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Influence of Farm Yard Manure and Biodigester Liquid Manure on Production of Paddy (*Oryza sativa* L.) Under Irrigated Condition

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Abstract

A field experiment was carried out under irrigated condition during *kharif* of 2008. The soil was red sandy loam in texture and initial soil status of the soils were pH of 7.0, EC (0.2 dS/m), medium in organic carbon status (0.51%), low in available P_2O_5 (16.0 kg/ha) and low in available K_2O (141.0 kg/ha). The treatments include three levels of FYM (7.5, 10.0 and 12.5 t/ha) and three levels of biodigester liquid (equivalent to 75, 100 and 125 N kg/ha). The design adopted was randomized complete block design with three replications. The composition of the FYM was 0.48% N, 0.26% P_2O_5 and 0.34% K_2O and biodigester 0.18% N, 0.008% P_2O_5 and 0.36% K_2O. Application of FYM 12.5 t/ha +biodigester liquid (equivalent to 125 kg N/ha) in two splits recorded significantly highest number of panicles per plant (16) and grain yield of 4847 kg/ha. However, the next best treatment was FYM 12.5 t/ha+biodigester liquid (equivalent to 100 kg N/ha) in two splits (15 and 4142 kg/ha respectively) and FYM 12.5 t/ha + biodigester liquid (equivalent to 75 kg N/ha) in two splits (15 and 4082 kg/ha respectively). This might be due to availability of more nutrients than the recommended dose leads to higher grain yield.

Key words : Paddy, Farm yard manure, Biodigester liquid manure, Grain yield.

Rice (*Oryza sativa* L.) occupies a high place among the food crops cultivated in the world. The world rice production in 2008-09 was 610 mt cultivated over an area of 147 m ha with the productivity of 3.75 t/ha. India has the largest area among rice growing countries and stands second in production. India produces 97.0 mt of rice in an area of 43.18 m ha with the productivity of 2,101 kg/ha. In Karnataka, rice is grown in an area of 1.42 m ha with an annual production of 3.60 m t and productivity is 2.53 t/ha (1). Rice production is the most water consuming system and utilizes about 60% of total available irrigation water. To meet the water crisis head on, valuable gains can be achieved by growing rice with less water. Therefore, there is a need to develop an alternate system that requires less water. Aerobic method is a new concept of growing rice. It is a production system, which concentrates on direct seeding and irrigating intermittently, in contrast to the practices such as rising of nursery, puddling, transplanting and submergence. The concept of organic farming has been gaining momentum with the use of different manures and crop residues to increase the productivity of crop and the soil fertility status. So, the present investigation was undertaken.

Methods

A field experiment was conducted at Organic Farming Research Station, Naganahally, Mysore, University of Agricultural Sciences, Bengaluru during *kharif* of 2008. The soil of the experimental site was red sandy loam in texture with neutral pH (7.0), EC (0.2 dS/m), medium in organic carbon status (0.51%), low in available P_2O_5 (16.0 kg/ha) and low in available K_2O (141.0 kg/ha). The treatments include three levels of FYM (7.5, 10.0 and 12.5 t/ha) and three levels of biodigester liquid (equivalent to 75, 100 and 125 N kg/ha). The composition of the FYM was 0.48% N, 0.26% P_2O_5 and 0.34% K_2O and biodigester is 0.18% N, 0.008% P_2O_5 and 0.36% K_2O. The experiment was laid out in a randomized complete block design with 11 treatments replicated thrice.

Detail of treatments and the corresponding symbols used during the study are as follows. T_1 : FYM 7.5 t/ha+ BD manure (equiv to 75 kg N/ha) in two splits, T_2 : FYM 7.5 t/ha+ BD manure (equiv to 100 kg N/ha) in two splits, T_3 : FYM 7.5 t/ha + BD manure (equiv to 125 kg N/ha) in two splits, T_4 : FYM 10 t/ha + BD manure (equiv to 75 kg N/ha) in two splits, T_5 : FYM 10 t/ha+BD manure (equiv to 100 kg N/ha) in

Table 1. Plant height, number of panicles / plant and yield of paddy as influenced by organic manures under irrigated condition.

