixed
7. Culture period: i) < 3 months ii) 3-6 months iii) 6-12 months iv) > 12 months
8. Planting density: veg : i) < 2 sq. m ii) 2-3 sq.m iii) 3-4 sq.m iv) >4 sq.m
9. Harvest /sq.m/year : i) <2 kg ii) 2-3 kg iii) 3-4 kg iv) > 4 kg

The practical situation of the Ber-Sorjan: The practical situation of the current design of bers attached to or nearby houses are given in the Figs. 1 to 3.

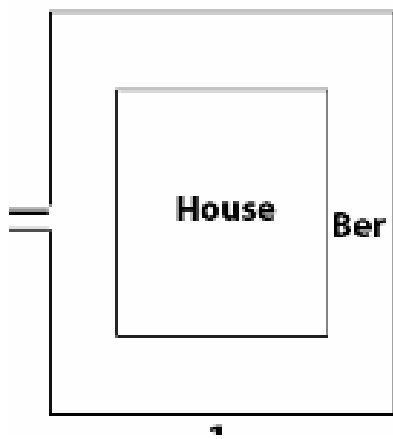


Fig. 1. Ber Diagram 1. Around the house

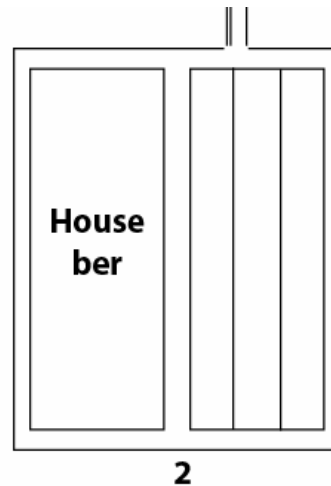


Fig. 2. Ber Diagram 2. Attached to the house

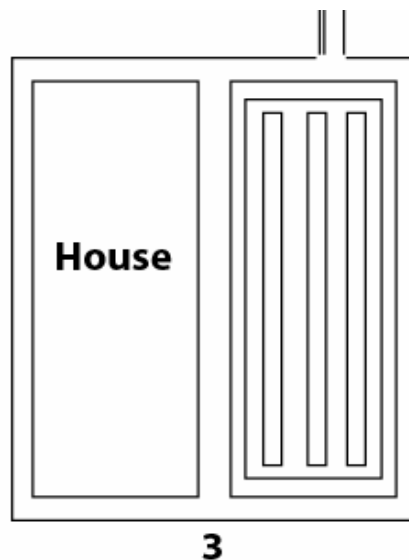


Fig. 3. Ber Diagram 3. Ber nearby the house

Study focus: Main problems of ber/sorjan culture

- Pollution of water through other sources
- Lack of land around homestead for ber/sorjan and ditch
- Lack of family coordination
- Increasing land demand for domestic house
- Inconsistent tidal water
- Lack of awareness
- Lack of fair marketing channel

1. Available homestead land using for ber: i) < 10%, ii) 10-25%, iii) 25-40%, iv) >40%
2. Depth of ber water dry season: i) < 10%, ii) 10-25%, iii) 25-40%, iv) >40%
3. Ber water used for irrigation: i) < 10%, ii) 10-25%, iii) 25-40%, iv) >40%
4. Components of ber facing limitations: Fish, Fruit, Veg; Market, Instit disintegration, Non-coop of family members, Harvest processing and storage, Environmental barriers.
5. Main promotion from the Upazila Offices: Giving personal and family encouragement, Direct technical help, All interactive co-operation, Recommending land or pond.

Making the ber or sorjan

The water ditch bers or sorjan structures were made at the practical field level are given in the Figs. 4 and 5.



Fig. 4. Designing and making the Ber



Fig. 5. Vegetables grown over the Ber water

RESULTS AND DISCUSSION

The results obtained from the studies are briefly mentioned here.

Site characters: The major characteristics of the sites as studies are briefly mentioned here in the tables 1 to 5 and in the Figs. 4 to 7.

Site characters

The physiographic land and soil characters studied in the research are given in the Table 1. The results as regards bed utilization are mentioned in the Table 1. The results showed that the most of the soils were medium high to medium lowlands. The texture of the soils was silt loam to clay loam and the soil pH or reactions were slightly alkaline or slightly saline.

Table 1. Site characters studied

Areas	Land type	Soil texture and reaction	Fish species	Horticultural crops
Barisal	Medium high land low phase	Silt loam neutral reaction	Catfish mixed	Mixed fruit vegetables
Jhalakathi	Medium high land	Loamy slightly alkaline	Catfish	Mixed fruits Modern varieties (MV)
Patuakhali	Medium low land lower phase	Clay loam slightly saline	Pre-coastal	Leafy vegetables
Pirojpur	Medium low land	Silt loam non-saline phase	Cat fish mixed	Fruits and veg propagation

Bed information

The results show that the number of beds ware 2-3. For economic purpose it needs to be increased.

Ber information

The information on the ber and the components involved in the studies are mentioned in the Table 2.

Table 2. Ber information

Parameters	Major factor	Percent response in favour	Remarks
Percent land using for Ber i) < 10%, ii) 10-25% iii) 25-40%, iv) >40%	10-25%	54	Domestic house need
Ber water in dry season than highest depth i) < 10%, ii) 10-25% iii) 25-40%, iv) >40%	25-40%	67	Differential tide
Ber wat used for irrigation i) < 10%, ii) 10-25% iii) 25-40%, iv) >40%	<10%	72	Water shortage

The result shows that water during dry season reduced sharply.

