

FUNCTIONAL AND TAXONOMIC DIVERSITY OF MICROBIAL COMMUNITIES IN RECLAIMED EAST TEXAS LIGNITE MINE SOILS

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_____A two-year study was conducted at Big Brown lignite mine in Freestone County, Texas, to determine the influence of surface mining and reclamation on the functional and taxonomic diversity in soil microbial communities. Quarterly soil samples were collected along a chronosequence including sites of 0, 1, 4, 12, and 28 years following mining and reclamation. In addition to these sites, an unmined reference site, and a tree mott (reclamation age of 20 years) were included in the study. The functional diversity of the microbial communities was assessed using the Biolog sole-carbon source utilization (SCSU) assay. Taxonomic diversity was measured using whole-soil fatty acid methyl ester (FAME) analysis. Results indicated that surface mining had a transient influence on both the functional and taxonomic diversity of the soil microbial communities reducing complexity during disturbance and early reclamation. However, the effect was reversed as the reclamation process matured. Principal component analysis (PCA) was able to separate the younger sites from the older sites in both the SCSU profiles and the FAME profiles of the soils. The separation of sites was greater, however, in the analysis of the FAME profiles suggesting a more significant change in the level of taxonomic diversity. Results from the SCSU analysis revealed a return to similarity with the reference site between one and four years. Fatty acid methyl ester profiles indicated a return to similarity with the reference site in approximately 12 years.

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