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## **Improvement of P Recovery Rate in an Uncultivated Non-Allophanic Andisol Using Fermented Chicken Manure Pellets and P Foraging Root Growth of Japanese Radish**

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In Andisols, most of the fertilized phosphorus is sorbed by active Al and Fe, and P recovery rate is low in general. Because of this, P fertilizer was applied heavily and P has accumulated in the soils. There is concern about depletion of phosphate rock resources in the near future. Therefore, it is necessary to improve the P efficiency in the agricultural systems. The lateral roots of *Brassica rapa* nothovar. grow around P fertilizer and cover P fertilizer as if the roots are foraging P in P deficient soil (Nanzyo et al. 2004 Plant and Soil 265, 325-333). Japanese radish also shows this feature, and the radish shows higher P recovery rate than the average rate. The objective of this study was to examine the effect of fermented chicken manure pellets (FCMP) on growth of the radish and the P recovery rate in comparison with the alginate gel beads in which dicalcium phosphate dehydrate was suspended (DCPD-GB).

Japanese radish was planted in wooden frames, 120 cm long, 50 cm wide and 50 cm deep, filled with Kanuma pumice as subsoil and an uncultivated non-allophanic Andisol, collected from Integrated Terrestrial Field Station of Tohoku University, Ohsaki City, Miyagi Prefecture, Japan, as a plow layer soil. Three treatments were applied to the soil as large DCPD-GB (about 1.5 cm in diameter), small DCPD-GB (about 0.8 cm in diameter) and nil P in spring crop. The amount of applied P in the DCPD-GB treatments was 1.0 g P<sub>2</sub>O<sub>5</sub> per plant. In autumn cropping, FCMP was applied 0, 0.25, 0.75, 1.5 g P<sub>2</sub>O<sub>5</sub> per plant.

Lateral roots of radish completely covered DCPD-GB. But the diameter of taproot was less than 7 cm that is a typical taproot diameter of commercial Japanese radish. The P recovery rate obtained by the large GB and small GB treatment was 21% and 28%, respectively. These rates were higher than typical rate.

In the treatments with FCMP, lateral roots of radish covered FCMP. In addition, the lateral roots penetrated into the pellet. In the treatment with 1.5 g P<sub>2</sub>O<sub>5</sub> FCMP, the diameter of taproot exceeded 7 cm. P recovery rate by the radish in the treatment with 0.25 g P<sub>2</sub>O<sub>5</sub>, 0.75 g P<sub>2</sub>O<sub>5</sub> and 1.5 g P<sub>2</sub>O<sub>5</sub> was 32%, 42% and 35%, respectively. Thus, the Japanese radish with FCMP showed higher P recovery rate than the rate shown with DCPD-GB.