

Magnetic Mapping of Distribution of Wood Ash used for Fertilization of Forest Soil

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Abstract

The effect of wood-ash fertilization on forest soils has been assessed mainly through geochemical methods (e.g., content of soil organic matter or nutrients). However, a simple and fast method of determining the distribution of the ash and the extent of affected soil is missing. In this study we present the use of magnetic susceptibility, which is controlled by Fe-oxides, in comparing the fertilized soil in the forest plantation of pine and oak with intact forest soil. Spatial and vertical distribution of magnetic susceptibility was measured in an oak and pine plantation next to stems of young plants, where wood-ash was applied as fertilizer. Pattern of the susceptibility distribution was compared with that in non-fertilized part of the plantation as well as with a spot of intact natural forest soil nearby. Our results show that the wood-ash samples contain significant amount of ferrimagnetic magnetite and has susceptibility higher than that of typical forest soil. Clear differences were observed between magnetic susceptibility of furrows and ridges. Moreover, the dispersed ash remains practically on the surface, does not penetrate to deeper layers. Finally, our data suggest significant differences in surface values between the pine and oak plants. Based on this study we may conclude that magnetic susceptibility may represent a simple and approximate method of assessing the extent of soil affected by wood-ash.

Keywords: forest soil, wood ash, fertilizing, tree plants, iron oxides.

