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## Effects of Geohumus on Physiological Traits of Maize (*Zea mays* L. cv. Mikado) under Variable Water Supply

VAN NHA DUONG, FOLKARD ASCH

*University of Hohenheim, Inst. of Plant Production and Agroecology in the Tropics and Subtropics, Germany*

### Abstract

Drought is one of the most important abiotic factors affecting food security worldwide especially in arid or semiarid regions. Geohumus, known as a new generation of hydrophilic polymers, can absorb and release water for crops. Thus it was hypothesised that applying Geohumus to sandy soils (SS) would increase soil moisture resulting in improved performance of maize under water deficit conditions. Plants were grown in a split root system filled with 500 g SS (control) and 500 g SS mixed with 10 g Geohumus. The roots were divided between the two compartments and plants were watered daily to maintain field capacity. Fertiliser was supplied every three days in form of nutrient solution. 26 days after germinating, plants were subjected to one of three water supply levels (Full irrigation (FI) receiving 100 % FC; partial root drying (PRD) with half of the root system exposed to 100 % FC and the other half maintained at 50 % FC; and deficit irrigation (DI) with equal 50 % FC for both sides of root system) for 40 hours before sampling. At sampling plants were decapitated, root water potential determined in a scholander bomb and xylem sap sampled at permanent pressure 20 % above water potential for 10 min. Geohumus application compared to the plants grown in sand alone resulted in increases in pH<sub>xylem</sub> under DI, and strong increases in leaf and xylem abscisic acid concentration ([ABA]<sub>leaf</sub> and [ABA]<sub>xylem</sub>) under FI, PRD and DI. In contrast, there were significant decreases in leaf and root water potential and xylem osmotic potential under PRD and DI under Geohumus but leaf osmotic potential. However, no significant differences in photosynthesis, stomatal conductance, and transpiration between SS and Geohumus were found. In summary, plants with Geohumus application responded stronger to drought stress than those grown in SS.

**Keywords:** Physiological traits, SM, water deficit