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Original Research Article

Application of micronutrients and farmyardmanure for enhancement in rice (oryza sativa l.) panicle weight

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Abstract

Rice (Oryza sativa L.) is an important crop in many countries. According to the IRRI, more than 2 billion people globally depend on rice as a staple food (Dawe *et al.* 2003). The use of micronutrients had significant effect on grain weight. The heavier grains were found in treatment where all micronutrients viz. zinc, boron and iron were applied in combination.(Qadir *et al.* 2013). The present work represents the effect of various micronutrients on the panicles weight of *Oryza sativa* L. genotype (IR-36, JR-3-45 and PAC-708). The variety PAC-708 recorded the highest panicle weight (1.93gm) being significantly superior to IR-36. The lowest panicle weight (1.53 gm) was recorded in case of IR-36. The highest no. panicles weight was obtained by combination of Multiplex+ $ZnSo_4$ + Farm yard manure (FYM) in all the three genotype (IR- 36, JR-3-45 and PAC-708) of rice from three replication experiment.

Key Words: *Oryza sativa*, Panicle weight, Genotype, Micronutrient, FYM.

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INTRODUCTION

Rice is a major staple food crop for many developing countries, not only as a main source of calories but also as an important source of income and employment for many farmers, particularly poor households. (Sharma *et al.*2014). R ICE (Oryza sativa L.) is the main cereal crop in India but its productivity is very low compared with that in other advanced countries like China, USA and Japan. The crop is generally fertilized by farmers with nitrogen, phosphorus and potassium only, though micronutrients are also equally important. Micronutrients are elements which are essential for plant growth, but are required in much smaller amounts than those of the primary nutrients, nitrogen, phosphorus and potassium. Micronutrients are as important as the primary and secondary nutrients in plant nutrition (Chaturvedi 2006). Application of micronutrients fertilization led to a significant increase in Zn and Fe concentrations in rice grains. The highest mean values of Zn and Fe concentrations were produced by application of mixture (Zn + Fe) when compared with the untreated in both seasons, respectively (Gomaa *et al.* 2015). The area for planting to flooded lowland rice in the dry season (DS) is largely limited by irrigation. Due to the looming scarcity of water, rice production in the wet season (WS), therefore, may be an important practice. In WS, however, cloudiness with resulting lower solar radiation is very common. Grain yield under wet season (WS) conditions has gradually received more attention due to looming scarcity of irrigation water, which limits the area for planting to flooded lowland rice in the dry season in the tropics. (Rebecca *et al.*2004) Expanding the sink size through increase in spikelet's per panicle has been proven as an effective approach to increase rice yield in China (Li *et al.* 2012; Zhang H *et al.*2013). Understanding the morphological and physiological traits associated with improved filling efficiency in large-panicle rice varieties is critical to devise strategies for breeding programs and cultivation management practices. Information on such traits, however, remains limited. (Meng *et al.* 2016)

MATERIAL AND METHOD

The present experiment was conducted at the regional Agricultural research station, Kuthulia Rewa (M.P.). The field experiments carry out during rainy season. Firstly soil sample were collected randomly through a soil auger up to 15cm depth from 10 different spots of the experimental plot and mixed them to form composite sample. The field experiment laid out in split –plot design during both the seasons. The treatments comprised of three genotype of rice and eight micronutrient levels thus forming twenty four treatment combinations. These treatments were randomly arranged in each replication, keeping in all three replications. The genotype were taken in the main-plots, and the micronutrient levels in the layout plan as depicted

Treatments	**Symbol**
Main-plots treatments (Genotypes 3)	
IR-36	G1
JR -345	G2
PAC-708	G3
Sub-plot treatment (Micronutrient levels 8)	
No Micronutrient (Control)	M0
25 Kg Zn So4/ha (Soil application)	M1
FYM@10 tones/ha	M2
FYM+25kg ZnSo4/ ha	M3
Multiplex (Foliar spray thrice)	M4
Multiplex+ ZnSo4	M5
Multiplex+FYM	M6
Multiplex+ ZnSo4+ FYM	M7

