Effect of Phosphorus and Zinc Interaction on Vegetative Growth of Rice Grown in an Alfisol

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Growth and yield response of rice plants (*Oryza sativa*) to phosphorus (P) application is very low in P deficient Alfisols of Sri Lanka. Applied P could become unavailable by interacting with Zinc (Zn) in soil could be one reason. A net house experiment was conducted to study the effect of combined application of P and Zn fertilizers on their availability in soil and response of rice plant in a flooded Alfisol. Soil (Typic Rodaqualf) was collected from a lowland rice growing field in the dry zone of Sri Lanka. An availability study was conducted by applying combinations of P (0, 11, 22 and 33 mg/kg) and Zn (0, 1.1 and 2.2 mg/kg) to soil and measuring the Mehlich-3 extractable P and Zn contents. Same rates of P and Zn were applied to 5 kg of soil filled pots as triple super phosphate and zinc sulfate and planted with four germinated rice seeds. Growth parameters and P and Zn uptake were measured in 8 weeks. Zinc availability increased in soil but P availability decreased significantly ($P<0.05$) as rate of Zn application increases. Application of P reduced Zn availability in soil without increasing the P availability. However, none of these rates were able to increase the available P and Zn contents in the soil up to optimum rates. Plant height, number of productive tillers per plant and shoot dry matter content were not significantly ($P>0.05$) affected by P and Zn interaction. Application of P significantly ($P<0.05$) increased in shoot P concentration while application of Zn at 2.2 mg/kg significantly reduced shoot P concentration. However, these changes did not affect shoot P and Zn uptake significantly at rates used in this experiment. Further studies are required to study the effects of higher rates of P and Zn on their availability and plant responses.

Keywords: Alfisol, Nutrient availability, Nutrient uptake, Phosphorus, Rice, Zinc

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