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Arbuscular Mycorrhizal Fungi Infection in Wheat Roots - Effect of Genotypes, Location and Management

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Abstract

Wheat (*Triticum aestivum* L.) as one of the major food crops is grown under limited water and low nutrient supply conditions in many regions of the world. Therefore, improvement of wheat yields through enhanced nutrient efficiency by using arbuscular mycorrhizal fungi (AMF) as a component of integrated nutrient management strategy is of considerable importance.

A set of field experiments at four locations were conducted on research farm of CCS Haryana Agricultural University, Hisar in north India. The wheat variety WH157 showed highest grain yields at all fertiliser levels whereas ‘WL711’ only exploited its potential at intensive fertiliser and irrigation level. Under low input conditions (reduced fertiliser, low water level) ‘IWP72’ showed highest yield. The differences among varieties were more conspicuous at reduced fertiliser level with exception of one location. The root length was significantly influenced by location, wheat genotypes and the interaction. Averaged over 3 varieties the root length at anthesis differed about 30% between locations. ‘IWP72’ had the lowest root length and ‘WH157’ reacted most sensitive by changes of the root length of all locations. The wheat root infection rates by the native mycorrhiza of the soil ranged from 0–70%. The identified mycorrhiza spores belonged to the families Glomaceae, Acaulasporaceae and Gigasporaceae and *Glomus*. Fertiliser levels and location showed apparent influence on the number of mycorrhiza spores and infection intensity. No vesicular-arbuscular mycorrhizae (VAM) infections of the wheat roots were found at the location where waste water instead of canal water was applied. Soil tests revealed almost double content of plant usable Olsen-P, higher C-content and most appropriate C/N ratio compared to the other locations. Certainly this is one reason for high grain and biomass yield. Although the number of VAM spores existing in the soil (170 spores 100g⁻¹ soil) was just as high as the comparable experimental plots the wheat roots were not infected. Sensitivity of AMF spores to heavy metals in waste water or higher soil nutrients and lack of plant signals to VAM may be possible reasons for non infection.

Keywords: VAM, wheat, India, cultivars