



Tropentag, September 17-19, 2014, Prague, Czech Republic

“Bridging the gap between increasing knowledge and decreasing resources”

## Strains of *Trichoderma* sp. and their Capacity to Mobilise Phosphorus

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### Abstract

Soil microorganisms may enhance the plant availability of phosphorus (P). This ability is related to the production of organic acids and the activity of phosphatases. Whereas organic acids affect the pH and the solubility of mineral P compounds, phosphatases control the organic P mineralisation. We evaluated 21 strains of *Trichoderma* sp. regarding their potential to increase the P availability. At first, Petri dishes with NRBIP medium were inoculated with the fungi to estimate the solubilisation of  $\text{Ca}_3(\text{PO}_4)_2$  by measuring halo zones after 8 days incubation. Four promising strains belonging to *Trichoderma koningiopsis* sp. (Th003 and Th013) and *Trichoderma asperellum* (Th019 and Th204) were selected for further investigations. To quantify the phosphate solubilisation capacity 50 mL of NRBIP liquid medium were inoculated with the fungi and the concentration of ortho-P ( $\text{mg mL}^{-1}$ ) were measured after 5 days of incubation. Activities of acid and alkaline phosphatases (in units (EU) of p-nitrophenol  $\text{mol min}^{-1} \text{L}^{-1}$ ) were determined by using Pikovskaya's culture. Finally, the effect of these four strains of *Trichoderma* sp on the plant growth of maize (*Zea mays*) and tomato (*Solanum lycopersicum*) were evaluated under greenhouse conditions. Highest ortho-P concentrations of more than  $100 \text{ mg mL}^{-1}$  were measured for Th013 and Th204, whereas the ortho-P concentrations for Th003 and Th019 were lower than  $20 \text{ mg mL}^{-1}$ . The strain Th013 also showed a higher activity of acid phosphatase than the other strains tested, with an EU value of 4.26, followed by the strain Th204 with a value of 1.01 EU. However, the strain Th013 was not superior regarding its effect on plant growth. Neither for maize nor for tomato increased values for shoot or root weight and length, number of leaves or stem diameter were found when Th013 was applied. Probably, the plant available P concentration in soil was not the limiting factor and clearer results can be expected on soils with lower P contents.

**Keywords:** Phosphatases, phosphorus, *Trichoderma*