THE EFFECT OF SELENIUM ON THE ACCUMULATION OF SOME METALS IN PLANTS OF ZEA MAYS L. TREATED WITH IAA

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Selenium is a trace element which is known to be essential to man and animals. At high concentrations, selenium is toxic to plants. High selenium levels depress growth, and decrease organogenesis and protein and nucleic acid synthesis. Selenium affects metal distribution in the plants and sometimes increases the excretion of toxic elements. In this study, the aim was to investigate the effect of selenium on the accumulation of some metals (K, Na, Ca, Fe, Mg, Mn, Cu, Zn) in Zea mays L. plants treated with IAA.

The experiments were carried out with eight- to nine-day old maize plants (Zea mays L. var K33xF2) grown on Hoagland's medium at 25°C. The maize seeds were cultivated in the dark. The individual seedlings were transferred into an aerated solution containing macro- and microelements. The concentration of phytohormone (IAA) in the external medium was $10^{-4}$ mol dm$^{-3}$ and the concentration of selenium was $10^{-6}$ mol (NaHSeO$_3$) dm$^{-3}$, while the pH of the medium was 6.5. The accumulation of potassium, sodium, calcium, iron, magnesium, manganese, copper and zinc in the roots, mesocotyls and leaves of maize was measured by emission spectroscopy using a sequential spectrometer with (ICP-AES) technique. The analytical lines were: Se-196.026 nm, Zn-213.856 nm, Mn-257.610 nm, Fe-259.940 nm, Mg-279.806 nm, Cu-324.754 nm, Ca-317.933 nm, Na-589.592 nm, and K-766.490 nm. Standard solutions of the investigated elements (supplied by Merck) of 1 mg ml$^{-1}$ were used as a reference. Each sample of ca. 0.2 mg dry matter was treated with concentrated HNO$_3$ and digested. At the end of the mineralization, 30% H$_2$O$_2$ was added until mineralization was completed.

Our results indicate a significant dependence of the accumulation of some metals in the leaves, mesocotyls and roots on the content of IAA in the external medium of growing plants. Selenium ions affect the uptake, distribution and accumulation of nutrient elements in plant tissues, inducing an increased or decreased concentration of some of them in plant tissues (K, Na, Ca, Fe, Mg, Mn, Cu, Zn). The change of transport of some nutrient elements is probably one of the first observed symptoms of plant hormone and selenium effects on plants.