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Rice–poultry–fish–mushroom integrated farming systems for lowlands of Tamil Nadu

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ABSTRACT

Economics of rice–poultry–fish–mushroom system under lowland conditions in Tamil Nadu was studied during 1987–1992. A net profit of Rs 11,755% year was obtained in rice–poultry–fish–mushroom integarated farming system (IFS) in 0.40 ha area. Conventional cropping system (CCS) with rice–rice–green–manure/pulses gave a net income of Rs 6,334/year from the same area. By inclusion of poultry–fish–mushroom components in the IFS the net income per day increased to Rs 32.20 compared with Rs 17.35 in the CCS. An additional empolyment generation to the tune of 174 man-days/0.40 ha/year was also possible in IFS.

In the irrigated lowland rice (*Oryza sativa* L.) areas of Tamil Nadu raising 2 rice crops (May–August and August–December), followed by a rice–fallow–pulse or green-manure (January–April) is common after the introduction of high-yielding, fertilizer-responsive, short-duration varieties. The yield increase came to a standstill after a linear increase initially, thus leading to deficit for the growing population. Moreover, the ever-increasing cost of inputs and high fluctuation in marketing the harvested produce, the net income of the farmer has come down drastically. This apparently leads to the adoption of diverse activities, otherwise called as farming systems approach. Conventional cropping system results not only low income due to fluctuation in the market price but also leads to underemployment for the family labourers of the farmer during the lean season. With a view to mitigate the risks and uncertainities of income from crop enterprises and to reduce the time lag between investment and returns, it is essential that the farmers include such of those enterprises, in their production programme, that yield regular and evenly distributed income throughout the year and are not subjected to vagaries of nature (Throve and Gaigalikar, 1985).

To increase the net income of the small and marginal farmers of irrigated lowland rice areas, integrated farming system (IFS) using rice–poultry–fish–mushroom was undertaken.

MATERIALS AND METHODS

The experiment was conducted during 1987–92 at the TNAU, Coimbatore.

Cropping enterprise

An area of 0.40 ha was selected for each of the treatment, viz. Integrated Farming System (IFS) and Conventional Cropping System (CCS), considering small and marginal rice farmers of Tamil Nadu. In the

IFS, cropping systems adopted were : rice–rice–maize (*Zea mays* L.) (0.16 ha), rice–rice–groundnut (*Arachis hypogaea* L.) (0.10 ha), rice–rice–sesame (*Sesamum indicum* L.) (0.10 ha)-(Table1). In the CCS rice–rice–greengram (*Phasedus radiatus* L.) (0.20 ha) and rice–rice–green-manure (sunhemp) (0.20 ha) were adopted. The soil of the experimental field was low, medium and high in available N, P_2O_5 and K_2O respectively. The recommended cultural practices followed in this tract were adopted for different crops. The economic yields of the crops were recorded after harvest.

Fish culture

Fish pond in an area of 0.04 ha was excavated with a depth of 1.5 m. Fifteen-day-old fingerlings belonging to the species, viz. silvercarp (*Hypoohthamiahthys moli-trix*) (60), surface feeder; catla (*Catla catla*) (60), surface feeder; rohu (*Labeo rohita*) (60), column feeder; mrigal (*Cirrhinus mrigala*) (45), bottom feeder; common carp (*Cyernus carpia*) (45), bottom feeder; and grass carp (*Ctenopharyngodon idella*) (30), grass feeder, were stocked in the fish pond. Accordingly, the stocking density of fingerlings worked out to 7,500/ha of ponded water. No artificial feeding was given to fingerlings. Fishes were harvested commencing from tenth month and completed at the end of the year.

Poultry enterprise

A poultry shed having a plinth area of

Table 1. Components integrated farming system and conventional cropping system.

