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RESEARCH ARTICLE

STUDIES ON THE EFFECT OF FOLIAR APPLICATION OF ZINC CHELATE (BOLD) AND IRON CHELATE (GRIP) IN RICE

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ABSTRACT

Field experiments was conducted at Experimental Farm, Annamalai University, Annamalainagar to study the effect of zinc chelated (BOLD) and iron chelated (GRIP) on the growth and yield of rice, during (Navarai 2009). The experiments were laid out in randomized block design. The experiments consists of nine treatments viz., (T_1) 2 gm (GRIP) in 1 ltr of water, (T_2) 2 gm(BOLD) in 1 ltr of water, (T_3) 3 gm (GRIP) in 1 ltr of water, (T_4) 3 gm (BOLD) in 1 ltr of water, (T_5) 2 gm liberal zinc chelate in 1 ltr water, (T_6) 2 gm liberal iron chelate in 1 ltr water, (T_7) 3 gm liberal zinc chelate in 1 ltr water (T_8) 3 gm liberal iron chelate in 1 ltr water, (T_9) control (no foliar spray). Among the different treatments tried, foliar application of zinc chelated (BOLD) @ 2 g in 1 ltr of water favourably influenced the growth components viz., plant height, leaf area index, dry matter production, grain and straw yield(5708 kg ha$^{-1)}$. This was followed by iron chelated (GRIP) @ 2 g in 1 ltr of water. The control treatment (no nutrient application) registered the lowest values in growth components and yield 3830 kg ha^{-1} of rice.

INTRODUCTION

Rice (*Oryzasativa* L.) is the most important staple food crop of the World, particularly in Asia. Rice not only provides more than half of the calorific need for the population, but also accounts for about three fourth of protein intake. To feed the exploding projected population of India's rice production target for 2025 AD is 140 million tonnes, which can be achieved only by increasing the rice production by over 2.0 milliontonnes per year in the coming decade. For achieving sustainability in food production, the rate of nutrient supply to crop plants should keeppace with the rate of nutrient removal by the crops. Unbalanced fertilizer use at higher yield levels is one of the major factors contributing to nutrient mining in intensive rice production. The projected demand of rice production could be achieved by maintaining the sustainable soil fertility by the application of balanced NPK fertilizer along with chelated micro nutrients. Zinc deficiency is a widespread nutritional disorder in rice. It's vital importance was made known after the discovery of widespread deficiency in rice which is commonly, known as Khaira disease. Hence, it is necessity for fertilizing the rice crop with zinc has been stressed by Fageria *et al*., 2002. Iron deficiency manifested as leaf chlorosis' was first recognized by Wallance and Lunt, (1960). Zinc and iron deficiency of the standing crop can be effectively corrected by foliar application of zinc and iron through simple and effective methods of providing nutrients to crop.

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Considering the above facts, field experiments were conducted to evaluate effect of foliar application Zinc Chelated (BOLD) and Iron chelated (GRIP) in rice.

MATERIALS AND METHODS

A field experiment was conducted at the Experimental farm, Department of Agronomy, Annamalai University, Annamalainagar during 2009 (Navarai). The soil of the experimental field is clay loam in texture with low in available nitrogen, medium in available phosphorus, high in available potassium and low in available Sulphur and Iron. The experiment comprising of Nine treatments viz., (T_1) 2 gm (GRIP) in 1 ltr of water, (T_2) 2 gm (BOLD)} in 1 ltr of water, (T_3) 3 gm (GRIP) in 1 ltr of water, (T_4) 3 gm (BOLD) in 1 ltr of water, (T_5) 2 gm liberal zinc chelate in 1 ltr water, (T_6) 2 gm liberal iron chelate in 1 ltr water, (T_7) 3 gm liberal zinc chelate in 1 ltr water (T_8) 3 gm liberal iron chelate in 1 ltr water, (T_9) control (no foliar spray). The trial was laid out in a randomized block design with three replication plot size was 5 x 4 m for crop seed rate is 60 kg ha^{-1} (ADT 43). N, P, K were applied in the form of urea, single super phosphate and muriate of potash at 120:38:38 NPK ha^{-1} respectively was followed as RDF. All the agronomic practices were carried out uniformly to raise the crop. The foliar spraying of Zinc chelated iron Chelated, liberal iron chelated, liberal; Zinc chelated @ 2 g and 3 g/lit was done as per the treatment schedule at 20 and 50 DAT using high volume sprayer. All the agronomic practices were carried out uniformly to raise the crop.

