

**THE EFFECT OF CADMIUM ON GROWTH, PROTON SECRETION AND MEMBRANE POTENTIAL IN MAIZE COLEOPTILE CELLS**

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It is generally accepted that cadmium is one of the most harmful of the metals which affect plant growth and development. The aim of the present study was to determine and clarify how different concentrations of cadmium influence the IAA and FC-induced elongation growth of maize coleoptile segments. Simultaneously, the effect on the growth – related changes in medium pH were measured. The effect of cadmium on membrane potential was also studied.

The growth experiments were carried out with 10 mm-long coleoptile segments obtained from 4-day-old seedlings. The segments, with the first leaves removed, were excised 3 mm below the tip of the coleoptiles. The growth of the coleoptile segments was measured as per the method described by Karcz et al. (1990, 1995). The membrane potential was measured by recording the voltage between a 3M KCl-filled glass micropipette inserted into the parenchymal cells and a reference electrode in a bathing medium of the same composition as used in the growth experiments (i.e. 1 mM KCl, 0.1 mM NaCl, 0.1 mM CaCl<sub>2</sub>, initial pH 5.8-6.0).

It was found that high concentrations of cadmium in the incubation medium significantly inhibited the endogenous, IAA and FC-induced growth of the maize coleoptile segments. Simultaneously with growth measured acidification of the medium was also inhibited by cadmium.

Cd<sup>2+</sup> ions added to the control medium caused a depolarisation of the membrane potential, which value and time-course was concentration - dependent. Hiperpolarisation of the membrane potential induced by FC was suppressed at high cadmium concentrations. It is suggested that high concentrations of cadmium inhibit electrogenic proton pump.

**REFERENCES**

1. Karcz, W., Stolarek, J., Lekacz, H., Kurtyka, R. and Burdach, Z. Comparative investigation of auxin and fusicoccin-induced growth and H<sup>+</sup>-extrusion in coleoptile segments of *Zea mays* L. **Acta Physiol. Plant.** 17 (1995) 3-8.
2. Karcz, W., Stolarek, J., Pietruszka, M. and Małkowski, E. The dose-response curves for IAA induced elongation growth and acidification of the incubation medium of *Zea mays* coleoptile segments. **Physiol. Plant.** 80 (1990) 257-261.