RESPONSE OF THE GARDEN CRESS (*LEPIDIUM SATIVUM*) TO KEROSENE AND CADMIUM POLLUTION

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Abstract: The aviation industry is assumed to release many dangerous chemicals into the air. The damage caused is often evident locally, as the dilapidated state of the herbage gives unmistakable signs of pollution. These environmental pollution problems have led us to the idea to design an experimental setup to test the effect of these two global contaminants on our chosen test plants, garden cress (*Lepidium sativum*), via observation of the plants' bio-physiological response, namely the vitamin C change, the number of the sprouted seeds, the deviation of the root, stalk and leaf dimension compared to the control plants. The occurrence of hormetic dose-response in a Cd-polluted plant is detected during vitamin C investigation in the case of 1 mg kg-1 soil Cd concentration.

Several experiments were set up for the tests. The garden cress (*Lepidium sativum*) was chosen as the test plant. This plant has a high vitamin C content and can be consumed in at least two weeks. First, the seeds are, in general, potting soil and in an average sample of soil from the airport that was already purchased earlier. First, it was tested whether there was a difference in the number of hatched plants. There was a significant difference in the number of plants that hatched. Significantly more plants germinated in the general potting soil. I also investigated the difference between the physical parameters of these samples and whether they vary over time. It was measured root and stem lengths and leaf area on graph paper. The statistical analysis showed no significant difference in root length, but there is a significant difference in the stem and leaf area of the plants, which persists over time. The stems of the plants were longer in the average soil near the airport, and the leaf area was more significant in the general potting soil. Since different soil properties could influence the results obtained in this study, this was reproduced in this experiment by artificially contaminating the general potting soil previously used as a control with cadmium and kerosene. This experiment also observed that the contamination resulted in less seed germination than the control soils. As far as the physical parameters of the plants are concerned, it can be concluded that cadmium can be tolerated by the plants up to a certain level so that no significant difference is observed at lower cadmium contamination levels. The investigations also included measuring the vitamin C content of the plants grown in the soil by HPLC. It was found that on the 25th day after sowing, the vitamin C content was below the detection limit. However, in the first measurements, the vitamin C concentration significantly differed between the two soil-grown crops. The vitamin C concentrations of the garden cress plants grown in general potting soil were higher than the average samples from the airport. A significant difference was also detected in the plants grown in artificially contaminated soil due to the treatment.

The vitamin C content of garden cress plants grown in soil contaminated with 1 mg/kg Sa cadmium was significantly higher than the others. The other treatment investigated the effect of the kerosene induced in the plants. It sprayed the plants with 2 and 4 g JET A-1 type kerosene. The amount proved to be too high. The plants started to sag after only an hour, and by the next day, they had all died. Another treatment was sown seeds from the ordinary and bio garden cress in Petri dishes four times as much as before. One part of the cress samples was treated with cadmium, the other was sprayed with kerosene, and one-third was used as a control. On days 10, 11, and 14, after sowing, their vitamin C content was measured using HPLC. No significant difference was detected between the vitamin C content of the ordinary and bio seeds. The same result was obtained when I

analysed the samples sprayed with kerosene. The samples sprayed with kerosene showed a significant difference in time. The statistical analysis of the vitamin C content of the cadmium-treated samples gave similar results, so the treatment did not cause a considerable difference. Still, there is a significant difference in time. The plants accumulate cadmium in their bodies in detectable amounts within 24 hours. Atomic absorption spectrophotometry measurements detected this. An essential difference between the samples was detected. The cadmium in the treated samples is almost twice as high as in the control. Comparing cress with other plants - lettuce (*Lactuca sativa*) and white mustard (*Sinapis alba*) – it was found that although the other two plants are more sensitive to the presence of cadmium - they do not hatch after 72 hours of incubation in the dark after treatment with different cadmium solution series - cress is still able to produce viable germination initiative in the more dilute solutions.
Garden cress, with its excellent bioaccumulation capacity and relative insensitivity to lower cadmium concentrations, is a prime candidate for phytoremediation procedures. This is a testament to its adaptability and resilience, which should leave the audience impressed by its potential.
Keywords: Cadmium; Garden cress (*Lepidium sativum*); Hormesis; Kerosene Vitamin C