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Influence of nitrogen and phosphorus sources on mycorrhizal lettuces under organic farming

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Arbuscular mycorrhizal fungi (AMF) develop symbiotic associations with plants roots. These associations are very common in the natural environment and can provide a range of benefits to the host plant. AMF improve nutrition, enhance resistance to soil-borne pests and disease, increase resistance to drought and tolerance to heavy metals, and contribute to a better soil structure. However, agricultural intensive managements, such as the use of mineral fertilizes, pesticides, mouldboard tillage, monocultures and use of non-mycorrhizal crops, are detrimental to AMF. As a consequence, agroecosystems are impoverished in AMF and may not provide the full range of benefits to the crop. Organic farming systems may be less unfavourable to AMF because they exclude the use of water-soluble fertilisers and most pesticides, and generally they plan diverse crop rotations. The AMF develop the most common type of symbiosis in nature: about 90% of the plants are mycorrhizal and many agricultural crops are mycorrhizal. One of more mycorrhizal crops is lettuce, that is very widespread in intensive agricultural under greenhouse. Therefore, cultivated lettuce is know to be responsive to mycorrhizal colonization which can reach 80% of root length and contribute to phosphorus and nitrogen absorption by this plant specie.
For this work four different lettuce cultivars (Romana, Milanesa, Grande Lagos and Escarola) were used to study mycorrhization under organic agricultural system, supplying compost from agricultural waste (1 kg m-2) as background fertilization for all plots, red guano as phosphorus source (75 U ha-1 and 150 U ha-1 of P2O5), lupine flour as nitrogen source (75 and 150 U/ha of N) and a combination of both. Lettuce plants were cultivated under greenhouse and after two months of growing, plants were harvested and dried and fresh weight of lettuce roots and shoots were evaluated. The number of spores, percentage of colonization, total mycelium and glomalin content were also evaluated as mycorrhizal parameters.
The results showed a different response to mycorrhization of the four lettuce Cvs. In general, mycorrhized lettuce plants had a better response to lower level of nitrogen and phosphorus sources.