

EFFECT OF ORGANIC AND INORGANIC MANURES ON GROWTH AND YIELD OF RICE

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ABSTRACT

A field experiment was conducted during kharif seasons of 1998 and 1999 at Annamalai University experimental farm, Annamalainagar, Chidambaram, Tamil Nadu to study the effect of organic and inorganic manures on growth and yield of rice (*Oryza sativa* L.) variety ADT 38. Individual and combined application of organic manures (FYM, Green manure and Pressmud) along with inorganic fertilizers (100% and 75% recommended dose of fertilizer) had significant influence on plant growth and yield characters and grain yield of rice. Application of FYM @ 12.5 t ha⁻¹ along with 100 per cent recommended dose of fertilizer combination exhibited the highest growth and yield characters than other combinations.

Rice is the major staple food of Asia. Self sufficiency in rice has been a major goal of agricultural research and development in most Asian countries. In 2025, the global demand for rice would increase by 70 per cent, requiring a production of 810 million tonnes of unmilled rice compared to the present production of 480 mt. It has been repeatedly emphasized that to meet the demand, the yield potential of irrigated paddy will have to be increased from the present yield potential of 4.5 t ha⁻¹ to 8 t ha⁻¹ (Hossain, 1995). The importance of organic manures as a source of humus and plant essential nutrients to increase the fertility level of tropical soils has been well recognized. The organic matter content of cultivated soils of the tropics and sub-tropics is comparatively low due to high temperature and intense microbial activity. Therefore, soil humus has to be increased through periodic addition of organic manures for maintaining soil productivity, especially substitutes the inorganic fertilizer (Meelu and Singh, 1991). In tail end area of Cauvery delta, practice of application of organic manures to paddy field is limited when compared to inorganic fertilizer application. Since the quantitative

information about the advantages of organic manures in rice is lacking, the present investigation was carried out.

A field experiment was conducted in the Experimental farm, Annamalai University during Kharif seasons of 1998 and 1999 to evaluate the response of rice to different source of organic manures and two levels of inorganic fertilizer by way of individual and combined application on the growth and yield of lowland transplanted paddy cv. ADT 38. The experimental soil was clay loam with pH 7.5, EC 0.30 dSm⁻¹, organic carbon 0.5%, available NPK of 286, 17.2 and 301.5 kg ha⁻¹, respectively. The experiment consisted of 11 treatments (Table 1 and 2) and laid out in randomized block design with three replications. The experiment gross plot size in 5 m x 4m. Net plot size is 4 x 3m. The inorganic fertilizer like Urea, Single superphosphate and Muriate of potash were applied based on the treatment schedule. The recommended dose of fertilizer is 120:38:38 kg ha⁻¹ of N, P and K. The biometric observations were recorded, analyzed and presented in Table 3.

The growth characters viz., plant height, number of tillers hill⁻¹, leaf area index

Table 1. Nutrient analysis of different organic manures used.

Source	N%	P ₂ O ₅	K ₂ O%	Ca%	S%
FYM	0.68	0.20	0.50	-	-
Pressmud	2.52	0.62	0.34	3.06	1.30
Green manure <i>Sesbania aculeata</i>	2.55	0.32	1.30	-	-

Table 2. Quantity of nutrient supplied through various organic sources (kg ha⁻¹)

Source (t ha ⁻¹)	N%	P ₂ O ₅	K ₂ O%	Ca%	S%
FYM (12.5)	85.00	25.00	62.50	-	-
Pressmud (12.5)	315.00	77.50	42.50	382.50	162.50
Green manure <i>Sesbania aculeata</i>	165.75	20.80	84.50	-	-

Table 3. Effect of organic and inorganic manures on growth and yield characters of rice (Mean of two years)

