

**WANG, Y., STAB, A., HORST, W.J. (2004): Apoplastic binding of aluminum is involved in silicon-induced amelioration of aluminum toxicity in *Zea mays*. *Plant Physiol.* 136, 3762-3770.**

### **Abstract**

The alleviating effect of silicon (Si) supply on aluminum (Al) toxicity was suggested to be based on ex or in-planta mechanisms. In our experiments with the Al-sensitive maize cultivar Lixis, Si treatment but not Si pretreatment ameliorated Al-induced root injury as revealed by less root-growth inhibition and callose formation. Si treatment did not affect monomeric Al concentrations in the nutrient solution suggesting an in-planta effect of Si on Al resistance. A fractionated analysis of Si and Al in the 1 cm root apices revealed that more than 85% of the root-tip Al was bound in the cell wall. Al contents in the apoplastic sap, the symplastic sap and the cell wall did not differ between -Si and +Si plants. Si did not affect the Al-induced exudation of organic acid anions and phenols from the root apices. However, Al treatment greatly enhanced Si accumulation in the cell wall fraction reducing the mobility of apoplastic Al. From our data we conclude that Si treatment leads to the formation of hydroxyaluminumsilicates (HAS) in the apoplast of the root apex thus detoxifying Al.