

# COMPARITIVE STUDY OF GROWTH AND YIELD PERFORMANCE OF RICE BASED FARMING SYSTEMS

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## ABSTRACT

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 (T<sub>1</sub>), Rice + Fish (T<sub>2</sub>), Rice + Poultry (T<sub>3</sub>), Rice + Japanese quail (T<sub>4</sub>), Rice + Fish + Poultry (T<sub>5</sub>) and Rice + Fish + Japanese quail (T<sub>6</sub>). The treatments were compared in Randomized Block Design with four replications on a plot size of 80 m<sup>2</sup>. Among the treatments, integrated rice farming with fish and poultry components (T<sub>5</sub>) recorded the highest growth characters viz., plant height of 87.79 cm, number of tillers clump<sup>-1</sup> of 12.39, leaf area index of 6.34 and crop dry matter of 8.11 t ha<sup>-1</sup> and yield attributes viz., highest number of panicles clump<sup>-1</sup> of 5.21, number of filled grains panicle<sup>-1</sup> of 97.95. Integration of poultry with rice (T<sub>3</sub>) recorded the highest grain yield of 5.27 t ha<sup>-1</sup> and it was on par with rice + fish + poultry (T<sub>5</sub>). The least grain yield of 4.01 t ha<sup>-1</sup> was observed with rice + fish (T<sub>2</sub>). However, it was comparable with rice alone (T<sub>1</sub>).

**key word:** Rice, integrated farming system, growth and yield

## Introduction

'Rice is life' the slogan of the International Year of Rice - 2004 A.D. as declared by the United Nations General Assembly (Jacques Dioxf, 2003) comes from the understanding that rice crop and rice based cropping/farming system are essential to everyone directly for food security, livelihood improvement, cultural heritage and sustainable development for global peace (Viraktamath, 2006).

Rice as the principal food crop of Tamil nadu, is being cultivated in an area of 19.3 lakh hectares (l.ha) and with an annual production of 66.00 lakh tonnes (l.t). The Cauvery delta region, popularly known as Granary of Tamil nadu, contributes a major share for the rice production in Tamil nadu.

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 (T<sub>1</sub>), Rice + Fish (T<sub>2</sub>), Rice + Poultry (T<sub>3</sub>), Rice + Japanese quail (T<sub>4</sub>), Rice + Fish + Poultry (T<sub>5</sub>) and Rice + Fish + Japanese quail (T<sub>6</sub>). The treatments were compared in Randomized Block Design with 4 replications on a plot size of 80 m<sup>2</sup>.

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<sup>-1</sup>. In treatments involving poultry, cages made up of wood with the basement and sides comprising iron wire mesh of dimension 2.5 m<sup>2</sup> 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<sup>-1</sup> 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 m<sup>2</sup>, 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<sup>-1</sup> and was sold for meat after the harvest of rice crop.

## Result

Among the treatments, integrated rice farming with fish and poultry components (T<sub>5</sub>) recorded the highest growth characters viz., plant height of 87.79 cm, number of tillers clump<sup>-1</sup> of 12.39, leaf area index of 6.34 and crop dry matter of 8.11 t ha<sup>-1</sup> and yield attributes viz., highest number of panicles clump<sup>-1</sup> of 5.21, number of filled grains panicle<sup>-1</sup> of 97.95.

Integration of poultry with rice (T<sub>3</sub>) recorded the highest grain yield of 5.27 t ha<sup>-1</sup> and it was on par with rice + fish + poultry (T<sub>5</sub>). The least grain yield of 4.01 t ha<sup>-1</sup> was observed with rice + fish (T<sub>2</sub>). However, it was comparable with rice alone (T<sub>1</sub>).

