Public Abstract
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Title:CHANGES IN SELECTED SOIL QUALITY INDICATORS IN FORESTED SOILS FOLLOWING SAWLOG HARVEST

The highly weathered and nutrient-poor soils of the Missouri Ozarks are vulnerable to degradation, thus necessitating improved understanding of forest harvest impacts on soil quality. The objective of this study was to investigate changes in selected soil quality indicators following sawlog harvests. The research was conducted at the Missouri Ozark Forest Ecosystem Project (MOFEP), a long-term experimental study in mixed hardwood forests of southeast Missouri. Pre-harvest and post-harvest soil samples were collected from two levels of soil nutrient availability (low and medium soil nutrient status) at depths of 0-10 cm and 10-20 cm from sites harvested using clearcutting (CC) and single-tree selection (STS) and from no harvest (NH) management sites. Samples were collected from low soil nutrient status soils (SNS) exhibited < 20 % base saturation in diagnostic subsoil horizon and medium SNS soils contained 20-50 % base saturation in diagnostic subsoil horizon. The chemical soil quality indicators examined included total organic carbon (TOC) and total nitrogen (TN), active C (KMnO4 oxidizable carbon), water extractable organic C and water extractable N (WEOC and WEN, respectively), and soil pH. Activities of soil microbial enzymes ?-glucosidase and ?-glucosaminidase were evaluated as biological indicators. Water stable aggregate content (WSA) was quantified to examine changes in physical soil properties. Few differences in soil quality parameters were observed in the ~1.5 years after harvest. However two indicators, ?-glucosaminidase activity and WEN, showed significant change after harvest. In CC treatments ?-glucosaminidase activity decreased significantly at the 0-10 cm depth in January 2013 post-harvest collections when compared to the January 2013 NH values and pre-harvest CC treatment values collected January 2011. On specific collection dates, water extractable nitrogen also decreased significantly in CC treatments at 0-10 cm depths from low and medium SNS soils. In the CC treatment, values in low SNS soils collected in January 2013 post-harvest were significantly lower in WEN than NH treatment values from January 2013 and pre-harvest (January 2011) CC values. Soil quality changes after harvest, were most pronounced in CC harvested sites, though CC and STS sites were rarely significantly different from each other. Within the timeframe studied, ?-glucosaminidase did not show signs of rebounding to pre-harvest conditions in low or medium SNS soils at either depth. Additionally, WEN values in low SNS soil down to a depth of 20 cm exhibited a steady declining trend, though not completely below pre-harvest values. Thus, it is imperative that long-term monitoring of these trends continue due to the importance of nitrogen availability in forest soils. The research presented here indicates that ?-glucosaminidase activity and WEN may be useful early indicators of soil quality changes in Missouri Ozark forest soils. Other indicators investigated may prove to be more valuable indicators of soil quality over time.