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Agrisearch with a human touch

RICE BASED INTEGRATED FARMING SYSTEM FOR RAINFED LOWLANDS

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Introduction

Farming systems represent the integration of farm enterprise such as cropping systems, horticulture, animal husbandry, fishery, agro-forestry and apiary for optimal utilization of farm resources. The primary goals of rice-based integrated farming systems are i) maximization of yields of all the component enterprises to provided higher and stable income, ii) rejuvenation/ amelioration of systems productivity and achieving agro-ecological equilibrium, iii)control of the build-up of insect pests, diseases and weeds population through natural cropping system management and keeping them at low intensities and iv)reducing the use of chemical fertilizers and other harmful agro-chemicals to provide contamination-free healthy produce and safe environment to the society.

Among the various farming system options in the rice ecologies, rice-fish farming has a great potential, particularly in the eastern India, in view of the resources, food habits and other socio-economic conditions. The other alternate farming systems like rice-duck and rice-livestock can also increase the productivity and income in rice ecologies. The integrated rice-based farming system models involving rice and other crops, fish, poultry, livestock, mushroom and agro-forestry developed for small and marginal farmers of different zones in the country have the potential of higher farm income (Rs. 29400-156000 ha^{-1} yr^{-1}) and employment.

Traditionally practiced Rice based farming System

Farming family in tropical India is mainly dependent on *rainfed* farming with high risk of weather uncertainty. In a constant struggle to survive, the small and marginal farmers over the years have evolved techniques which have benefited them immensely. But without knowing the scientific basis of such integration they have been practicing the farming system for a long time. In lowland rice ecology, fingerlings of natural stock are collected by traps in the inlet/outlets from rice fields through the water channels realizing around 3 to 300 kg of fish /ha during and after rice growing period in the rice field seeded/planted with mostly traditional rice varieties yielding around 1.0 to 3.0 t grain / ha.

Improved rice based integrated farming system

Eastern India, in particular with about 5.6 m ha irrigated area and 14.6m ha rainfed lowlands of the total 26.58 m ha rice area, offers high potential for rice-fish farming system, especially in view of the resources, food habits and socio-economic needs of the people. In order to improve and stabilize farm productivity and income from rainfed water logged lowland areas, National Rice Research Institute, Cuttack has developed adoptable technologies of rice-fish diversified farming system. Farm size varied from minimum of about one acre to one hectare. Field design included wide bunds (Dykes) all around, a pond refuge connected with trenches on two sides (water harvesting come fish refuge system) and guarded outlet.

Technology No. 1: Rice-fish–horticulture-livestock based integrated farming system for rainfed lowlands: (semi-deep areas upto 50 cm water depth)

Components and Area

Main Field (65 %)	:	Rice + Fish
Fresh Refuge (15%)	:	Crop after Rice
Dyke (20 %)	:	Vegetables, Fruit, crops, Agroforestry, Floriculture, Mushroom, Duckery, Poultry, Goatary

Technology No 2 : Multitier rice-fish-horticulture based farming system for deep water areas (upto 1 m or more water depth)

Model area: 1.8 Acre

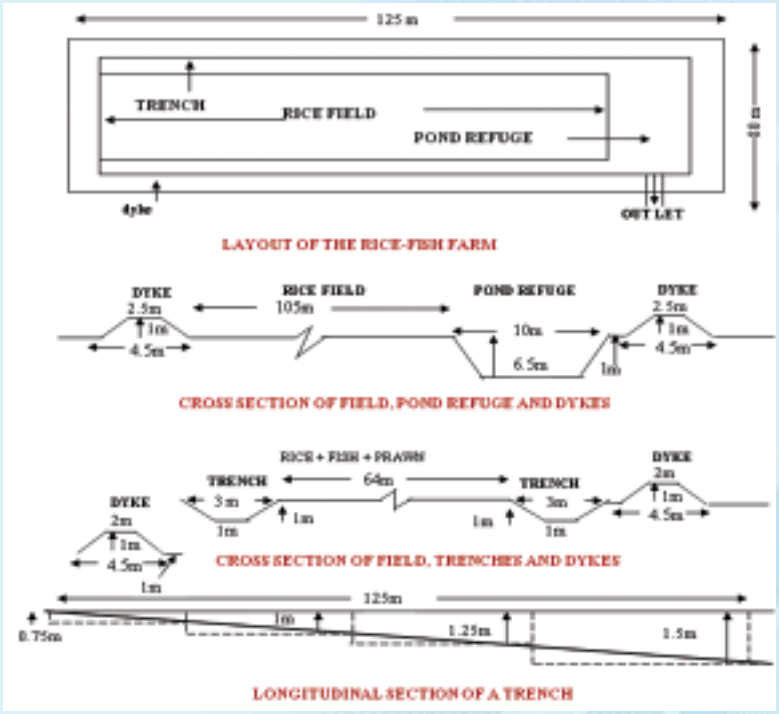
Components and Area

Upland (15% area) and Bund area (20%)- Tier I & Tier II- Fruit crops Tuber crops & vegetables, agro-forestry, poultry, duckery

