International Symposium “Root Research and Applications”
RootRAP, 2–4 September 2009, Boku – Vienna, Austria

# Is callose a barrier that does not enable penetration of the root cell protoplast in *Lemna minor* L. by lead ions?

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Plants have developed various resistance strategies: for example formation of physical and/or chemical barriers, which partly or completely limit the penetration of the organism by the stress factor. One of the common barriers used in plant cells is a callose layer. It can form a barrier protecting against both abiotic and biotic stress factors. Induction of synthesis of this cell component was also observed under the influence of trace metals: Al, Co, Ni, and Zn. In roots of *Lemna minor* treated with $Pb^{2+}$ ions, in spite of induction of callose synthesis in the root apex, Pb very quickly appeared in protoplasts. That is why the present study attempts to explain the cause of this phenomenon.

The treatment of *Lemna minor* L. plants with $Pb^{2+}$ resulted in intensified deposition of β-1,3-glucan (callose) in roots. It was localized in the protoderm and in the centre of the root tip (procambial central cylinder).

Callose distribution in *Lemna* root cell walls was only partly corresponded to lead localization. Very often, in walls containing numerous Pb precipitates, callose was not detected, and even if it was detected, then the number of signals for callose was much smaller than for Pb. A continuous callose bands were formed only local and they prevented the penetration by Pb only in a small area of the protoplast located in the immediate vicinity. Most of Pb deposited in walls was not separated from the protoplast by a callose layer. As a result, Pb was present in the protoplast.

In conclusion, callose, whose synthesis is induced in *Lemna* root cells under the influence of Pb, does not prevent effectively the penetration of the protoplast by Pb ions. The major, although not the only reason for this is certainly the rather limited, local distribution of callose in walls of individual cells.

Keywords: callose, lead ($Pb^{2+}$), root cell, duckweed, *Lemna*