## Discussion

The integration of component enterprises viz., fish culture and poultry rearing along with rice farming (T<sub>5</sub>) recorded higher crop growth characters like number of tillers clump<sup>-1</sup>, crop biomass, LAI and DMP and yield attributes viz., number of panicles clump<sup>-1</sup> and filled grains panicle<sup>-1</sup>. The treatment comprising poultry rearing with rice (T<sub>3</sub>) were observed to be on par. The poultry manure analysed with a higher nutrient of 1.73 per cent of nitrogen, 0.85 per cent of phosphorus and 0.38 per cent of potassium in available organic form. The manurial output from poultry rearing was recorded and computed to be 0.597 kg ha<sup>-1</sup> every day during the initial 15 days of rearing a broiler and the same increased to be 1.187 kg ha<sup>-1</sup> every day, nearing marketable age of the birds in the cropping period.

The recycling of an enormous quantity of such a nutritive organic waste about 7.09 t ha<sup>-1</sup> for one rearing worked out with 21.27 t ha<sup>-1</sup> for 3 rearing in the cropping season in a sustained manner (instead of one stroke application, the organic waste being added every day in smaller quantities) has resulted in an increased fertility status of the soil and its ability to support an excellent growth of the crop. In addition to their manurial value, the poultry might have also reduced the pest and disease incidence and weed competition by virtue of their acidic nature, especially in combination with fish culture.

The growth characters like number of tillers clump<sup>-1</sup>, DMP and LAI didn't show significant difference between T<sub>5</sub> and T<sub>3</sub>. The benefits derived by the rice crop from fish culture during initial stages were not adequate to surpass the same derived from poultry rearing. As an exception, the plant height in T<sub>5</sub> was significantly higher than that in T<sub>3</sub>, in the cropping season indicating that the ultimate cumulative benefit the crop realized at later stages viz., flowering, could be greater with the

synergistic effect of poultry and fish combination than the manurial addition from poultry alone. These observations are in line with the reports of Pandiarajan (1995) and Murugan et al., 2005.

Compared to sole rice farming ( $T_1$ ), integrating fish culture along with rice ( $T_2$ ) performed superior in respect of growth characters and yield attributes. However, sacrificing 10 per cent of land area for the sake of including fish culture has led to lesser grain yields in rice + fish ( $T_2$ ) compared to rice alone ( $T_1$ ). The same principle of loss of rice area contributed for lesser grain yields in the treatments involving fish culture compared to those without fish culture. Whereas the complimentary benefits of weed control through the herbivorous fish *Ctenopharyngodon idella* and pest control through other omnivorous fish species made those yields comparable to the others compared.

## Reference

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Table 1. Effect of integrated farming system on the growth characters of rice

Treatments	Plant height (cm)	Number of tillers clump <sup>-1</sup>	Leaf area index	Crop dry matter production (t ha <sup>-1</sup> )
T <sub>1</sub> -Rice alone	71.87	7.49	4.17	8.11
T <sub>2</sub> - Rice + Fish	78.38	8.51	4.83	9.05
T <sub>3</sub> - Rice + Poultry	84.71	11.58	6.11	12.41
T <sub>4</sub> - Rice + Japanese quail	81.10	9.53	5.35	10.09
T <sub>5</sub> - Rice + Fish + Poultry	87.79	12.39	6.34	13.16
T <sub>6</sub> - Rice + Fish + Japanese quail	83.08	10.27	5.64	10.86
S. Ed	0.80	0.45	0.16	0.44
CD (P=0.05)	1.62	0.91	0.31	0.89

Table 2 Effect of integrated farming system on yield characters and yield of rice

Treatments	Number of panicles clump <sup>-1</sup>	Number of filled grains panicle <sup>-1</sup>	Grain yield (t ha <sup>-1</sup> )
T <sub>1</sub> -Rice alone	3.80	62.41	4.01
T <sub>2</sub> - Rice + Fish	4.14	70.54	3.87
T <sub>3</sub> - Rice + Poultry	5.04	95.91	5.27
T <sub>4</sub> - Rice + Japanese quail	4.41	78.66	4.63
T <sub>5</sub> - Rice + Fish + Poultry	5.21	97.95	5.04
T <sub>6</sub> - Rice + Fish + Japanese quail	4.68	86.45	4.48
S. Ed	0.11	4.03	0.18
CD (P=0.05)	0.21	8.07	0.36