

## **Reducing Egypt rock phosphate use in Zea mays cultivation on an acid soil using clinoptilolite zeolite**

### **ABSTRACT**

Insufficient supply of P for initial growth of crops does not only limit N uptake but it also leads to poor yield of crops. In acidic soils of the tropics, sorption of P occurs mainly on surfaces of Fe and Al oxides and hydroxides. Most of the P added through mineral fertilizers is fixed by high Al and Fe oxide concentrations and transformed into insoluble P compounds. Reduction of Al and Fe is important so as to ensure adequate supply and readily available P for crops uptake. A number of studies using zeolites as an amendment in the fertilization programs of crops have improved crops production, nutrients uptake, and nutrients use efficiency. However, there is dearth of information on the use of clinoptilolite zeolite (CZ) to reduce P fixation not to mention reduction of N, P, and K fertilizers use in agriculture. This study was conducted to: (i) determine dry matter production, nutrients concentration, nutrients uptake, and use efficiency of Zea mays (Hibrimas variety) by including CZ in the fertilization program of Zea mays planted on an acidic soil, and (ii) determine the effect of including CZ in the fertilization program of Zea mays on selected chemical properties of an acidic soil. Egypt rock phosphate (ERP), urea, and muriate of potash were used in this study. Seventy five percent (w/w) of the recommended N, P, and K fertilizers for Zea mays were combined with CZ. Standard procedures were used to determine soil pH, inorganic nitrogen, available phosphorus, exchangeable aluminium, iron, potassium, calcium, magnesium, and organic matter before and after planting. Zea mays were harvested at tasselling stage and measured for dry matter production, nutrients uptake and use efficiency. The effect of CZ application with 75% of fertilizers (E2) and 100% fertilizers (E1) were statistically similar for selected soil chemical properties, dry matter production, nutrients concentration, uptake of nutrients, and nutrients use efficiency except for N. Nitrogen use efficiency for E2 was better than that of E1. These findings suggest that adoption of CZ with 25% reduction of N, P, and K fertilizers are useful. Further field trials and economic analysis are recommended to confirm the findings of this study. These aspects are being investigated in our on-going field experiments.

**Keywords:** Zeolites; Acid soils; Nutrient use efficiency; Fertilizers management; Rock phosphate