

AGE CHRONOSEQUENCE AND LANDSCAPE EFFECTS ON THE QUALITY CHARACTERISTICS OF RECLAIMED COAL MINE SOILS UNDER FOREST AND PASTURE BASED SYSTEM IN MISSISSIPPI¹

A. Adeli², D. Lang, J. P. Brooks, M.R. McLughlin, J.J. Read, N. R. McGrew and J. Willers

Abstract: Surface coal mining leads to reclamation which uses materials favorable to plant growth; however, these materials may initially be low in organic C. It is important to study the soil organic C sequestration potential of reclaimed mine soils under different land use and management systems. Few studies have been undertaken the potential of reclaimed mine soils for soil organic C sequestration by comparing them with the undisturbed soil under cold temperate or dry climatic conditions. However the soil quality indicators of reclaimed mine soils in southeastern United States, having a subtropical climatic condition with high precipitation, have not been investigated. This preliminary study was undertaken at a surface lignite mine in Mississippi. Our objective was to evaluate the physical, chemical and biological changes of the soil through an age chronosequence of reclaimed mine soils. A chronosequence of 0, 2, 5 and 10-year-old reclaimed sites corresponding to reclamation since 2011, 2009, 2005 and 2000, respectively, were chosen for the study. Soil samples for 0-15 and 15-30 cm depths were obtained in 2011 from all designated reclaimed mine sites under both pasture and forest based systems. In each reclaimed mine site, soil samples were taken at the peak, shoulder and toe of the hillslope to also evaluate the effects of landscape on soil profile development. Soil survey or profile description was evaluated in a 1- m deep soil profile at each reclaimed site. Different soil quality indicators including pH, Electrical Conductivity, bulk density, soil carbon and nitrogen mineralization, soil organic C associated with the soil aggregate fractions, total C and N, biomass C and available P were measured. Detailed information will be presented and discussed.

Additional Keywords: Organic C, N mineralization, C sequestration.

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² Ardeshir Adeli, John Brooks, Michael McLaughlin, John Read and Jeffrey L Willers are with the Genetic and Precision Agricultural Research Unit, ARS-USDA ,P.O. Box 5367, Mississippi State, 39762.; David J. Lang, Associate Professor, Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762; N. Rebecca McGrew, RPG, Environmental Manager, Red Hills Mine, 1000 McIntire Road, Ackerman, Mississippi 39735