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著者	Hara Shintaro, Shimizu Toshinori, Uno Toru, Tajima Ryosuke, Ito Toyoaki, Saito Masanori
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Phosphorous Uptake from Organic Matter via AM fungi - Possible Involvement of Phytate-Degrading Bacteria -

**Shintaro Hara, Toshinori Shimizu, Toru Uno, Ryosuke Tajima,
Toyoaki Ito and Masanori Saito**

Tohoku University, Japan

Introduction

Plants uptake nitrogen from organic matter in soil via AM fungi (Hodge *et al.*, 2001). Major compartments of phosphorous (P) in organic matter are phytate. Though phytate degrading-bacteria are frequently isolated from soil, AM fungi lack extracellular phytase. In this study, we investigated the possibility of P uptake from phytate in organic matter via AM fungi interacting with phytate-degrading bacteria.

Materials and Methods

Seedlings of Lotus (*Lotus japonicus* B-129 'Gifu') were cultivated in a sterilized loamy soil-sand mixture (ratio 1:1) with/or without inoculation of AM fungi (*Rhizophagus irregularis* or *Claroideoglossum etunicatum*). After 9 weeks, the young plant was transferred to plastic pot containing 300 g of sterilized loamy soil-sand mixture. A mesh bag (37- μ m mesh) which contains soil as microorganism inoculum (farmland soil or forest soil, 4.0 g dry weight) with/or without phytate-rich organic matter (mixture of crushed soy bean seeds and crushed buck wheat seeds, total 0.8 g) was set under the plant in each pot. After 6 weeks, plants were harvested, and dry weight and P concentration were determined. Phytate-degrading bacteria were isolated from organic matter in mesh bag.

Results and Discussions

Plant growth and P uptake were increased in *R. irregularis* with organic matter treatment. This result suggested that organic P were degraded by soil organism and released inorganic P were uptaken by plant via AM fungi. Total 109 phytate-degrading bacteria were isolated and most of these were *Burkholderia* sp. or *Pseudomonas* sp., and these were isolated from all treatments. On the other hand, five strains of *Rhizobium* sp. were isolated from only *R. irregularis* inoculated treatment.

References

Hodge A, Campbell CD, Fitter AH (2001). An arbuscular mycorrhizal fungus accelerates decomposition and acquires nitrogen directly from organic material. *Nature*, 413: 297-299.