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Abstract

During the last fifty years phenomenal progress has been made in several areas of ecology of different toxic elements in soils. Concerns regarding heavy metals contamination in the environment affecting all ecosystem componets, including “soil-plant-animal-human” chain (SPAHC), have been identified with increasing efforts on limiting their bioavailability. Many sites have been identified as hazardous (H) waste (W) sites (S)(HWS) because of the presence of elevated concentrations of these elements. In 2000, the main cadmium actual transfer index (“ATI” by Márton 2004) maximum and minimum values in the case of maize 4-6 foliaged phenophase ranged between +22.0- -89.2%. compared with control soils. The grain “ATI” maximum and minimum values changed between +14.4- -89.2% as opposed to unterated plants. The highest yields reached around 10 t* ha-1. These study shows maize has ability to a different degree to cadmium bioaccumulation from soil to corn and by these way for “FOOD CHAIN”.

Key words: Phosphorous, Fertilization, Cadmium, Translocation, Corn

Introduction

Nowadays, sustainable (S) precision (P) agricultural (A) production (P)(SPAP) has become the major issue following global changes in all the world over. It is well known that it has strongly established on soils. The functioning and their ability to supply nutrients, store water, release gases, modify pollutants, decrease physical degradation and produce crops is profundly influenced by their fertiliy. During the last fifty years phenomenal progress has been made in several areas of ecology of different toxic elements in soils (ATSDR 1997, 1999; ANZECC 1992; CWP 1995; COC 2004; DEFRA 2002; EDF 1998; HSC 2005; IARC 1993;). Concerns regarding heavy metals contamination in the environment affecting all ecosystem componets, including “soil-plant-animal-human” chain (SPAHC), have been identified with increasing efforts on limiting their bioavailability (Magher 1991; NEPC 1998; NDH 1986; NTP 1991). Many sites have been identified as hazardous (H) waste (W) sites (S)(HWS) because of the presence of elevated concentrations of these elements. They will remain a threat to the environment until they are removed or immobilized. We can test and improve these situation by using different plant species, as corn (Zea mays L.) x macro nutrients as phosphorous experimental methods. Maize has a very great biomass (B) production (P) potential (P)(BPP) and important role in soil fertility by the design of plant rotation to field plant production, the animal foraging as a fodder-crop with a high carbohydrate (70%)

and protein (10%) content (70%) and via pytoremediation possibilities. Cd is considered to be a nonessential element for maize, it is effectively absorbed by both the root and leaf system. By these ways a great proportion of the cadmium is to be accumulated in root tissues, even when Cd enters the plant via foliar system from the polluted air and precipitation. The most chief geobiochemical property of cadmium ions is their strong affinity for sulfhydryl groups of several compounds (OSHA 1992; Richardson 1992; RAIS 1991; Sittig 1991; TAP 1999; WA 1996; WHO 1992, 2001). Furthermore Cd shows an affinity for other side chains of protein and for phosphate groups too. The Cd content of maize is of the highest concern as a Cd reservoir and as the patway of cadmium to soil-plant-animal-man chain (FOOD CHAIN). Thus, tolerance and adaptation of corn to higher Cd levels, although important from the environmental poin of view, create a helth risc.

Material and Method

The phosphorus (P2O5) mineral fertilization and cadmium loading effects were studied in a long-term field experiment set up at Experimental Station of the Research Institute for Soil Science and Agricultural Chemistry of the Hungarian Academy of Sciences on a calcareous chernozem soil at Nagyhörcsök in 1977. The soil had the following agrogeochemical characteristics: pH (KCl) 7.3, humus 3.0%, ammonlactate (AL) soluble-P2O5 60-80 mg*kg-1, AL-K2O 180-200 mg*kg-1 in the plowed layer. From 1977 to 2000 the experiment consisted of 4x3x2x4=96 plots in split plot design. The gross plot size was 4.9x7=34.3 m2. The fertiliser rates in kg* ha-1 of phosphorus (P2O5) were 0, 100 (in every year from 1977), 2000 (in 1977), 4000 (in 1997) and kg*ha-1*year-1 of cadmium were 0, 70 from 1992 to 2001.

Results and Discussion

In 2000, the main cadmium actual transfer index (“ATI” by Márton 2004) maximum and minimum values in the case of maize 4-6 foliaged phenophase ranged between +22.0- -89.2%. compared with control soils. The grain “ATI” maximum and minimum values changed between +14.4- -89.2% as opposed to unterated plants. The highest yields reached around 10 t* ha-1. These study shows maize has ability to a different degree to cadmium bioaccumulation from soil to corn and by these way for “FOOD CHAIN”.

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