

【Workshop 1】 Development of phyto-technology for decreasing heavy metal in food
Cadmium uptake of *Arabidopsis halleri* ssp. *gemmifera* is affected by
not only cadmium content in soil but also two factors, i.e. pH and zinc
concentration in soil.

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Based on CODEX standard, domestic cadmium standard in food is under discussion. Phytoremediation is considered as one of feasible countermeasures, especially from the viewpoint of low cost and low impact to cropping soil. *Arabidopsis halleri* ssp. *gemmifera* is brassica plants, which was reported as hyperaccumulator of zinc and cadmium. It was reported that the plant showed resistant to high concentration of cadmium and accumulated 200 to 1,700 mg·kg⁻¹ of cadmium in the shoot. However little is known concerning their performance on cadmium uptakes under less contaminated condition or other factors, such as pH or coexistent ions. In the present study, we report the effect of pH and zinc concentration on cadmium uptake of *A. halleri* ssp. *gemmifera* in hydroponics and field trials. Hydroponic trials were carried out in which the nutrient solution contained 0.05, 0.5mg Cd/L x 0.05, 0.55, 5.05mg Zn/L. As the result, cadmium uptake by the plants increased as increasing the concentration of zinc as well as cadmium in the nutrient solution. On the other hand, zinc uptake by the plants was not significantly affected by the concentration of cadmium. In the condition, cadmium uptake by the plant was affected not only cadmium but also zinc, therefore it can be important to take the concentration of other cations, i.e. zinc into consideration. The field trials were conducted for two year (2007 and 2008) with pH variation by some soil additives such as elemental sulfur(S) and autoclaved lightweight concrete (ALC). Addition of S and ALC made soil pH changed from 6.4 to 4.7 and 7.3 respectively, 7 month after. Cadmium uptake increased 141% with S addition, whereas it did not change respectively with ALC addition. The low pH with S made cadmium availability in soil and cadmium uptake into the plant increased. It suggests that the efficiency of phytoremediation can be increased with the sulfur addition, however it is important to monitor

cadmium movement to prevent leaching cadmium below the root zone and groundwater. Adding ALC was less effective for the cadmium uptake, so the phytoremediation with the plants can be used even after pH correction with ALC to prevent rice or vegetable from taking up cadmium. As the conclusion, cadmium uptake by *A. halleri* ssp. *gemmifera* is affected by two factors, i.e. pH and zinc concentration. Expectation of cadmium uptakes was quite important for planning the phytoremediation, but more works are requested to clarify the relationship the uptake and the other factors. (405 words)