Promotion of Fisheries

The results obtained from the studies on the factors of promotion of fisheries including its extension, training and development are given in the Table 3 and Figs. 6 and 7.

Table 3. Main promotion from the Upazila Offices

Parameters	Fish farm owner	Fish farm stakeholders	Fish farm promoters	Remarks
Giving personal and family encouragement	66	39	65	Extension
Recommending land or pond	92	82	53	Lease of govt khas land
Direct technical help	62	74	70	DOF
Interactive co-operation	41	73	43	Short storage

As per professional involvements farm owners initiative recorded highest as responded by 39% as business, but very closely followed by extension promoters being 38%. The result shows that fish farmers were in shortage of land Govt. Khas land may be allotted for them for this specific purpose.

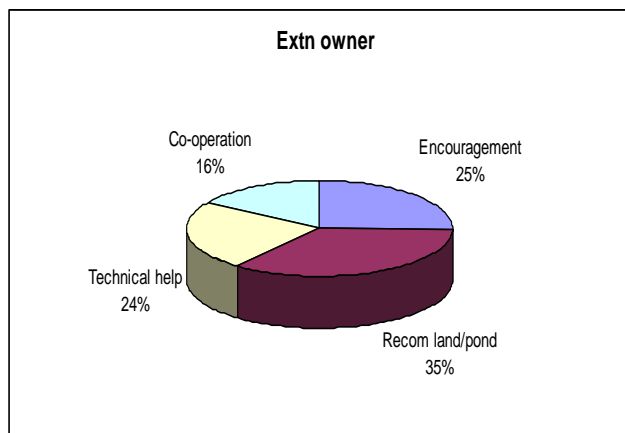


Fig. 6. Percent fisheries promotion as per systems

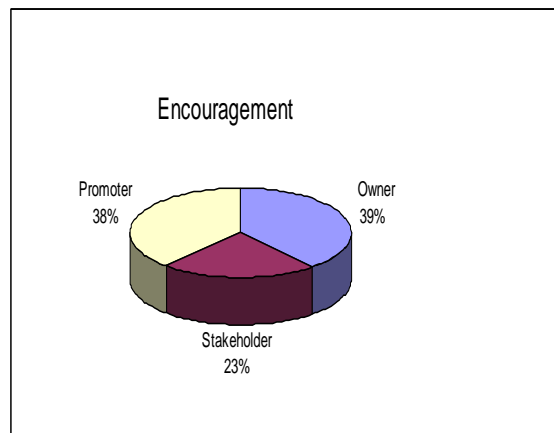


Fig. 7. Percent fisheries promotion as per profession

About 77% respondent told that the commercial farm businessman should take their strategy of promotion under the advice of the Fisheries Extension Officers.

Potential fisheries production systems

The potential fisheries production system

The potential and commercially viable fish production systems as per physiographic results obtained from the studies are illustrated in the Figs. 8 to 13. The practical ber models studied at the field level included were: i. Ber medium lowland rice + fish based on road side ridges, ii. Ber medium highland fruit tree- vegetable based attached to houses, iii. Ber tidal river and house multipurpose fruit tree based, iv. Ber developing as model and house multipurpose tree based, v. Ber new developing lands land pond and house based, and vi. Ber medium highland land fruit vegetable garden based. The results revealed that the medium high and medium lowlands with tidal saline to slightly alkaline soils produced 36-43% more income in cases of rice + short duration fruits and vegetables which may be replicated to similar extension domain under direct supervision of Fisheries and soil technology professional. This type but generalized recommendations were also given by many scientists (Das 1997 and Haq 2007).



Fig 8. Ber medium lowland rice + fish based on oad side ridges



Fig 9. Ber medium highland fruit tree-vegetable based attached to houses



Fig. 10. Ber tidal river and house multipurpose fruit tree based



Fig 11. Ber developing as model and house multipurpose tree based



Fig 12. Ber new developing lands land pond and house based



Fig 13. Ber medium highland land fruit vegetable garden based

CONCLUSION

It may briefly be concluded that the integration of Agriculture and fisheries department at Upazila level should be strengthened to develop integrated agricultural productivity. Inputs should be made available to the farmers specially fish seeds by establishing hatchery and nursery at the locality. As to meet the present technical problems, the depth, width and number of bers should be increased and the Khas lands should be allotted to the farmer for bers/ bed culture. It may be concluded as per HRD which has been prioritized by respondents that well organized need based technical training should be conducted for the farmers and Extension service should be strengthened both from agriculture and fisheries department. The types of land soils to be preferred were suggested to medium high to medium lowlands with slightly saline reaction. The texture of the soils were required to be silt loam to clay loam and the soil pH or reactions were slightly alkaline or slightly saline. The fish production systems components working in the areas as per persons and sectors were the fish processing and cultivation of fruits and vegetables and social marketing. The result shows that fish farmers were in shortage of land Govt. Khas land may be allotted for them for this specific purpose. It may be concluded that the site and

species of fish, fruits and vegetables should be selected as per existing natural conditions and giving high preference to short duration income and female employable food security components.

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