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Full Length Research Article

EFFECT OF ORGANIC AND INORGANIC FERTILIZER ON GROWTH AND YIELD OF PADDY CV GR 11

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ABSTRACT

The trial with three replications and six treatments was laid out in Randomized Block Design to assess the performance of different organic and inorganic fertilizer on growth and yield of paddy crop (Variety GR 11) during *Kharif* season. Different doses of fertilizers were applied to all the plots except untreated control. Application of 50 % N through RDF + 50% N through vermicompost recorded higher growth attributes like plant height was 42.2 cm and 118.1 cm, No. of tillers per plant was 8.7 and 12.1 at 45 DAT and at harvest time respectively, panicle length (22.3 cm), grains per panicle (128.0), 1000-grain weight (19.7 g) and grain yield (4.97 t/ha.) and straw yield (5.77 t/ha.) of rice variety GR 11. The data clearly revealed that the yield obtained with treatment T_5 (50% RDF + 50% N through vermicompost) was recorded significantly higher growth as well as yield attributes than all other treatments.

INTRODUCTION

One of every three people depends on rice for more than half of their daily food and one in nine (approximately 700 million) depends on rainfed rice. Ninety percent of the world's rice is grown and consumed in Asia region. Rice is also an important staple food in some countries of Latin America and Africa. Asian rice production has increased by 24% during 1965 to 1980 and that was attributed to the use of higher rate of fertilizers, mainly N-fertilizer. Rice pro-ductivity is now at stagnant situation or declining in areas where N-fertilizer application is very high; it has also raised the concerns about sustainability of monoculture rice (Jeyabal and Kuppuswamy, 2001). Food security in India (1.6 billion by 2050 that will require 450 Mt of food grain production) is a challenge (Siddiq, 2000). To achieve food security, hybrid rice can be one of the most feasible options to increase 15% to 20% of food production (Peng *et al.,* 1999, Siddiq, 1996). Organic sources of nutrients applied to the preceding crop benefits the succeeding crop to a great extent (Hedge and Dwivedi, 1992). The various implications of commercial fertilizers particularly in decreasing the soil fertility and productivity and the ever increasing cost of chemical fertilizers compels one to think of the use of organic manures (Bhardwaj and Gaur, 1985; Modgal and Singh, 1990). Application of organic material along with inorganic fertilizers in soil leads to increase in system productivity and also sustained soil health for longer period and system productivity becomes more sustainable in nature. It is well known that organic sources cannot meet the integrated use of nutrients seem to be more appropriate. Incorporation of organic sources and later on its decomposition determines the availability of the nutrients. Thus, to fulfill the following objectives this trial has been undertaken:

- To study the performance of local variety (Gujarat-11)
- To study the effect of different nutrient management practices on yield of paddy.
- To determine optimum level of nutrient dose to be used for obtaining optimum production of paddy.
- To demonstrate the effectiveness of improved management practices in paddy cultivation.

MATERIALS AND METHODS

Study Site

A study was carried out at the ASPEE, ARDF Farm, Village-Nare, Taluka- Wada, District-Palghar (Maharashtra), India

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Table 1: Effect of organic and inorganic fertilizer on growth and yield of paddy cv. GR 11

Treatment	Plant height, (cm)		No. of tillers,		Test weight, (g)	Panicle length, (cm)	Grains / panicle	Yield, (t/ha)	
	45 DAT	At harvest	45 DAT	At harvest				Grain	Straw
T_1	32.3	102.5	4.9	7.4	14.7	16.1	100.8	2.76	3.53
T_2	35.6	106.2	5.8	8.2	16.0	17.4	111.5	3.14	4.03
T_3	37.2	108.1	6.7	9.5	16.7	18.1	114.3	3.45	4.34
T_4	39.0	109.4	7.0	9.8	17.4	19.3	117.9	3.92	4.81
T_5	42.2	118.1	8.7	12.1	19.7	22.3	128.0	4.97	5.77
T_6	40.9	112.7	7.5	10.5	18.3	20.7	123.2	4.23	5.15
S.Em. ±	0.78	0.26	0.13	0.14	0.10	0.27	2.66	0.05	0.08
C.D. (0.05)	2.46	0.81	0.41	0.45	0.31	0.84	8.39	0.17	0.25
CV (%)	3.57	0.41	3.30	2.58	0.99	2.43	3.98	2.43	2.93

