CADMIUM ACCUMULATION AND TOLERANCE STRATEGIES IN INDIGENOUS FORAGE GRASSES

Shamima Sabreen[1], Shu-ichi Sugiyama[1], M Hasinur Rahman[2] and Suguru Saiga[3]

[1]Faculty of Agriculture and Life Science, Hirosaki University, Hirosaki, Japan.
[1]PlusGroup Ltd., Newnham Park, Tauranga, New Zealand
[3]Faculty of Agriculture and Life Science, Iwate University, Morioka, Japan

Excessive toxic metal levels in soils pose considerable hazards to human and animal health. Cadmium (Cd) is considered an important environmental soil pollutant as it is readily absorbed by plants and has the potential to enter the food chain. Cadmium levels have increased in soils throughout the world including USA, New Zealand and Japan, where great quantities of phosphate fertilizer are required for intensive cultivation. Grasses are excellent candidates for phytoremediation because of their high biomass production, high adaptability and low management costs. Few studies of phytoextraction of Cd have been undertaken for interspecific variation among grasses. Because Cd hyperaccumulation is an unusual biological phenomenon and the ecological significance of this trait remains largely obscure, this study was therefore, conducted to assess interspecific responses and phytoextraction abilities of C_3 grass species for Cd applications in hydroponics to clarify their potential for phytoremediation of Cd. Populations of 30-day-old C_3 grass species, i.e., *A. alba*, *A. odoratum*, *D. glomerata*, *F. arundinacea*, *F. pratensis*, *L. multiflorum*, *L. perenne*, and *P. pratensis* were grown hydroponically for 15 days with different concentrations of Cd (0, 5, 10 and 50 μ*M*). For each species, shoot biomass, the proportion of growth inhibition (GI, %), shoot Cd concentration and accumulation, shoot nutrient uptake, and the proportion of uptake inhibition (UI, %) of nutrient minerals were evaluated. Effects of Cd application included stunted growth. The GI was increased 16% to 70% with increasing Cd concentrations. For all Cd treatments, *L. multiflorum* showed the highest shoot dry biomass. Shoot Cd concentrations negatively influenced mineral nutrient uptake. The highest Cd treatment caused UI of various elements by 40% to 95%. At 50 μM Cd treatment, Cd accumulation varied by twenty times among species, and *L. multiflorum* showed the highest Cd accumulation (116.46 μg·plant^{-1}). Our results indicate that *L. multiflorum* exhibited high degrees of both Cd tolerance and phytoextraction among grass species.

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