COMPARISON OF THE ACTIVITY OF SOME ANTIOXIDATIVE ENZYMES IN THLASPI CAERULESCENS CULTIVATED WITH HEAVY METALS IN THE SOIL OR IN HYDROPONICS

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Thlaspi caerulescens plants are commonly known as Zn and Cd hyperaccumulators. The seeds of a heavy metal-resistant ecotype of Thlaspi caerulescens were collected from a population from the mine tailings and former smelter sites at Plombieres (Belgium). The seeds were sown in soil bought in a market. Seven-week-old plants were transferred to a nutrient solution, and exposed to different Cd and Zn concentrations. The leaves were harvested and analyzed after the plants had been exposed to metals for 7 days. The results were compared to those for control plants. Other plants were cultivated in the soil from the sites of seed collection for 10 weeks in a greenhouse in Limburgs Universitair Centrum in Diepenbeek. Some morphological differences among the plants cultivated in the soil from Plombieres were observed; they allowed us to divide the plants into three groups.

We studied the activity of some antioxidative enzymes – superoxide dismutase (SOD), ascorbate peroxidase (APX), guaiacol peroxidase (GPX), and catalase (CAT). For hydroponically cultivated plants, it was found that SOD activity decreased in Cd-treated plants, but increased at the highest Zn concentration. APX activity was almost unchanged in the presence of Cd, and showed higher activity than the control at lower Zn concentrations. At higher Zn concentrations, the activity was lower than that in the control. In Cd-treated plants, GPX activity was lower than in the control, but it was enhanced at the highest Zn concentration. CAT activity always decreased in the presence of Cd, Zn and combinations of the metals in the nutrient solution.

For the soil cultivated plants, the activity of SOD, APX and GPX was higher than in control, but CAT activity was lower than in control. The greatest changes in the activity of the antioxidative enzymes were observed in the group of plants with purple- and violet-coloured leaves.

Catalase seems to be the most sensitive enzyme to heavy metal stress in Thlaspi caerulescens.

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