

Roles and application of arbuscular mycorrhizal fungi in environmentally friendly agriculture

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Arbuscular mycorrhizas (AM) exhibit mutualistic symbiosis between fungi in phylum glomeromycota and most terrestrial plant roots. It has been well-documented that the major benefit to plants from this relationship is improvement of water and inorganic nutrient, especially phosphorus, uptake. Additional benefits include increased tolerance of environmental stresses such as nutrient deficient soil, drought conditions, salinity and pathogens.

Modern agricultural practices such as fertilization, biocide application, and monoculture affect the community composition and diversity of AM fungi. In general, these agricultural practices have negative impacts on AM association. Soils in the conventional agricultural system are AM fungi-impoverished, particularly with regards to numbers of species. Management practices typical of conventional high input systems, particularly P fertilizer application and the use of biocides, are known to be deleterious to AM fungal symbiosis. Although the effect of biocides on AM symbiosis is complex and not easily predictable, overuse of most biocides reduces AM fungi colonization rates and spore production. Low-input organic farming systems in environmentally friendly agriculture have increasingly garnered interest due to their focus on natural resource conservation and reduction of environmental degradation. Organic fertilizers do not appear to suppress AM fungi and may even stimulate them. Our results show that AM colonization, fungal spore population, glomalin-related soil protein (GRSP) and species diversity of AM fungal community in organic farming system is significantly higher than in conventional farming system. However, the actual importance of AM symbiosis to particular crop species in organic farming remains to be determined. It is also well-known that different species of AM fungi have varying effects on plant growth, and high input conventional farming may select particular AM fungal species. It is important that this is considered in production of AM fungal inoculum.

In the last decades, interests in the production and application of AM fungi for agricultural

purposes has increased in the world. The application of AM fungi can be beneficial in production of crops and would contribute to reduced input of chemical fertilizers and pesticides in agriculture. Therefore, organic farming system is the suitable environment for the development of AM fungal system and for successful application of AM fungi with economically profitable results. Still, there are major problems in production of high quality and quantity of AM inoculum due to their obligate relationship of the symbiosis. Current state of art of production and application of high quality of AM fungal inoculum would be presented and the future perspectives as well as their limitations would be addressed.