

Intact extraradical mycelium - a strategy for arbuscular mycorrhizal fungi in agricultural systems

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Abstract

Arbuscular mycorrhiza are known to contribute to host plant P acquisition and protection against both biotic and abiotic stresses. However the practical exploitation of this mutualistic relationship is rarely considered in agricultural systems, allegedly owing to the cost of inoculation and the requirement for timely colonisation. AMF colonisation starting from an intact extra-radical mycelium (ERM) takes place faster than when initiated from other AMF propagules. We report on the ability of an intact ERM developed by indigenous AMF population on mycotrophic plants (developers) to significantly improve the subsequent AMF colonisation of wheat, subterranean clover and maize. This mechanism allowed the protection of wheat and subterranean clover from excessive Mn, leading to a greater growth of the crop (2.7 and 4.7 times, respectively). Using the same strategy to promote the AMF colonisation of maize, the crop was able to exhibit high levels of colonisation, even up to 45 kg of P per ha of applied P, and the plants took advantage in terms of P use efficiency. Our results indicate that the use of intact ERM as preferential source of AMF inoculum is a valid strategy to increase the role of this symbiosis under marginal or more intensive cropping systems. This strategy can easily be implemented in cropping systems through simple adaptations to both crop rotation and tillage practices.