THE IMPACT OF ARBUSCULAR MYCORRHIZAE FUNGI IN SUSTAINABLE AGRICULTURE

Ebrahim Sedaghati
Department of Plant protection, Agriculture Faculty, Vali-e- Asr University of Rafsanjan, Iran

Arbuscular Mycorrhizal fungi (AMF) are naturally occurring organisms that form mutually symbiotic relationships with nearly 90%of plants including grasses, forbs, shrubs and trees. They function as a collection system for their host plants, accessing moisture and nutrients up to 50 times more efficiently than non mycorrhizal plants. Mycorrhizal fungi have existed since the first plants appeared on dry land more than 450 million years ago. Mycorrhizae form a network of hyphae that associate with plant roots and draw nutrients from the soil that the root system would not be able to access otherwise. The increased capacity of plant roots for water and nutrients uptake from the soil when colonized by AMF is the main mechanisms proposed to explain the effect of AM in plant performance. This fungus-plant alliance stimulates plant growth and accelerates root development. Mycorrhizal fungi play a major role in soil aggregation through hyphae networking and glomalin (biological glue) production. Therefore, their presence in the soil is essential to maintain physical soil properties. Mycorrhizal fungi allow plants to draw more nutrients and water from the soil. They also increase plant tolerance to different environmental stresses. Moreover, these fungi play a major role in soil aggregation process and stimulate microbial activity. Arbuscular Mycorrhizae provide more different benefits to the plants and to the environment: Produce more vigorous and healthy plants. Increase plant establishment and survival at seeding or transplanting, Increase yields and crop quality, Improve drought tolerance, allowing watering reduction, enhance flowering and fruiting, optimize fertilizers use, especially phosphorus, increase tolerance to soil salinity and reduce disease occurrence specially soil borne pathogens. AM fungi are recognized as high potential agents in plant protection and pest management. In several cases direct biocontrol potential has been demonstrated, especially for plant diseases caused by *Phytophtora, Rhizoctonia, Fusarium* and *Meloidogyne* pathogens. Several studies have confirmed synergism between AMF and biocontrol agents such as *Burkholderia cepacia, Pseudomonas fluorescens, Trichoderma harzianum* and nitrogen fixing bacteria such as *Rhizobium, Bradyrhizobium* and *Azotobacter*. AMF contribute to maintain soil quality, nutrient cycling and control soil water/wind erosion. However, in soil that has been disturbed by human activity, the quantity of Mycorrhizae decreases drastically so that there are not enough of them to produce a significant benefit on plant growth and health, hence the importance to compensate for this lack. In agricultural research, the goals of sustainability may be summarized in their briefest form as 'maximum plants production with a minimum of water and fertilizers application and soil loss'. Within this context of balanced agrosystem inputs and outputs, the roles of the AMF have been described as that of a fundamental link between plant and soil. In case of reforestation, there is an increasing effort to reforest degraded forests and old agricultural lands. However, reforestation of degraded lands is often difficult and is usually expensive but in many cases mycorrhizal fungi have a key factor in establishment of plants in these depredated lands. In recent years that organic and sustainable products, reduction in chemical fertilizers application, biological control of plant pathogens is a goal of governments, producers and food safety organizations, AMF in addition to other benefits microorganism can accessible this kind of production.

Key words: Mycorrhizae, organic agricultural products, sustainable agriculture