Soil Microarthropods: Bioindicators of Conservation Management Practices

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INTERPRETIVE SUMMARY

Microarthropods are important components of the soil decomposer food web. Organic matter is a major influence on microarthropod abundance and diversity. Conservation practices that increase soil organic matter improve soil quality by supporting the development of the soil biotic community. The microarthropod community is a positive feed back for improved soil quality. Microarthropods use organic matter, regulate other decomposers in the soil food web, and aid in the release of nutrients bound up in residues and microbial biomass (bacteria and fungi). Microarthropods also contribute to soil aggregation with the production of fecal materials. Our objective is to compare the impact of two cover crops (legume blend, rye-legume blend) and examine changes with successive years under conservation strip tillage on microarthropod abundance and diversity.

Four fields in Tift County, Georgia were selected for this study. At each of the four fields two cover crops were grown, a legume blend and a rye plus legume blend. All fields are planted to cotton for the summer growing season. Each cover crop field was divided into four quadrats. We began sampling microarthropods in the four fields at the initiation of conservation practices. Sampling occurred at the end of the first winter cover crop season and at the mid and end of season for summer crop and the successive winter cover crop. Five subsamples for microarthropods were taken within each quadrat, within a 3-meter radius of each other at successive sample dates. We will sample twice during each growing season of cotton and winter cover for two consecutive years.

Microarthropods were extracted by a 5-watt heat source from intact soil cores (5 cm by 5 cm) inverted over a funnel and collection jar filled with 70% ethanol. Organisms were identified to major groups of Insecta (I) and Acari (A): Collembola (I), Insect larvae/nymph (Coleoptera, Diptera, Hemiptera/Homoptera), Prostigmata (A), Astigmata (A), Mesostigmata (A), and Oribatida (A).

We have completed sampling for the first year of cover crop and cotton seasons. Seasonal changes in abundance of mites for the first year were driven by soil moisture content. Prostigmata were the most abundant across all fields and seasons. Astigmata were extremely rare. The diversity of microarthropods increased in mid season cotton samples. Abundances and diversity across cover crops and seasons remain to be calculated for the second year. Statistical comparisons between seasons and cover crops will be made after the second year of sampling.

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