

FECHE-CHRISTOFFERS, M.M, BRAUN, H.-P., LEMAITRE-GUILLIER, CH., VANDORSSELAER, A., HORST, W.J. (2003): Effect of manganese toxicity on the proteome of the leaf apoplast in cowpea (*Vigna unguiculata*). Plant Physiol. 133, 1935-1946.

Abstract

Excess manganese (Mn) supply causes formation of visible brown depositions in the cell wall of leaves of cowpea (*Vigna unguiculata*), which consist of oxidized Mn and oxidized phenols. Since oxidation of Mn and phenolic compounds in the leaf apoplast was proposed to be catalysed by apoplastic peroxidases, induction of these enzymes by Mn excess was investigated. Indeed, peroxidase activity increased upon prolonged Mn treatment in the leaf tissue. Simultaneously, a significant increase in the concentration of soluble apoplastic proteins in "apoplastic washing fluid" (AWF) was observed. The identity of the released proteins was systematically characterized by analysis of the apoplast proteome using two-dimensional gel electrophoresis and liquid-chromatography tandem mass spectrometry (LC-MS/MS). Some of the identified proteins exhibit sequence identity to acidic peroxidases from other plants. Several other proteins show homologies to pathogenesis-related proteins (PR), e.g. glucanase, chitinase and thaumatin-like proteins. Since PR-like proteins are known to be induced by various other abiotic and biotic stresses, a specific physiological role of these proteins in response to excess Mn supply remains to be established. The specific role of apoplastic peroxidases in the response of plants to Mn stress is discussed.