Soil bacteria: Metabolic diversity in a Wildlife Management Area

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This research is part of a larger study linking the soil microbiome and processes to the aboveground plant community.

Soil samples were collected from six plots under closed canopy in the Sheffield Wildlife management area in the Piedmont ecoregion of Georgia in Paulding County. Two of the plots were located in the longleaf pine savanna where restoration of longleaf pine has been in place since 2010. Samples were collected in sterile plastic tubes at the center of each plot and 10 meters above and below the center. For each sample, soil pH and the concentration of nitrogen (N), phosphorus (P), and potassium (K), were determined. We found that overall soils were slightly to moderately acidic and NPK content was low to moderate.

To establish the community level physiological profile of soil samples we used BIOLOG EcoPlates™ whereby soil samples were incubated in triplicate in plates containing 31 different carbon sources. Active metabolism was established spectroscopically by the development of a purple coloration and the data analyzed using statistical methods in order to generate a preliminary "metabolic fingerprint" of soil communities. Our results from metabolic profiles suggest that sites may host a diverse soil population or that the microbiota may use a wide variety of carbon sources.

Combined with additional information on the taxonomic diversity of the soil microbiome and changes in the above ground community of plants, this research will broaden understanding of ecological processes and help inform management practices for the restoration of the endangered longleaf pine community.

A list of keywords: community level physiological profiling, soil microbiome, longleaf pine savannah