

IWASAKI, K., MAIER, P., FECHT, M., HORST, W.J. (2001): Influence of the apoplastic silicon concentration on the manganese tolerance of Cowpea (*Vigna unguiculata* (L.) Walp.). J. Plant Physiol. (accepted)

Influence of the apoplastic silicon concentration on the manganese tolerance of Cowpea (*Vigna unguiculata* (L.) Walp.)

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Summary

The relationship between the manganese (Mn) and silicon (Si) concentrations in apoplastic washing fluids (AWF) and the severity of Mn toxicity symptoms were investigated in the leaves of the Mn-sensitive cowpea cultivar (*Vigna unguiculata* (L.) Walp. cv. TVu 91) in solution-culture experiments. The expression of Mn toxicity symptoms was prevented when 1.44 mM Si was supplied together with 50 μ M Mn. However, distinct Mn toxicity symptoms were observed in plants pretreated with 1.44 mM Si and then exposed to 50 μ M Mn without concurrent Si supply. The Mn concentrations in the AWF of leaves but not in the bulk-leaf tissue were decreased by both Si treatments. Independent from the Si treatment period, Si concentrations in the bulk-leaf tissue were increased. However, the Si concentrations in the AWF of the plants pretreated with Si were lower than those of plants supplied with Si and Mn concurrently. The severity of Mn toxicity symptoms and the guaiacal-peroxidase (POD) activity in AWF of these plants were not significantly correlated with the Mn concentrations in AWF but were highly significantly correlated with the Si concentrations in AWF. The results show that the decrease of Mn concentration in the apoplast caused by Si supply was insufficient to explain the enhanced Mn tolerance by Si supply. A possible role of apoplastic soluble Si was indicated.