

Roongroj Pitakdantham 2007: Studies on Enhancing the Effects of Arbuscular Mycorrhizal Fungi on Maize under Field Conditions. Doctor of Philosophy (Soils), Major Field: Soil Science, Department of Soil Science. Thesis Advisor: Emeritus Professor Amnat Suwanarit, Ph.D. 165 pages.

Arbuscular mycorrhizal (AM) fungi are obligate symbionts which grow and reproduce only in the roots. Generally, AM fungal species are identified by the differences in spore morphotypes and process of sporulation. In a present study, PCR-RFLP technique, using *HinfI* and *TaqI* as restriction enzymes, could be used to identify *Glomus aggregatum* in the form of spores and in colonized roots of maize in pure pot culture. This technique confirmed the morphological identification of *Scutellospora fulgida*, even when single spore was used. The present pot and field experiments were carried out to examine effect of some factors on AM fungi applied to maize. The results led to the following conclusions. The growth promotion effect of AM fungi decreased with increasing rates of P fertilizer but was not affected by N fertilizer. Different AM fungal species required different N:P ratios to attain their maximum root colonization and spore production. For each species, maximum root colonization and maximum spore production were obtained with different N:P ratios. No relationship was observed between degree of root colonization or intensity of spores produced by AM fungi and maize dry matter yield. Downy mildew resistance in maize had no effect on the response of maize to AM fungi. The maize cultivar requiring higher rates of N and P fertilizers responded to AM fungi lower than the cultivar requiring lower rates of N and P fertilizers. In two field experiments, the enhancing effects of *G. aggregatum* on maize growth were found either to remain constant or to slightly increase when 10 successive cropping were done within 5 years and 4 months. Repeating AM fungal inoculation in the following cropping had growth promoting effect on maize when maize plants were not under severe N stress but had negative effect on maize plants grown under severe N stress. Seven recommendations were presented.

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Thesis Advisor's signature

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