

Effect of organic and inorganic fertilizers on growth and yield of paddy

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ABSTRACT: A field experiment was conducted during the rainy (kharif) season of 2014 at Thane, Maharashtra, to study the effect of organic and inorganic fertilizers on growth and yield of paddy cv. GR 11. Different doses of fertilizers as per treatment were applied to all the plots except untreated control. Results indicated that higher growth attributes like plant height (43.9 cm & 116.5 cm), no. of tillers/no. of plant (8.6 & 12.2) at 45 DAT and at harvest respectively, panicle length (21.3 cm), no. of grains/panicle (125.3), 1000-grains weight (19.1g) and grain (4.64 t/ha) and straw yields (5.36 t/ha) were recorded in the treatment of 50% nitrogen through RDF + 50% nitrogen through vermicompost.

INTRODUCTION

Rice is the most important and staple food crop for feeding of more than two third populations globally. It is the only cereal that is eaten as whole grain and human selection down the ages has given preference to quality to cater to the needs of diverse rice based preparations. India is the world's second largest rice producer and consumer next to China. In the world, rice is cultivated on about 163.1 mha of area with total production of 722.5 mt and productivity of 4.4 t/ha (Anonymous, 2012). The India's rice production has reached to a record high of 104.32 mt from an area of 43.17 mha with productivity 2.42 t/ha in 2011-2012 (Anonymous, 2013). In Maharashtra state, rice is cultivated on 1.513 mha area in almost all four regions viz., Vidharbha (0.795 mha.), Konkan (0.383 mha.), Western Maharashtra (0.323 mha.) and Marathwada (0.12 lakh ha.) with annual production of 4.171 mt and 2.878 mt milled rice. The area (0.795 mha.) and production (1.681 mt) of rice crop is more in Vidharbha region while highest productivity was recorded in Konkan region i.e. 2.75 t/ha milled rice and 3.83 tha rough rice by production of 1.526 mt rough rice (10.53 lakh tonnes milled rice) (Anonymous, 2014), the present study was carried out, to study the performance of local variety GR-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 and to demonstrate the effectiveness of improved management practices in paddy cultivation.

MATERIALS AND METHODS

A study was carried out at the ASPEE ARDF Farm, Village- Nare, Taluka.- Wada, Dist.-Palghar (Maharashtra), during kharif 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 treatments were tested in Randomized Block Design three times. Total six treatments constitute of T₁: control, T₂: 50% RDF, T₃: 75% RD, T₄: 100% RDF, T₅: 50% RDF + 50% N through vermicompost and T₆: 75% RDF through inorganic + 25% through vermicompost were tried in 5m x 3 m plot. 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 was transplanted on 15th July and were harvested on 5th November in 2014. Recommended management practices and plant protection measures were followed. Observations on plant height, cm, no. of tillers/plant at 45 DAT and at harvest grain test weight (1000 grains), panicle length, cm, no. Of

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grains/panicle and grain and straw yields were recorded. The data obtained during the study were subjected to statistical analysis using the WASP. (Software developed by ICAR Research complex Goa).

RESULTS AND DISCUSSION

Plant height progressively increased with advancement of the age of crop. When organic sources of nutrients were applied and supplemented with inorganic sources of nutrients enhanced the nutrient availability and helped in increasing the plant height. Data on plant height of rice (Table 1) revealed that plant height increased progressively with an increase in the age of the crop. The plant height was found to be at par with application of 50% N through RDF + 50% N through vermicompost at 45 DAT (43.9 cm) and at harvest (116.5 cm) respectively, observations in the present study are in confirmedly with the finding report by (Mahapatra *et al.*, 2004).

In general, no. of tillers increased with crop age upto 90 DAT but, the number of tillers at maturity were slightly reduced. The application of 50 % N through RDF + 50% N through vermicompost recorded higher numbers of tillers at 45 DAT (8.6) and at harvest (12.2) respectively, similar observations on number of tillers were found by Sarawgi and Sarawgi, 2004.

With regard to yield, yield components increased with an increase in level of RDF. Application of 50 % N through RDF + 50% N through vermicompost recorded higher panicle length (21.3 cm), no. of grains/panicle (125.3), 1000-grain weight (19.1 g) and grain (4.64 t/ha.) and straw yields (5.36 t/ha.) of rice variety GR 11. These yield components were minimum in T₁ (control), panicle length (15.7 cm), grains/panicle (101.8), 1000-grain weight (14.1 g) and grain (2.57 t/ha.) and straw yields (3.57 t/ha.) Paraye *et al.*, 2006 also noted the similar trend as observed in the present study.

The yield advantage on the application of organic sources is due to their capability to supply essential nutrients in addition to 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 fertilizers might be due to higher nutrient concentration along with higher biomass production. Application of organic manure along with chemical fertilizers accelerated microbial activity, increased nutrient use efficiency and enhanced 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.

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

Treatment	Plant height (cm)		No. of tillers/plant		Test weight (g) (1000 grain)	Panicle length (cm)	Grains/panicle	Yield, t/ha.	
	45 DAT	Harvest	45 DAT	Harvest				Grain	Straw
T ₁	32.4	102.6	4.8	7.2	14.1	15.7	101.8	2.57	3.57
T ₂	36.3	106.5	5.5	8.7	16.0	17.1	109.0	3.15	4.17
T ₃	37.3	107.9	6.7	9.5	16.4	18.1	114.2	3.54	4.37
T ₄	41.1	109.9	7.2	9.9	17.2	18.8	116.7	3.80	4.58
T ₅	43.9	116.5	8.6	12.2	19.1	21.3	125.3	4.64	5.36
T ₆	42.6	113.0	7.8	10.9	18.5	19.9	122.2	4.24	5.07
S.Em.	0.21	0.33	0.11	0.14	0.16	0.18	0.79	0.06	0.06
C.D. (0.05)	0.68	1.03	0.35	0.44	0.50	0.56	2.48	0.19	0.18
CV%	0.95	0.52	2.83	2.49	1.63	1.67	1.18	2.78	2.19

CONCLUSION

It can be seen from the above data that all the treatments were significantly higher than each other. The treatment T₅ (50% RDF + 50% N through vermicompost) was significantly superior in growth and yield parameters of paddy cv. GR11 than all other treatments.

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