Component	Area (ha)	Number
Integrated farming system		
Cropping programme		
Rice ('IR 50')–rice ('IR 20')–maize ('Co 1') (May–Aug) (Aug–Dec) (Jan–April)	0.16	
Rice ('IR 50')–rice ('IR 20')–groundnut ('Co 2') (May–Aug) (Aug–Dec) (Jan–Apr)	0.10	
Maize ('Co 1')–rice ('IR 20')–sesame ('TMV 3') ('May–Aug') ('Aug–Dec') ('Jan–Apr')	0.10	
Fisheries		
Fish pond (including mushroom shed)		
Silver carp/catla		120 (40%)
Rohu		60 (20%)
Mrigal/common carp		90 (30%)
Grass carp		30 (10%)
Poultry		
Bapkok layer		20
Mushroom shed		
Production capacity 1.5–2.0 kg/day		
Conventional cropping system		
Rice ('IR 50')–rice ('IR 20')–greengram ('Co 3') (May–Aug) (Aug–Dec) (Jan–Apr)	0.20	
Rice ('IR 50')–rice ('IR 20')–green-manure (sunhemp) (May–Aug) (Aug–Dec) (Jan–Apr)	0.20	

2.2 m^2 was erected over the fish pond at 1 corner. Bottom of the poultry shed was provided with wire mesh (3 mm x 3 mm) to facilitate free falling of poultry droppings into the fish pond. Twenty (500/ha)18-week-old Bapkok chicks were procured and kept in the poultry shed. As regards the feed, the birds were fed as prescribed for different growth and production phase of the fowls. The feed components other than mineral mixture, shellgrit, molasses and fishmeal were utilized from the crop component. In the year of start rice bran, maize flour, groundnut cake, sesame cake, alfalfa meal and illfilled rice grains were accounted at the procurement rate at farm level, and produce from the crop component of the IFS was used for the preparation of the poultry feed from second year onwards. The alfalfa meal utilized in the poultry feed was raised around the fish pond. The birds started laying eggs around 22 weeks and were culled at the age of week 72 when the egg yield is uneconomical.

Mushroom enterprise

A mushroom shed with a dimension of 5 m x 3 m was constructed with locally available materials, to take up the desired production level of 1.5–2.0 kg mushroom/day. Oyster mushroom (*Pleurotus* sp.) was produced utilizing rice straw from crop component as base. Thus by making use of one of the farm produces as input, the cost of production per kilogram of edible mushroom could be reduced considerably.

Economics

The economics involving all the components of the IFS and crop activity in CCS was worked out. While working out the economics, the cost of the materials used from the crop components for preparation of poultry feed was not included. The cost of construction of poultry shed and fish pond viz, Rs 2,500 and Rs 3,000, respectively was apportioned and added to the production cost for 5 years. An interest on the capital (fixed and working at 12.5% per annum) was also included in the production cost. The cost of construction of mushroom shed was included in the production cost of second year.

RESULTS AND DISCUSSION

Cropping enterprise

An average net income of Rs 7,687 and Rs 6,334 was obtained from the crop component of the IFS and CCS respectively (Table 2). The mean annual additional income due to introduction of gardenland crop, viz. maize, groundnut and sesame in IFS was Rs 1,344. This value did not include the maize and other items utilized for the preparation of poultry feed from the second year. The net income from crop component in the IFS was always higher than the CCS except during 1988–89. The benefit: cost ratios of crop activity in the IFS and CCS were Rs 1.67 and Rs 1.87 respectively. The reduction in benefit : cost ratio in the IFS was due to non-addition of the values of 200 kg maize grain, 88 kg groundnut cake and 51 kg sesame cake in the gross income which was obtained from the cropping enterprise and used for preparation of the poultry feed from the second year onwards. The employment generation in the crop component of the IFS was 376 mandays/annum. Total employment generation from the CCS was also 376 mandays/year. The illfilled grains of rice was used for preparation of poultry feed and it constituted 35% in poultry feed.