Treatments	Plant height (cm)	No. panicles/ plant	Yield (kg/ha)
FYM 7.5 t/ha + BD manure (equiv to 75 kg N/ha) in two splits	89	11	2440
FYM 7.5 t/ha + BD manure (equiv to 100 kg N/ha) in two splits	92	12	2676
FYM 7.5 t/ha + BD manure (equiv to 125 kg N/ha) in two splits	95	13	3290
FYM 10 t/ha + BD manure (equiv to 75 kg N/ha) in two splits	99	13	3618
FYM 10 t/ha + BD manure (equiv to 100 kg N/ha) in two splits	102	14	3433
FYM 10 t/ha + BD manure (equiv to 125 kg N/ha) in two splits	108	14	3738
FYM 12.5 t/ha + BD manure (equiv to 75 kg N/ha) in two splits	109	15	4082
FYM 12.5 t/ha + BD manure (equiv to 100 kg N/ha) in two splits	111	15	4142
FYM 12.5 t/ha + BD manure (equiv to 125 kg N/ha) in two splits	112	16	4847
Rec. practices (10 t FYM + 100-50-50 NPK kg/ha)	111	12	1742
SE ±	3.03	0.51	125.3
CD at 5%	9.10	1.52	375.9

two splits, T_6 : FYM 10 t/ha + BD manure (equiv to 125 kg N/ha) in two splits, T_7 : FYM 12.5 t/ha +BD manure (equiv to 75 kg N/ha) in two splits, T_8 : FYM 12.5 t/ha + BD manure (equiv to 100 kg N/ha) in two splits, T_9 : FYM 12.5 t/ha + BD manure (equiv to 125 kg N/ha) in two splits, and T_{10} : Recommended package of practices (10 t FYM + 100 : 50 : 50 NPK kg/ha).

The land of the experimental site was prepared by ploughing twice mechanically with mould board plough and then, levelled with harrow. Before incorporation of organic manures, it was analyzed. The required quantities of organic manures based on the nitrogen content were applied based on treatment to different plots, 15 days before sowing FYM was applied for each treatment. Biodigester liquid was prepared and applied as a top dress in two splits.

Results and Discussion

Plant height of rice was significantly influenced by FYM and biodigester liquid manure. Application of FYM 12.5 t/ha + BD manure (equiv to 125 kg N/ha) in two splits recorded highest plant height of 112 cm. However, it was onpar with FYM 12.5 t/ha + BD manure (equiv to 100 kg N/ha) in two splits (111 cm), Recommended package of practice (10 t of FYM + 100 : 50 : 50 NPK kg/ha) (111cm), FYM 12.5 t/ha + BD manure (equiv to 75 kg N/ha) in two splits (109 cm) and FYM 10 t/ha + BD manure (equiv to 125 kg N/ha) in two splits (108 cm). This could be due to greater solubility and accelerated release of nitrogen by chemical fertilizer and organic manure by providing an opportunity for aerobic rice to utilize higher quantum of nutrients. Similar findings were reported by Rajanna et al. (2). Significantly increase in plant height with these treatments might be due to greater availability and steady release of nutrients from organic sources which perhaps increased the plant height. Devaraju et al. (3) opined that adequate supply of plant nutrients influenced the plant height. Nitrogen increases the chlorophyll content at all growth stages as it is a constituent and might have increased the photosynthesis and resulted in increased plant height (4).

Number of panicles per plant of rice was significantly influenced by FYM and biodigester liquid manure. Application of FYM 12.5 t/ha + BD manure (equiv to 125 kg N/ha) in two splits recorded higher number of panicles per plant of 16. However, it was at par with FYM 12.5 t/ha + BD manure (equiv to 100 kg N/ha) in two splits (15) and FYM 12.5 t/ha +BD manure (equiv to 75 kg N/ha) in two splits (15). This might be due to positive correlation between N application and formation of productive tillers. Use of higher dose of nitrogen, phosphorus and potassium through organic sources might have helped in inducing good vegetative growth (5, 6) which in turn produced higher number of panicles leading to higher yield. This increased number of panicles may be attributed to steady supply of nutrients which enhanced the dry matter production due to more availability of photosynthates.

Grain yield of rice was significantly influenced by FYM and biodigester liquid manure. Application

of FYM 12.5 t/ha + BD manure (equiv to 125 kg N/ha) in two splits recorded highest grain yield of 4,847 kg/ha. However, the next best treatments were FYM 12.5 t/ha + BD manure (equiv to 100 kg N/ha) in two splits (4,142 kg/ha) and FYM 12.5 t/ha + BD manure (equiv to 75 kg N/ha) in two splits (4,082). This significant increase in grain yield may be due to the higher yield attributing parameters intern leads to grain yield. Higher leaf area and leaf area duration which are responsible for higher photosynthetic activity promoted dry matter production resulting in higher grain and straw yield (5). The increased yield was supported by relatively higher dry matter in stem which is an indication that quick growth of stems may be helpful in supporting more leaves. The earlier workers in rice have ascribed the parameters like leaf dry matter and total dry matter to the grain yield (7).

Conclusion

Application of farm yard manure along with biodigester liquid manure at higher doses recorded significantly higher growth parameters and grain yield. Use of biodigester liquid manure is one of the cheap and efficient sources of nitrogen in organic farming which can be an efficient substitute for chemical fertilizers for higher crop yield and profitability of rice.

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