

Production efficiency of components in wetland rice based farming system

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ABSTRACT

A field study was conducted at the Annamalai University, Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai Nagar. The treatments compared were rice alone as control (T₁), Rice and Fish (T₂), Rice and Poultry (T₃), Rice and Japanese quail (T₄), Rice, Fish and Poultry (T₅) and Rice, Fish and Japanese quail (T₆). The treatments were compared in Randomized Block Design with four replications on a plot size of 80 m². Productivity of each components as revealed by their economic products are expressed as rice grain equivalent yield after conversion on the basis of unit price. Results indicated that integration of cropping with components like fish culture and polurty rearing resulted in higher productivity than cropping alone under low land rice based integrated farming system.

Key word: Rice, integrated farming system, rice grain equivalent yield

Introduction

The average holding size of farms in india has been declining and over 80 million out of 105 million operational holdings are below the size of 1 ha (Mahapatra and Bapat, 1992). Because of ever increasing population and decline in per capita availability of land in India there is hardly any scope for horizontal expansion of land for food, feed and fibre production. Vertical expansion by integrating appropriate farming components regarding lesser space and time and ensuring higher totoal productivity of the system is the only alternate option left out. Aiming for increased total productivity per unit area in specified time is the ultimate way for sustaible food production.

Diversification of agricultural activities, which links farm based enterprises with the rice cultivation, would help the rice growing farmers to get more income and generate additional employment. Farming system approach was observed to be a resource management strategy for achieving economic and sustainable agricultural production to meet the diverse requirement of farm house hold while preserving the resource base and maintaining high environmental quality.

A judicious mix of any one or more of the activities like fishery, poultry, duckery, japanese quail, rabbit rearing and mushroom culture with rice production, reported to help in effective recycling of wastes, increasing gainful employment, better utilization of available resources, more diversification of farm products and increasing income to farmers especially small and marginal farmers. Application of organic manures along with chemical fertilizers was found to increase crop yield. Poultry and Japanese quail manure in combination with fertilizers could increase overall farm production in an integrated farming system.

Materials and Method

Field investigation was carried out at the Annamalai University, Experimental Farm, Department of Agronomy, Annamalai Nagar with rice cv. ADT 43. The treatments compared were rice alone as control (T₁), Rice + Fish (T₂), Rice + Poultry (T₃), Rice + Japanese quail (T₄), Rice + Fish + Poultry (T₅) and Rice + Fish + Japanese quail (T₆). The treatments were compared in Randomized Block Design with 4 replications on a plot size of 80 m².

In treatments involving fish, trenches on one side of the plot size with a dimension of 9 x 9 m were excavated and fingerlings of Catla, Rohu, Mrigal, Silver carp, Common carp and Grass carp were released @ 1500 ha⁻¹. In treatments involving poultry, cages made up of wood with the basement and sides comprising iron wire mesh of dimension 2.5 m² were installed at a height of 1.5 m, using four concrete poles buried deep in the field to support them. The poultry breed Vencob was released in the cage @ 20 birds cage⁻¹ and were sold for meat at the age of 45 days. Two such rearing were done within the crop period of 110 days. The fishes were harvested and sold after the harvest of rice crop.

In treatments involving Japanese quail, cages made up of wood with the basement and sides comprising iron wire mesh of dimension 2.5 m², were installed at a height of 1.5 m, using four concrete poles buried deep in the field to support them. The quail breed like Nanthanam was released in the cages @ 40 quails cage⁻¹ and was sold for meat after the harvest of rice crop.

Productivity of components

Cropping

Productivity of the rice crop in terms of grain yield were recorded and expressed as kg of rice grain equivalent yield (REGY).

Fishery

In treatments involving fish, each species was collected for measuring length and weight at monthly intervals and expressed the mean value in cm and g respectively after a period of three months of rearing the fish were harvested

Poultry

Broiler birds were reared for 45 days in total (including 12 days in rooster) the weight of each bird was recorded weekly in g and at the end of 45 days they were sold

Japanese quail

Japanese quail were reared for 30 days. The weight of quail birds were recorded at the time of sales in g.

The productivity of each component was converted into grain equivalent yield using the following formula suggested in kg.

$$\text{Rice grain equivalent (kg)} = \frac{\text{Productivity of components (kg)} \times \text{Cost of components (Rs.Unit}^{-1}\text{)}}{\text{Cost of rice (Rs.Kg}^{-1}\text{)}}$$

Result and Discussion

The results on productivity have clearly indicated that integration of cropping with components like fish and poultry resulted in higher productivity of 113837 kg ha⁻¹ of rice grain equivalent yield than cropping alone that recorded 4010 kg ha⁻¹.

The inclusion of high yielding and nutrient responsive varieties in the study by replacing the local varieties popular among the farmers and recycling of wastes of other farming components as organic manures helped in increasing the productivity of crop. The efficiency of components linkage was evaluated predominantly on the basis of productivity of each component in the system. Broiler meat production with an increased productivity compared to cropping alone has provided wider scope for inclusion of poultry as a component in the low land farming along with fish and rice. Similar increase in the total productivity of integrated farming system was also reported by Govindan *et. al*, 1990 Rangasamy *et. al* 1992, Jayanthi *et. al*, 2002 and Murugan and Kathiresan, 2005.

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Table 1. Productivity (rice grain equivalent yield) of integrated farming system

Treatments	Component productivity (kg ha ⁻¹)				System productivity (kg ha ⁻¹)
	Crop	Fish	Poultry	Japanese quail	
T ₁ -Rice alone	4010	-	-	-	4010
T ₂ - Rice + Fish	3870	1394	-	-	5264
T ₃ - Rice + Poultry	5270	-	106987	-	112257
T ₄ - Rice + Japanese quail	4630	-	-	28950	33580
T ₅ - Rice + Fish + Poultry	5040	1810	106987	-	113837
T ₆ - Rice + Fish + Japanese quail	4480	1586	-	28950	35016