Recently, cadmium (Cd) accumulation in soybean seed is one of the serious agricultural problems. However, characteristics of Cd transport and accumulation in soybean plants are unclear so far. In this study, it was characterized that the mechanism of Cd transport in soybean plants using mixed tracer, which included ^{107}Cd (half-life: 6.5 hr) and ^{109}Cd (half-life: 453 d). We described the dynamics of ^{107}Cd transport in the test plants using the positron-emitting tracer imaging system (PETIS); which presents a movie of changing distribution of a positron-emitting radioactive tracer within an intact test plant (Fujimaki 2007). The ^{109}Cd was used in the experiments with autoradiography and well-type counter to study Cd distribution within the same plant individuals.

Soybean (*Glycine max* [L.] Merr. cv. Williams) plants were grown with hydroponic culture in a growth chamber. Plants at beginning seed stages (R5) were transplanted to plastic tubes containing 0.5 mM $CaCl_2$ solution and subjected to the experiments. The test plants were placed between a set of PETIS detector heads in another growth chamber. Cd tracer (including ^{107}Cd and ^{109}Cd) was added to the $CaCl_2$ solution with 0.1 μM non-radioactive Cd. ^{107}Cd is positron-emitting tracer and detectable by PETIS, but ^{109}Cd is not. The imaging was performed for 36 hours. After the PETIS experiments, the test plants were transferred to a fresh culture solution excluding Cd and grown. The plants were sampled at about 2, 3 and 5 days after the point of Cd feeding. The sampled plants were pressed with heated iron. ^{109}Cd distribution in the test plants was analyzed using autoradiography and well-type counter.

In the field of view of PETIS, Cd appeared in the shoot base about a few hours after Cd feeding and moved upward through the stems. In most cases, Cd reached the upper most node within 36 hours. With the autoradiography, weak signal was detected in the seeds and pods at 2 days after Cd feeding, while no signal was detected in the leaves. It indicates that Cd is transferred to the pods and seeds without passing through leaves by this moment. Results with well-type counter revealed that approximately 90% of Cd absorbed by the test plants was distributed into the roots at 2 days after Cd feeding. The distribution of Cd in the roots decreased at 3 and 5 days after Cd feeding. On the other hand, the distribution of Cd in the seeds, pods, leaves and petioles with time. These results suggest that a large part of Cd accumulated in the roots first, and then moves into the shoot parts on a time scale of day.

REFFERENCE

Fujimaki S. (2007) *ITE letters on Batteries, New Technologies and Medicine* 8; C1-C10