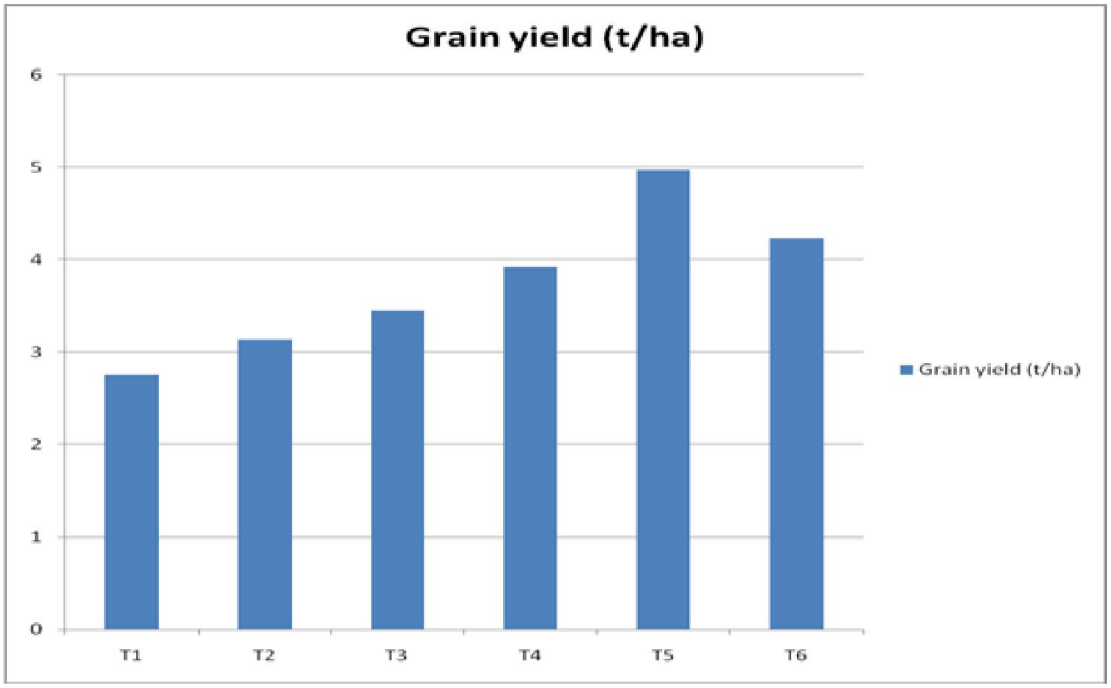
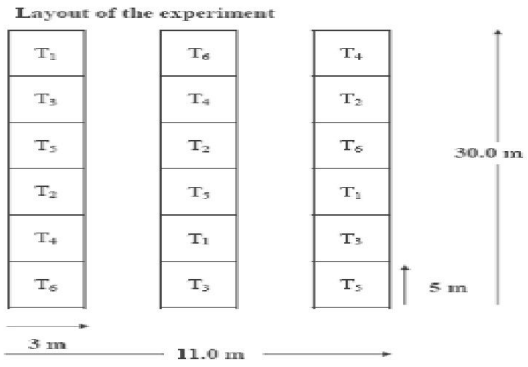


Fig 1. Effect of organic and inorganic fertilizer on yield of paddy cv. GR 11

during the *Kharif* (wet) season of 2013-2014. The average annual rainfall of the study area is 3000-3500 mm. The average maximum and minimum temperatures are 23.8˚C and 12.6˚C, respectively. The experiment was laid out in Randomized Block Design and replicated three times. Rice cultivars GR 11 with nutrient management practices such as T_1: absolute control, T_2: 50% RDF, T_3: 75% RDF, T_4: 100% RDF, T_5: 50% RDF + 50% N through vermicompost and T_6: 75% RD of NPK through inorganic +25% through vermicompost were assigned in 5 m x 3 m treatment plots. The recommended dose of NPK was applied in the form of urea (46-0-0), single super phosphate (0-16-0) and muriate of potash (0-0-60). Vermicompost (1.25-0.8-0.65) was incorporated in soil as per the treatment at the time of final ploughing. Paddy cultivar was transplanted on 21st July and was harvested on 9th December in 2013. Agronomic management practices and plant protection measures were followed as per the recommendation.

Statistical Analysis

The data obtained during the study were subjected to statistical analysis using the WASP. (Software developed by ICAR Research complex Goa).



RESULTS AND DISCUSSION

It is evident from the data presented in Table 1 that the application of 50 % N through RDF + 50% N through vermicompost recorded significantly highest grain and straw yield of paddy over treatments of organic compost added with different levels of RDF, inorganic sources alone and absolute control. The results revealed that growth attributes were increased with increase in level of RDF and N application through vermicompost. Application of 50 % N through RDF + 50% N through vermicompost significantly recorded higher growth attributes like plant height was 42.2 cm and 118.1 cm,

No. of tillers per plant was 8.7 and 12.1 at 45 DAT and at harvest, respectively. While growth attributes like plant height was 32.3 cm, 102.5 cm**,** No. of tillers per plant was 4.9, 7.4 were minimum in T_1 (control) at 45 DAT and at harvest respectively. Similar finding were also reported by (Mwale *et al*., 2000, Pramanik*,* 2007 and Ranjita *et al*., 2011). Application of organic manure along with chemical fertilizer accelerates the microbial activity (Rani and Srivastava, 1997), increases nutrients use efficiency (Narwal and Chaudhary*,* 2006) and enhances the availability of the native nutrients to the plants resulting higher nutrients uptake (Bhandari *et al.,* 1992). The data from Table 1 showed that yield components were increased with increase in level of RDF. Application of 50 % N through RDF + 50% N through vermicompost recorded higher panicle length (22.3 cm), grains per panicle (128.0), 1000-grain weight (19.7 g) and grain yield (4.97 t/ha.) (Fig 1) and straw yield (5.77 t/ha.) of rice variety GR 11. The yield components were minimum in T_1 (control), panicle length (16.1 cm), grains per panicle (100.8), 1000-grain weight (14.7 g), grain yield (2.76 t/ha.) and straw yield (3.53 t/ha.) of rice variety GR 11.

The yield advantage on the application of organic sources is due to their capability to supply essential nutrients other than N, P and K. Application of farm yard manure is known to increase concentrations of Fe, Mn, Zn, and Cu in rice. Higher nutrients uptake with the application of inorganic fertilizer might be due to higher nutrient concentration along with higher biomass production (Swarup and Yaduvanshi, 2006 and Banik *et al.,* 2006). Application of organic manure along With chemical fertilizer accelerates the microbial activity (Rani and Srivastava, 1997), increases nutrients use efficiency (Narwal and Chaudhary, 2006) and enhances the availability of the native nutrients to the plants resulting higher nutrients uptake (Bhandari *et al.,* 1992). Vermicompost applied plots built-up residual soil fertility because of slow release of nutrients and reduction of nutrient losses.

Conclusion

It can be seen from the above data that all the treatments were significantly higher than each other. The treatment T_5 (50% RDF + 50% N through vermicompost) was significantly higher than all other treatments in growth and yield parameters.

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