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Improved Mycorrhisation in Tomato by Soil Inoculation with *Pseudomonas* sp. Proradix®

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Abstract

Arbuscular mycorrhizal fungi (AMF) are regarded as an important factor for the uptake of phosphorus (P) and other relatively immobile nutrients particularly in low input systems. Furthermore, AMF support healthy growth of plants being involved in the resistance against toxic elements and suppression of pathogens. In arable land, however, mycorrhisation of plant roots may often be insufficient as a consequence of few AMF propagules, competition with deleterious soil microbes or stunted root growth. Large-scale soil inoculation with appropriate AMF is usually not practicable considering the costs and problems of inoculum production. As an alternative single studies have shown the potential for application of beneficial rhizobacteria to improve root infection with the indigenous, site-specific and adapted AMF flora.

In this study, the effect of a commercial fluorescent *Pseudomonas* ssp. train *Pseudomonas* sp. proradix® (Proradix®, Sourcon-Padena GmbH & Co. KG, Tübingen, Germany) on mycorrhisation improvement, nutrient acquisition and growth of tomato (*Lycopersicon esculentum* Mill.) plants was tested in a green house experiment. Tomatoes are an important vegetable produced in Indonesia. This investigation is a prerequisite for the ongoing development of bioeffectors useful under humid tropical conditions.

Two tomato seeds were cultivated in pots containing 1.7 kg dry matter of a loess/sand mixture (3:1) with increasing levels (approx.: 0; 800; 4000; 8000 propagules per pot) of AMF-inoculum (*Glomus intraradices* strain 510, Mycotec Biotechnik Gbr, D-30419 Hanover) with and without *Pseudomonas* sp. proradix® (1.5×1010 cfu per pot). 100 N, 50 P, 150 K, 50 Mg, 0.06 Fe mg kg^{-1} loess dry matter were fertilised.

Proradix® significantly improved the establishment of AMF in tomato roots. Root and shoot biomass production of tomato was positively affected by Proradix®, which was particularly pronounced in the soil without AM-inoculum. The P-concentration in tomato shoots increased with increasing application rate of the AM-inoculum, whereas the additional effect of Proradix® was small and only observed in the treatments with low rates of AM inoculation. Manganese concentrations in shoot tissue declined with increasing AM application rates and were additionally lowered by Proradix®. The results suggest that *Pseudomonas* sp. proradix® is a mycorrhisation helper bacterium.

Keywords: Fluorescent Pseudomonades, low input systems, mycorrhiza helper bacteria, mycorrhizal management

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