Fish culture

In fish culture the mean weight of the

Table 2. Economics of rice–poultry–fish–mushroom system

Component	Integrated farming system (IFS) (area, 0.40 ha)			Conventional cropping system (CCS) (area, 0.40 ha)			Additional net income from IFS over CCS (Rs)
	Gross income (Rs)	Cost of production (Rs)	Net income (Rs)	Gross income (Rs)	Cost of production (Rs)	Net income (Rs)	
1987–88							
Crop	17,900	8,814	9,086	15,212	6,974	8,238	848
Poultry	3,099	2,394	705				705
Fisheries	3,960	1,508	2,452				2,452
Total	24,959	12,716	12,243	15,212	6,974	8,238	4,005
1988–89							
Crop	21,150	11,014	10,136	18,960	7,661	11,299	−1,163
Poultry	2,715	1,751	964				964
Fisheries	4,920	1,373	3,547				3,547
Mushroom	10,150	8,268	1,882				1,882
Total	38,935	22,406	16,529	18,960	7,661	11,299	5,230
1989–90							
Crop	17,270	11,040	6,230	11,315	6,660	4,655	1,575
Poultry	2,700	1,778	922				922
Fisheries	3,500	1,523	1,977				1,977
Mushroom	7,884	7,233	651				651
Total	31,354	21,574	9,780	11,314	6,660	4,655	5,125
1990–91							
Crop	21,331	13,230	8,101	12,476	7,403	5,073	3,028
Poultry	3,317	1,885	1,432				1,432
Fisheries	3,220	1,549	1,671				1,671
Mushroom	5,220	4,826	394				394
Total	33,088	21,490	11,598	12,476	7,403	5,073	6,525
1991–92							
Crop	17,731	12,893	4,838	9,716	7,317	2,403	2,435
Poultry	2,476	1,913	563				563
Fisheries	2,240	1,474	766				766
Mushroom	7,524	5,063	2,461				2,461
Total	29,971	21,343	8,628	9,716	7,313	2,403	6,225
Mean for 5 years							
Crop	19,076	11,398	7,678	13,536	7,202	6,334	1,344
Poultry	2,861	1,944	917				917
Fisheries	3,568	1,486	2,082				2,082
Mushroom	6,156	5,078	1,078				1,078
Total	31,661	19,906	11,755	13,536	7,202	6,334	5,421

Cost of construction of poultry shed (Rs 2,500) and fish pond (Rs 3,000) was apportioned to 5 years and added in production cost.

An interest of 12.5% per annum was added for fixed and working cost

fingerlings increased constinuously with an increase in age and reached the maximum around the tenth month. The mean weight of fingerling was 2 g at initial stage and 950 g in the tenth month. The growth of the fingerlings was solely due to the droppings of the birds sheltered over the fish pond. The average net income from the sale of fish was Rs 2,082 (Table 2). The net income/day was Rs 5.70. The employment generation was 10 mandays/per year.

Poultry enterprise

The body weight of the layers increased up to the eighth month and it was maintained till culling. Moreover, no mortality was observed till the end of the cycle. The egg production varied from 2,252 to 4,531 in different years and the mean annual production over 5 years was 3,404. This worked out to the mean yield of 170 eggs/bird/year. The mean annual live weight of the culled bird was 1.62 kg/bird. An average net income of Rs 917 (Table 2) was obtained and the income per day was Rs 2.51. Employment generation due to poultry enterprise was 100 mandays/year.

Mushroom production

Mushroom production varied from 290 to 550 kg in different years, being mean annual mushroom production 424 kg. It gave an average net net income of Rs 1,078/year (Table 2) and net income of Rs 2.95/day. The employment generation was 64 mandays/year.

Economics of IFS and CCS

An average net profit of Rs 11,755 was obtained in rice–poultry–mushroom IFS and Rs 6,334 was obtained from CCS from 0.40 ha/year (Table 2). Integrated Farming System increased the income up to Rs 5,421 over CCS. Similar findings were reported by Ganesan *et al.* (1991). Inclusion of poultry–fish–mushroom components in the IFS increased the net income per day to Rs 32, 20 compared with Rs 17.35 in CCS and thus it provides an additional net income of Rs 14.85/day. Total employent generation was 550 mandays/year in the IFS. An additional 174 mandays of employment was generated by the introduction of poultry–fish–mushroom system in the IFS over the CCS. This was in conformity with the findings reported by Satheesh *et al.* (1985). It can be concluded that in the irrigated lowlands of Tamil Nadu, rice–poultry–fish–mushroom system is best and can be adopted to earn higher net return and increase the productivity per unit area per unit time. It also opportunity to small and marginal farmers for the effective utilization of family labour round the year.

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