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CADMIUM CONTENT DETECTED IN FORAGE SPECIES GROWING IN A HEAVY METAL CONTAMINATED SITE AND IMPLICATIONS FOR THE FOOD CHAIN

Simonetta Bullitta, Francesca Serralutzu, Giovanna Piluzza

ISPAAM CNR, Sassari, Italy

Background and Aims

Cadmium is a non-essential metal found as environmental contaminant both from natural occurrence and from industrial and agricultural sources. According to the European Food Safety Authority (EFSA), food is the dominating source of overall cadmium exposure for adult nonsmokers. Also, polluted areas may show higher cadmium concentrations in locally produced food and usage of cadmium-containing fertilizers in agriculture increases cadmium concentrations in the crops and derived products.

In the frame of a project aimed at selecting plant-microbe associations useful for phytoremediation purposes in a heavy metal (HM) polluted area in the Sulcis-Iglesiente region, we screened the accumulation of Cd and other HMs in different plant parts of several spontaneous herbaceous species occurring in a HM polluted area and grazed by ruminants, with the aim to check the potential dangers that such plant species can represent for the food chain safety.

Methods

A field experiment was performed in a HM polluted derelict mine site where local populations of plant species belonging to the botanic families Leguminosae, Graminaceae, Compositae and Brassicaceae were grown in 30 cm spaced rows, experimental design was

a randomized block with three replicates and 24 plants per plot. Plant development and biomass production and cadmium concentration in plant tissues were determined by means of an atomic absorption spectrophotometer, also other HMs and nutrient elements were determined. A pot experiment was also performed to determine Cd partition in roots and shoots of the plant species.

Results

In the field experiment, the average foliage Cd concentration ranged from 8 mg kg⁻¹ in *Pisum sativum* to 2.5 mg kg⁻¹ in *Lolium rigidum*. In the pot experiment *Cichorium intybus* had significantly higher Cd concentration in shoots, *Lotus ornithopodioides* and *Pisum sativum* in roots.

Conclusions

Considering the Cd content detected in the plant species under study, it is not likely that sheep grazing such plant species in the area ingest the critical dose that will produce chronic toxicity in sheep (approximately 2.5 mg kg⁻¹ body weight per day); it should anyway be considered that a dose > 0.5 mg kg⁻¹ body weight per d for 1 year is likely to produce subclinical effects in sheep according to Wilkinson et al. (2003) and Prankel (2002).