

Direct and Residual Effects of Boron and Zinc on Growth and Nutrient Status of Rice and Wheat Crop

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Abstract : The micronutrients boron and zinc deficiencies are extensive in the areas of rice-wheat cropping system. Optimum levels of these nutrients in soil are necessary for healthy crop growth. Since rice and wheat are major staple food of world's populace, the higher yields and nutrition status of these crops has direct effect on the health of human being and economy of the country. A field study was conducted to observe the direct and residual effect of two selected micronutrients boron (B) and zinc (Zn) on rice and wheat crop growth and its grain nutrient status. Each plot received either B or Zn at the rates of 0, 1, 2, 3 and 4 kg B ha⁻¹, and 5, 10, 15 and 20 kg Zn ha⁻¹, combined B and Zn application at 1 kg B and 5 kg Zn ha⁻¹, 2 kg B and 10 kg Zn ha⁻¹. Colemanite ore were used as source of B and zinc sulfate for Zn. The second season wheat crop was planted in the same plots after the interval period of 30 days and during this time gap soil was fallow. Boron and Zn application significantly enhanced the plant height, number of tillers, Grains panicle⁻¹ seed index fewer empty grains panicle⁻¹ and yield of rice crop at all defined levels as compared to control. The highest yield (10.00 tons/ha) was recorded at 2 Kg B, 10 Kg Zn ha⁻¹ rates. Boron and Zn concentration in grain and straw significantly increased. The application of B also improved the nutrition status of rice as B, protein and total carbohydrates content of grain augmented. The analysis of soil samples collected after harvest of rice crop showed that the B and Zn content in post-harvest soil samples was high in colemanite and zinc sulfate applied plots. The residual B and Zn were also effectual for the second season wheat crop, as the growth parameters plant height, number of tillers, earhead length, weight 1000 grains, B and Zn content of grain significantly improved. The highest wheat grain yield (4.23 tons/ha) was recorded at the residual rates of 2 kg B and 10 kg Zn ha⁻¹ than the other treatments. This study showed that one application of B and Zn can increase crop yields for at least two consecutive seasons and the mineral colemanite can confidently be used as source of B for rice crop because very small quantities of these nutrients are consumed by first season crop and remaining amount was present in soil which were used by second season wheat crop for healthy growth. Consequently, there is no need to apply these micronutrients to the following crop when it is applied on the previous one.

Keywords : residual boron, zinc, rice, wheat

Conference Title : ICSS 2018 : International Conference on Crop and Soil Sciences

Conference Location : Dublin, Ireland

Conference Dates : July 23-24, 2018