Table 1: Treatments' combinations: 24

1. G1M0	**9. G2M0**	**17. G3M0**
2. G1M1	10. G2M1	18. G3M1
3. G1M2	11. G2M2	19. G3M2
4. G1M3	12. G2M3	20. G3M3
5. G1M4	13. G2M4	21. G3M4
6. G1M5	14. G2M5	22. G3M5
7. G1M6	15. G2M6	23. G3M6
8. G1M7	16. G2M7	24. G3M7

Details of layout in the field
Experiment design: Split plot
Replications: three
No. of plot in one replications: 24
Gross plot size: 3.4m ×4.5m= 15.3 m^2
Net plot size: 4.0m × 3.0m= 12m2
Row and plant spacing: 20cm and 10cm
No. of rows per plot: 10
Replication border: 1.0m
Main plot and subplot border: 0.5m
Total no. of plot: 72

Table 2: Panicle weight (gm) as influenced by rice genotypes and Micronutrients, FYM and their interactions

Micronutrient level (M)	Genotype (G)			Mean
	IR-36	JR-345	PAC-708	
Control	1.03	1.20	1.18	1.13
ZnSo4 (25kg/ha)	1.26	1.69	1.57	1.50
FYM(10 t/ha)	1.50	2.03	2.05	1.86
ZnSo4+ FYM	1.93	2.31	2.32	2.18
Multiplex spray (thrice)	1.21	1.48	1.63	1.44
Multiplex+ ZnSo4	1.46	1.86	1.91	1.73
Multiplex+ FYM	1.77	1.92	2.19	1.96
Multiplex+ ZnSo4 +FYM	2.09	2.12	2.66	2.29
Mean	**1.53**	**1.82**	**1.93**	

RESULT AND DISCUSSION

JR-3-45 and PAC – 708 Recorded equally higher panicle weight (1.82 and 1.93 gm) being significantly superior to IR-36. The lowest panicle weight (1.53 gm) was recorded in case of IR-36. Indian soils have become deficient not only in major plant nutrients but also in secondary nutrients, like sulphur, calcium, and magnesium. Micronutrients such as zinc, boron and to a limited extent iron, manganese, copper and molybdenum have also been reported to be deficient widely in all the soils. (Radhika *et al*. 2013). Amongst the micronutrient levels, Multiplex + ZnSo4 + FYM recorded the maximum panicle weight (2.29 gm),being significantly superior to all rest of the treatment except (ZnSo4 + FYM in 2.18 gm).The lowest panicle weight (1.13 gm) was recorded in case of control treatment. The interaction genotype and micronutrients was found to be non-significant. However, PAC – 708 applied with Multiplex + $ZnSo_4$ + FYM resulted in the highest panicle weight (2.66 gm), while the lowest value (1.03 gm) was recorded in case of IR-36 grown without any micronutrients. Balancing the micronutrients for rice cultivation enhanced both the quality and yield of rice (Ma, 2007). Different micronutrients were applied to achieve the highest yield of rice (cv. IR-6). (Jamila *et.al.*2013). The results indicated that different micronutrients significantly affected most of the yield contributing parameters. (Qadir *et al* 2013). It is known that productive tiller percentage an panicle numbers are largely influenced by total solar radiation (Yoshida, 1981). The effects of panicle type and source-sink relation on the variation in grain weight (GW) and quality within a panicle were investigated using four japonica (Oryza sativa L.) varieties differing in grain density and two source-sink adjusting treatments. There were significant differences in GW and filling grain percentage (FGP) among superior and inferior grains for compact-panicle varieties. (Wang *et al*.2007).

CONCLUSION

The analysis of their variety of rice IR-36, PAC-708 and JR-3-45 for panicle weight is done Eight micronutrient treatment were given, in which higher panicle weight is of PAC-708 (1.93gm) and lowest weight is of IR-36 (1.53gm) Among the micronutrient level, Multiplex + $Znso_4$ +FYM recorded the maximum panicle weight (2.29gm) being significantly superior of all the treatment.

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