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Study accumulation of heavy metals by plants in field condition

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Heavy metal pollution in soil and water has becoming a serious problem for agriculture and health. An alternative soil remediation technology has been proposed that use rare, heavy-metal tolerant plant species that are able to hyperaccumulate metals in plant shoots. The accumulation of cadmium, lead and zinc by different cultivated plants from soils contaminated with heavy metals was studied in the vicinity of the Non-Ferrous-Metal Works near Plovdiv, Bulgaria. Cereals, leguminous crops, industrial crops (oil crops, fibre crops, tuberiferous and root crops, tobacco), ethereal-oil crops, medicinal and aromatic herbs were used in the study. The contents of the heavy metals in the plant material /roots, stems, leaves, flowers, seeds, etc./ was determined after the method of the dry mineralization. The quantitative measurements were carried out with ICP. A clearly distinguished species peculiarity exists in the accumulation of the heavy metals in the vegetative and reproductive organs of studied crops. The crops can be divided into four groups which differ considerably in their ability to accumulate heavy metals: (i) low accumulator (maize and peas); (ii) - moderate accumulator (barley, lentils, gram, sunflower, sesame, fennel, coriander, dill, peppermint, basil, cotton, potatoes, datura), (iii) high accumulator (wheat, soy bean, beans, rape, peanuts, anise, black mustard, flax, hemp, sugar beet, fodder beet) and (iv) hyperaccumulator (Salvia sclarea L. and tobacco). Each one of the crops from these groups can be successfully grown in slightly polluted calcaric fluvisoils. Concentrations of Cd, Pb and Zn in the seeds of peas and corn of maize were low, even at polluted soils (Cd -27 mg/kg, Pb - 914 mg/kg, Zn -1904 mg/kg). The crops from this group are suitable for growing in strongly polluted soils. The crops from the second, third and four groups can be recommended for growing in industrially polluted regions, as they are mainly used for processing. Salvia sclarea L. was the most perspective

crop from family Lamiaceae for growing in industrially polluted region - a very good hyper-accumulator of heavy metals and could be used for cleaning the toxic metals from polluted soils, as well as the end product (oil) can be used in the perfumery and cosmetics and tobacco industries.