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Sulfur Supply Increases the Cadmium Uptake by *Panicum maximum* cv. Massai

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Background/Objectives. Cadmium (Cd) is a potentially toxic element present in the environment. Thus, it's important to reduce its concentration in the environment to avoid a decrease in food production and Cd contamination of soil and organisms. In this context, phytoextraction is a promising alternative to meet this demand, since this technique is viable and inexpensive. However, it's necessary to identify the plants that have potential to accumulate Cd due to the toxicity caused by this heavy metal. It's important to mention that damage caused by Cd is inevitable, but can be attenuated when there is adequate sulfur (S) supply. Sulfur is a component of metabolic compounds such as amino acids (cysteine), antioxidants (reduced glutathione - GSH), phytochelatin (PCs) and metallothionein (MTs), which operate in Cd detoxification. In this context, our objective with this study was to evaluate the effect of S supply on the Cd uptake by *Panicum maximum* cv. Massai (Massai grass).

Approach/Activities. The Massai grass was grown in a greenhouse, using pots with 2 L of nutrient solution. Combinations of three S rates (0.1, 1.9 and 3.7 mmol L^{-1}) and three Cd rates (0.0, 0.1 and 0.5 mmol L^{-1}) were added in nutrient solution. Seeds were added to germinate in expanded vermiculite irrigated with deionized water in the first 14 days and in nutrient solution modified to attend 0.1 mmol L^{-1} S (diluted to 25% of ionic strength) in the 9 days following. After 23 days of growth, five seedlings were transplanted to the modified nutrient solutions to meet only S rates. Nineteen days after this stage was provided the nutrient solutions were modified to meet S and Cd rates for a period of 7 days. Seven days after the Cd exposure, plants were harvested and the Cd concentration was determined in roots, stems and leaves by optical emission spectrometry with inductively coupled plasma (ICP-OES) after nitric-percloric digestion of plant material. The Cd accumulation was obtained by multiplication of Cd concentration and biomass production. Data were submitted to analysis of variance (F test) and comparison of means by a Tukey test (p<0.05).

Results/Lessons Learned. The Cd concentration in roots of Massai grass was 422.02; 447.10; 440.64; 1093.80; 1230.96 and 1580,85 mg kg^{-1} dry mass, while the Cd concentration in stems was 155.11; 172.46; 248.88; 871.97; 933.03 and 1117.72 mg kg^{-1} dry mass, and in leaves the Cd concentration was 159.32; 135.40; 123.06; 818.98; 983.39 and 1068.79 mg kg^{-1} dry mass, when plants were grown with the following combinations of S (mmol L^{-1}) and Cd rates (mmol L^{-1}): 0.1+0.1; 1.9+0.1; 3.7+0.1; 0.1+0.5; 1.9+0.5 and 3.7+0.5. There was no effect (p>0.05) of S in the Cd concentration of plants exposed to 0.1 mmol L^{-1} Cd, but the Cd concentration in the tissues of Massai grass exposed to higher Cd rate increased (p<0.05) with the higher S supply. The highest accumulation of Cd in roots, stems and leaves of Massai grass (p<0.05) were observed when the plants were exposed to higher Cd rate, and the plants grown with 1.9 mmol L^{-1} S showed the highest accumulations of Cd (p<0.05) in roots (175.31 µg/plant), stems (704.54 µg/plant) and leaves (470.33 µg/plant). From the results presented it's evident that the S supply of 1.9 mmol L^{-1} increases the capacity of Cd uptake by Massai grass.

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