PHYTOEXTRACTION POTENTIAL OF INDIAN MUSTARD AS INFLUENCED BY A RANGE OF ZINC CONCENTRATIONS IN SOLUTION CULTURE

Abstract

Zinc is the heavy metal occurring in the greatest concentrations in the majority of wastes arising in modern, industrialized communities and is one of the most common metals found at metal-polluted sites. Phytoextraction is a plant-based remediation technology aimed at the removal of metals from contaminated sites through the use of metal-accumulating plants. Although Indian mustard (*Brassica juncea* Czern.) has been identified as a moderate accumulator of Zn, little is known about the Zn-phytoextraction potential of this plant at different levels of Zn exposure. Our objectives were to determine how the level of Zn exposure influences plant growth, accumulation of Zn in plant tissues, and development of nutrient deficiencies for different metal-accumulating accessions of *B. juncea*. In the experiment, three *B. juncea* accessions (426308, 182921, and 211000) were supplied with 12 levels of Zn (0.0 to 7.0 mg L^{-1}) in a solution-culture experiment. Three weeks after the initiation of treatments, plants were harvested, and the dry mass and nutrient concentration of plant parts were determined. *Brassica juncea* accessions did not differ in ability to concentrate Zn in shoots, but accession 426308 exhibited a greater capacity for dry mass accumulation than other accessions. Although differences in dry mass among accessions became increasingly less as the concentration of Zn in solution increased, accession 426308 exhibited the greatest Zn accumulating ability. Elevating the supply of Zn in solutions had a limited effect on increasing the total Zn in shoots, primarily because increasing concentrations of Zn in plant tissues were accompanied by a suppression of plant growth. Plants suffered Zn-induced Fe deficiency if the supply of Zn in solution exceeded 2.0 mg Zn L^{-1}, a condition that undoubtably affected plant growth. Although Zn tolerant, the Zn phytoextraction potential of *B. juncea* may be limited by suppressed growth and nutrient disorders related to high levels of Zn in the root medium.