Mapping the variability of soil quality indicators in natural versus agricultural ecosystems

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Mapping the Variability of Soil Quality Indicators in Natural Versus Agricultural Land Management

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Introduction

- Soil quality is defined as the capacity of a soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality and support human health and habitation (Karlen et al., 1997).
- The objective of this study was to evaluate the changes of physical soil quality indicators in natural versus agricultural land management (LM).
- Previous studies in western Kentucky indicate that decreases in soil organic matter content due to tillage have increased bulk density. (Arvidsson, & Håkansson,1996).

Study Site

The natural grassland and woodland fields were located throughout Land between the Lakes in Kentucky (36°45'00.0"N, 88°04'19.0"W). The agricultural no-till and conventional tillage sites were part of Kelly Farms in Calloway county Kentucky (36°41'33.33"N, 88°14'34.70"W). The minimum continued treatment timeline for all fields was 12 years. Major soil series for both ecosystems included Grenada silt loam and Brandon silt loam.

Methods

Natural LM consisted of grassland and forest, Agricultural LM consisted of conventional tillage and no-tillage. Three fields were sampled from each LM type. Fields were between 0.5 and 1 hectare in size. Ten random compaction measurements were taken per field at the depth of 21 cm. Five disturbed samples were randomly taken and mixed from each field at the depths of 0-7.5 cm. These mixed samples were used to measure soil organic matter content (SOM) and soil macro-aggregate and micro-aggregate amounts. SOM was determined using the method of loss of ignition (LOI). Macro-aggregate (2.0 mm – 0.25mm) and micro-aggregate (0.25 mm - 5) were measured using the wet sieving method (Handayani et al., 2011). All data was statistically measured using ANOVA single factor with an α of 0.05.

Results

Wooland

Grassland

Woodland

Grassland

Woodland

Grassland

Grassland

Grassland

Grassland

Grassland

References


Acknowledgements

This research was made possible by the support and funding of the McNair Scholar Program. We thank Mrs. Leslie Furches for the support and dedication to Murray State’s McNair Scholars. We also thank Terry Derling, Benedict Ferguson, Kelsey Greene, Kayla Christensen, Kang Chi Wu, and Connor Mitchell for all their help and support.