

عنوان مقاله:

Growth and Chemical Composition of Corn in Three Calcareous Sandy Soils of Iran as Affected by Applied Phosphorus and Manure

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Phosphorus (P) fertilizer recommendations for calcareous-sandy soils low in organic matter need further investigation. Therefore, the objectives of this study were to evaluate the effects of P and manure on corn (*Zea mays* L.) growth and chemical compositions and P recommendations for calcareous sandy soils with low organic matter under greenhouse conditions. Treatments consisted of a factorial arrangement of P levels (0, 25, 50, and 100 mg kg⁻¹ soil as KH₂PO₄), manure rates (0, 10, 20 and 30 g dried sheep manure per kg soil) and three soils (Soil 1, sandy loam, initial P 10.8 mg kg⁻¹; Soil 2, sandy loam, initial P 7.6 mg kg⁻¹; and Soil 3, loamy sand, initial P 5.5 mg kg⁻¹) in a completely randomized design with four replications. Results showed that P application in Soil 1 decreased corn dry matter. However, application of 25 or 50 mg P kg⁻¹ soil increased corn yield significantly in Soils 2 and 3, respectively. Maximum corn yield was obtained when 30 g kg⁻¹ manure was added to sandy loam soils and 20 g kg⁻¹ to loamy sand soil. Application of P and manure significantly increased plant P concentration and uptake in all three soils. Zinc concentration in plants treated with Phosphorus was higher than in the control in soils 1 and 2. Such a trend was not observed in soil 3, but manure application increased it. Iron concentration in plants treated with P increased in soils 1 and 2 but was decreased in soil 3; however, manure application increased it in all soils. Plant Mn concentration and uptake responses to P and manure application was not consistent. Applied P, in general, increased plant Mn concentration in soils 1 and 2, but had no effect on plants in Soil 3. Manure effect on plant Mn concentration was not consistent. It seems that addition of manure to sandy soils can improve soil productivity and increase corn yield. Due to the low P buffering capacity of sandy soils, application of high rates of P can increase P concentration to an undesirable level in soil solution. This may depress plant growth and also availability of some micronutrients like Fe and Zn to corn plants. Therefore, P fertilizer recommendations for sandy soils should be based on the soil test P level. Manure application is recommended for sandy soils, due to its positive effects on nutrient uptake and plant growth. Prior to any phosphorus fertilizer recommendations for sandy soils the results of this experiment should be verified under field conditions and measuring P concentration in soil solution at different stages of plant growth is highly recommended.

کلمات کلیدی:

Corn, Phosphorus, Calcareous, Manure, Sandy

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