

## **Effect of zinc and phosphorus supply on the activity of carbonic anhydrase and the ultrastructure of chloroplast in sweet corn (*Zea mays* var. *saccharata*)**

### **Abstract**

Phosphorus (P) and zinc (Zn) interact with each other and this interaction can affect the yield of corn plants. This study was conducted to examine the effect of different levels of P and Zn on the ultrastructure of chloroplast and physiological characteristics of corn plants. Sweet corn was grown in nutrient culture containing all combinations of P at levels of 0.0 and 80.0 mg L<sup>-1</sup> as KH<sub>2</sub>PO<sub>4</sub> and Zn at levels of 0.0 and 20.0 mg L<sup>-1</sup> as ZnSO<sub>4</sub>·7H<sub>2</sub>O and harvested at 14 and 28 days after transplanting. Phosphorus (P) and zinc (Zn) concentrations in leaves increased with increasing P and Zn concentration in nutrient solution. Zinc supply did not affect P concentration but Zn concentration reduced with increasing P supply in nutrient solution at both harvests. The lowest amount of chlorophyll content was recorded in Zn<sub>20</sub>P<sub>0</sub> treatment due to the interaction of Zn with iron in the growth medium. Carbonic anhydrase activity in leaves was enhanced with increasing Zn levels and decreased with increasing P levels at both harvest times. Carbonic anhydrase activity is a better indicator of Zn nutritional status than Zn concentration alone. The ultrastructure of chloroplast was affected with P and Zn supply.

**Keyword:** Carbonic anhydrase; Chloroplast ultrastructure; Phosphorus; Transmission electron microscopy; Zinc