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Natural Resources Research Update

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Title: Spatial and temporal variability affect soil microorganism activity in high production corn systems.

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Text: Soil microorganisms are involved in residue decomposition, nutrient cycling, and plant health. Understanding the spatial and temporal variability in microbe activity and the role of soil management is essential for maintaining the soil biota. A field study demonstrated that soil exhibited spatial variation in inherent properties (e.g. depth of topsoil, clay content) but soil microorganism did not. Soil microorganisms were associated with soil organic C fractions and these associations were most likely related to the role of microorganisms in soil aggregation (Grigera et al., 2006). The distribution of soil microorganisms is influenced by management practices such as in-row cultivation where redistribution of crop residue creates an enhanced zone for soil microorganisms when residue is concentrated in the row. This enhanced zone may benefit the crop as nutrients in the residue become available (Grigera et al., 2007a). Mycorrhizal fungi positively affect plant growth and play an important role in P nutrition. Mycorrhizal fungi may benefit high production corn crops by facilitating P uptake during the reproductive stages (Grigera 2007b). The increase in mycorrhizal growth during the reproductive stages of corn were associated with an increase in the hyphal network and not increased sporulation (Grigera 2007c). Producers should incorporate management practices such as reduced tillage and residue retention that are least detrimental to the soil biota. As fertilizer prices increase selecting varieties that are susceptible to mycorrhizal infection may improve fertilizer use efficiency.

Grigera, M.S., R.A. Drijber, K.M. Eskridge, and B.J. Wienhold. 2006. Soil microbial biomass relationships with organic matter fractions in a Nebraska corn field mapped using apparent electrical conductivity. Soil Science Society of America Journal 70:1480-1488.

Grigera, M.S., R.A. Drijber, and B.J. Wienhold. 2007a. Redistribution of crop residues during row cultivation creates a biologically enhanced environment for soil microorganisms. Soil and Tillage Research 94:550-554.

Grigera, M.S., R.A. Drijber, and B.J. Wienhold. 2007b. Increased abundance of arbuscular mycorrhizal fungi in soil coincides with the reproductive stages of maize. Soil Biology and Biochemistry 39:1401-1409.

Grigera, M.S., Drijber, R.A., Shores-Morrow, R.H., and Wienhold, B.J. 2007c. Distribution of Arbuscular Mycorrhizal Biomarker C16:1*cis11* Among Neutral-, Glygo-, and Phospho-Lipids Extracted from Soil During the Reproductive Growth of Corn. Soil Biology and Biochemistry 39:1589-1596.