

Effects of Cd-contaminated soil on growth of radish  
(二十日大根の成長に及ぼすカドミウム汚染土壌の影響)

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**Background:** Pollution of agricultural soils with heavy metals has become increasingly serious concerns throughout the world. Heavy metals in the soil can be taken up by plants through roots and translocated to organs where it can accumulate to high levels. Cadmium (Cd) has been found to accumulate in many soils and is one of the most dangerous heavy metals for human health. In addition, Cd is considered to be one of the most mobile elements which can easily enter the food chain. In this study, to clarify how cadmium contained in soil accumulates in food plants, French breakfast radish was grown in pot with Cd-contaminated soil. In addition, the growth of the plant was recorded and the changes in Cd concentration and nutrients of each part of the grown plant were measured.

**Methods:** Three series of pot experiments (Exps. 1 to.3) were carried out to investigate the variation of Cd uptaken from Cd-contaminated soil. Totally 37 seeds of French breakfast radish (*Raphanus sativus*) were grown on soil with various concentrations of Cd by  $\text{CdCl}_2 \cdot 2 \frac{1}{2} \text{H}_2\text{O}$  (0 to 100 ppm). Plant growth was recorded for X days and the harvested plants were separated into roots, stems, leaves or seedlings. Vitamin C, vitamin A and chlorophyll contents in each part were measured by kits and UV/VIS spectrophotometry. The concentrations of metals (Cd, Zn, Ca, Cu and Na) in soil and radish were measured with Hitach Atomic Absorption Spectrometry.

**Results and Discussion:** Growth of French breakfast radish in the Cd-administered group was significantly delayed as compared with that in the control group. Probably observed delay was due to the decrease of chlorophyll a/b contents. However, in, 5 ppm, 10 ppm and 20 ppm Cd-contaminated soil, interestingly biomass of radish stems and leaves was increased than those obtained from control soil. The concentrations of Zn, Ca and Cu were increased with soil containing high concentrated Cd. Cd, Zn, Ca, Cu and Na were most enriched in roots. There is no significant difference on Vitamins A and C contents among plants grown in soil with 0 to 100 ppm Cd. As the results demonstrated, it can be concluded that this cultivar is not suitable for cultivation in Cd-contaminated soil because the radish accumulated mainly Cd in the roots. In that sense, it is not edible and may be used to repair soil contaminated with Cd; however, further studies are needed to confirm that radish can be used for remediation of Cd in soil.