Treatments	Plant height (cm)	No. of tillers hill ⁻¹	LAI	DMP at harvest (t ha ⁻¹)	No. of panicles m ⁻²	No. of filled grains panicle ⁻¹	1000 grain weight (g)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)
T ₁ - Control	86.12	5.32	3.98	13.49	186.10	78.65	20.30	1.98	4.12
T ₂ - FYM @ 12.5 t ha ⁻¹	107.88	9.20	5.79	16.81	301.11	129.86	20.86	5.14	8.86
T ₃ - Green manure @ 6.5 t ha ⁻¹	106.12	8.56	5.61	16.65	296.12	127.72	20.42	5.00	8.69
T ₄ - Pressmud @ 12.5 t ha ⁻¹	107.96	9.23	5.81	16.79	302.68	130.92	20.95	5.15	8.88
T ₅ - FYM @ 12.5 t ha ⁻¹ +100% RDF	118.50	12.60	6.73	17.69	321.00	139.60	21.16	5.52	9.60
T ₆ - Green manure @ 6.5 t ha ⁻¹ +100% RDF	112.72	10.60	6.22	17.16	311.04	134.06	21.09	5.30	9.18
T ₇ - Pressmud @ 12.5 t ha ⁻¹ + 100% RDF	116.23	11.96	6.56	17.52	318.01	138.06	21.13	5.42	9.46
T ₈ - FYM @ 12.5 t ha ⁻¹ + 75% RDF	114.48	11.29	6.39	17.32	314.72	136.14	21.11	5.36	9.32
T ₉ - Green manure @ 6.5 t ha ⁻¹ + 75% RDF	108.06	9.26	5.85	16.83	303.65	130.05	20.98	5.16	8.90
T ₁₀ - Pressmud @ 12.5 t ha ⁻¹ +75% RDF	111.82	10.57	6.19	17.14	309.98	133.98	21.04	5.28	9.17
T ₁₁ - 100% RDF	110.09	9.90	6.02	16.98	307.12	132.13	21.01	5.22	9.04
S.E.	0.77	0.32	0.08	0.07	1.13	0.21	0.01	0.02	0.12
CD (P=0.05)	1.54	0.63	0.15	0.14	2.26	0.42	0.03	0.04	0.12

RDF-Recommended dose of fertilizer.

and dry matter production were significantly influenced by the treatments. It was observed that application of organic manures along with inorganic nutrients increased the growth characters of rice to a considerable extent. Treatment T₅ (FYM @ 12.5 t ha⁻¹ along with 100% recommended dose of fertilizer) recorded the highest plant height (118.0 cm),

number of tillers hill⁻¹ (12.60), LAI (6.73) and dry matter production (17.69 t ha⁻¹) at harvest stage, which was closely followed by treatment T₇ (Pressmud @ 12.5 t ha⁻¹ + 100% recommended dose of fertilizer). Treatment T₁ (control plot - no fertilizer application) resulted the least value of growth characters. The treatment T₂ was at par with T₄ and T₉. The beneficial effect

of growth characters might be due to the rapid decomposition of FYM with supplementation of inorganic form of fertilizers. The favourable effects of applying organic and inorganic sources of fertilizer was also reported by Gangwar and Niranjana (1991) in fodder sorghum. Though the organic manures along with 100 per cent inorganic fertilizer application recorded maximum value, it was on par with the application of organic manures in addition with 75 per cent inorganic fertilizer application. These results are in accordance with the reports of Pradeep and Thanunathan (1999) and Sumathy *et al.* (1999) on rice.

Organic manures along with inorganic fertilizer application significant increased the yield attributes and yield of rice. Among the various treatments, T₅

(FYM @ 12:5 t ha⁻¹ + 100% RDF) registered the highest grain yield (5.52 t ha⁻¹) and straw yield of 9.60 t ha⁻¹. Number of panicles m⁻², filled grains panicle⁻¹, thousand seed weight were also found to be higher in this treatment T₅ which in turn contributed to increase the yield under this treatment. The control plot (T₁) resulted in least grain yield of 1.98 t ha⁻¹. This significant response might be due to the enhanced nutrient availability to the crops by the application of organic manure in combination with inorganic fertilizer. The similar result was reported by Bijay Singh *et al.* (1983) and Sasireka *et al.* (1998).

From this study, it is concluded that there was better response for the combined application of organic and inorganic fertilizers rather than the *per se* application.

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