Effect of foliar application of zinc chelate (bold) and iron chelate (grip) on growth components and yield of rice

Treatments	Plant height at harvest(cm)	Numbers of tillers $hill^{-1}$	LAI at flowering	DMP at harvest kg ha^{-1}	Grain yield kg ha^{-1}	Straw yield kg ha^{-1}
(T_1)- 2 gm (GRIP) in 1 ltr of water	88.3	18.6	6.27	13127	5509	7618
(T_2) -2 gm (BOLD)} in 1 ltr of water	90.4	19.7	6.39	13569	5708	7861
(T_3) -3 gm (GRIP) in 1 ltr of water	84.1	16.5	6.00	12482	5270	7212
(T_4) -3 gm (BOLD) in 1 ltr of water	85.4	17.5	6.13	12885	5390	7495
(T_5) -2 gm liberal zinc chelate in 1 ltr water	82.6	16.0	5.82	12224	5135	7089
(T_6) -2 gm liberal iron chelate in 1 ltr water	80.9	15.5	5.69	11718	4855	6863
(T_7)-3 gm liberal zinc chelate in 1 ltr water	79.4	15.0	5.48	11386	4715	6671
(T_8) -3 gm liberal iron chelate in 1 ltr water	77.2	14.6	5.32	10995	4580	6415
(T_9) -control (no foliar spray)	74.5	14.1	4.91	9440	3830	5610
SEd	0.73	0.18	0.05	120.15	59	61
CD(p=0.05)	1.44	0.36	0.11	241	118	122

RESULTS AND DISCUSSION

In this study foliar application zinc chelated (BOLD) and iron chelated (GRID) had a favourable influence on growth characters and yield of rice. Foliar application of zinc chelated -2 gm (BOLD) in 1 ltr of water at 20 and 50 DAT recorded maximum plant height of 90.4 cm , number of tillers of 19.7, LAI at flowering 6.39, DMP of 13569 kg ha^{-1}at harvest, grain yeild of 5708 kg ha^{-1}. This treatment was followed by foliar application of iron chelated -2 gm (GRIP) in 1 ltr of water at 20 and 50 DAT. Zinc chelate application is responsible for many phsysiological function in plants. Zinc is constituents of several plant enzymes that relat many metolobic function in plants. Besides it is needed for the formation of plant auxins which is considering as plant growth promoting hormones that increased the plant height (Kandha *et al* 1997). Increase in tillers $hill^{-1}$ by application of Zn was reported by Naik and Das (2006) in rice. Increased number of tillers hill1 due to the application of Fe-chelate was reported by Singh *et al.,* 2007; Yarnia *et al.*, 2008.Increase in LAI due to application of zinc chelates is in conformity with the findings of Khanda *et al.* (1997). Iron plays a vital role in the formation of amino levulinic acid which is the precursor of chlorophyll (Miller *et al.,* 1982). This might be the reason for higher LAI in rice. With regard to dry matter production of rice, the highest DMP was registered with foliar application of zinc chelated (BOLD) @ 2 g in 1 ltr of water at 20 and 50 DAT (T_2). The next best was iron chelated (GRIP) 2 g in 1 ltr of water at 20 and 50 DAT (T_1). Increase in DMP due to application of zincchelates is in conformity with the findings of Srilakshminarayanan, 2001. Applicationof iron chelated increased the DMP might be due to inducedphotosynthesis and thereby accumulation of more DMP ultimatelyincreases grain and straw yield. These results are in consonance withthe findings of Bhamanyar and Piradshti (2008). The treatment T_2 recorded the maximum grain and straw yield. this might bedue to foliar application of Znas zinc chelated, the foliar feed zinc might have produced conducive physical environment coupled will good supply of zinc recorded (highest values of growth and yield components which ultimately increased the grain and straw yield of rice. The treatment T_1 was next in order. Foliar application of iron through iron chelated might have increased the photosynthetic activity there by accumulation of more DMP, ultimately increases the grain and straw yield. The results are in line with the findings of Bhamana andPradshti (2008).The lowest grain yield was recorded under control treatment.This might be due to lack of availability of adequate amount of essential nutrients to the plants which in turn affects proper development of growth and yield components resulted in low yield. The results are confirmed with the findings of Ramana *et al.* (2006) and Singh *et al.* (2007).

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