

EFFECT OF VESICULAR ARBUSCULAR MYCORRHIZAL INOCULATION ON THE YIELD AND PHOSPHORUS UPTAKE OF BARLEY

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ABSTRACT

Roots of barley plants are usually infected with vesicular arbuscular mycorrhizal (VAM) fungi in arable fields. The likely effects of this infection on the crop yield and P uptake were investigated in a pot experiment conducted under natural field environments. Barley plants were grown in an unsterilized or methyl bromide fumigated (sterilized) field soil with or without mycorrhizal inoculation. Inoculation caused 268% increase in overall levels of VAM infection over uninoculated controls and the relative increase was significantly higher in sterilized than unsterilized soil. Dry matter yield was significantly reduced (21%) in inoculated compared with uninoculated treatment plants, whereas, it was significantly increased (22%) in sterilized compared with plants grown in unsterilized soil. P concentration in plant components was significantly increased by mycorrhizal inoculation. Phosphorus uptake per unit weight and length of root were significantly higher by 38 and 43 percent, respectively in inoculated than uninoculated treatments.

The higher yields of dry matter in sterilized than unsterilized soil were attributable to the increased release of nutrients as a consequence of decomposition of soil biota killed by the process of soil sterilization, whereas the effect of fungus on host plant was beneficial in terms of improved plant P nutrition or quality of the produce, but a simultaneous marked reduction in dry matter implied a parasitic effect of the endophyte, possibly due to root density and level of available soil P higher than the threshold limit of positive mycorrhizal plant growth response. Clearly there may be a need for the careful manipulation of VAM populations in cereal fields.