

**COMPARISONS OF NO-TILLAGE AND
CONVENTIONAL COTTON WITH EVALUATIONS
OF MYCORRHIZAL ASSOCIATIONS**

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resulting from NT culture was a positive factor contributing to rapid growth and maturation of NT cotton at this site.

Abstract

Increased yield of cotton has been observed with no-tillage (NT) following winter wheat cover compared with conventional tillage (CT); however the reasons for NT benefits have remained unclear. The objectives of these studies were to document differences in plant growth between the two tillage systems, and to investigate possible interactions between vesicular-arbuscular mycorrhizal (VAM) fungi and cotton plant performance. Two primary questions were addressed. First, how much benefit is provided cotton by the NT system as compared with CT? Second, do VAM fungi contribute to increased growth of cotton?

Growth and maturity of cotton were influenced by tillage. Cotton plants fully emerged on May 12 were 25 percent taller and had developed 12 percent more nodes in NT soil than in CT soil by the final measurement date of July 6, 1996. Although there was no direct proof that VAM contributed to improvements in growth and maturation, observations were consistent with such a role. There was greater plant growth in NT soil as could be promoted by a VAM hyphal network, while other soil differences were likely involved. Plants in NT soil under field conditions continued rapid growth during an extended dry period. Growth of plants in CT soil was reduced even though NT plants had greater stomatal conductivity and transpiration rates. NT plants were better supplied with water than were CT plants even though water potential readings were similar for plants in the two tillage systems.

Plants had significantly more VAM colonization sites per centimeter of root in NT soil than in CT soil. Nylon mesh with 60 micron openings placed around roots contained greater numbers and length of VAM hyphae in NT soil than in CT soil when removed for inspection at the end of the study. Plants with root systems enclosed by the root-restricting nylon mesh absorbed more ³²P from placement sites outside the mesh in NT soil than in CT soil, an indication of hyphal absorption. Increased VAM activity