Rice (40% area) – Tier III & Tier IV ; rainfed lowland- Vegetables, pulse, oilseed, tuber crop and rest deepwater rice- dry season rice , vegetables

Aquaculture (25% area) –Tier V; 7% water area as fish nursery in the upper end and rest 18% area in the lower end connected with rice field

Design and Layout



Productivity: The farming system model could annually produce about 16-18 tonnes (t) of food crops, 1 t of fish and prawn, 0.5-0.9 t of meat, 10,000-12,000 eggs in addition to 3-5 t of animal feed and 12-15 t of fiber/fuel wood from one hectare farm area.

Economics: The net income would be around Rs.1,00,000/ha in the first year, which is likely to be increased to 1,50,000 or more from third year onwards. The system generate additional employments of 400-450 man days/ha/year with cost benefit ration of 1:2.85. The same rice-fish-horticulture model for rainfed lowland situation of 1 ha area has been replicated in regional station in Assam has estimated total income of Rs. 187900 in the 1st year and 197900 in the 10th year of the system

Design and Layout:

Productivity: 14-18t of food crops, 0.6-1.0 t of fish and prawn , 0.5-0.7 t of meat , 8000 – 12000 of eggs , 10-12 t of fibre / fuel wood , 3-5t of animal feed , flowers etc/ha/yr.

Economics: The net income would be around 1,30,000/ha/year i.e., 20 fold over the traditional system of rice farming in deep water with the benefit cost ratio of 1: 2.0-2.5 and employment generation is upto 300 mandays/ha/year.

Technology No 3. : Rice based integrated farming system for small and marginal farmers

Model area: 1.0 Acre

Components and Area

Main plot for rice-rice+Fish: 1200 m^2 (30% of total area)

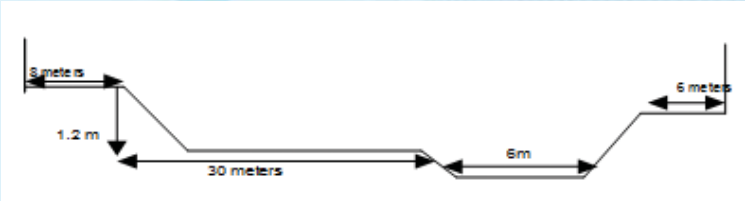
Main plot for Fish: 1200 m^2 (30% of total area)

Trench: 200 m^2 with 0.8 meter depth (5% of total area)

Bund area(Horticulture crops +vegetables): 1000 m^2 (25 % of total area)

Agro-forestry: 400 m^2 (10% of total area)

Total Area: 4000 m^2



Design and layout

Productivity: Rice based integrated farming system model of 1 acre could produce about 11 q of food crops, 1.0 q of fish, 0.5 q of meat, 14 q of vegetables and 0.9 q of fruits besides 15 to 20 q of rice straw (used for mushroom).

Economics: The net income would be around Rs. 85000- 95000/Acre/year with the benefit cost ratio of 1: 2.2 and employment generation is upto 500 mandays/ha/year.

Validation in the farmer's field

Kunjo Mullick village Gadkujang, Jagasinghpur district belonged to small farmers category. His rice field was prone to flood during wet season due to poor drainage, back water and remain waterlogged for nearly 4-5 months. Rise in salinity level was another problem during end march till monsoon.. Kunjo Mullick mostly grew local rice varieties with low inputs and could get very low rice produce (0.8 - 1.0 t ha^{-1}) and hence could not sustain his livelihood.

The team of NRRI scientist did some basic survey in the Jagatsinghpur district and selected the farmer based on his available resources. The farmer lack vision to utilize his land and water for crop diversification and inability to generate his livelihood from his land. Kunjo Mullick was advised to reshape his rice area and was trained for crop diversification by visiting NRRI farming system models. With the initial investment of Rs 72,000 was done by the farmer for establishment and shaping of his rice area (Total 4 acres) into watershed/pond area of about 1 acre where he was advised to put the Indian major carps and the dug out soil was transformed into raised dykes where the farmer took banana, coconut and vegetable crops like cowpea, pumpkin, leafy greens, drum stick etc. Poultry and duckery was taken in the house made with locally available materials. At the end of the year he could get the net income of Rs. 150000/- with the cost benefit ratio of 1: 2.08.

Citation

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