

Forest Soil Response Three-Years after Aerial Liming Application in West Virginia¹

Jeff Skousen,* Loren Gormley, and Stephanie Connolly²

Abstract: Soil acidity in forests across the globe has increased due to anthropogenic acid deposition, which is leading to a decline in forest health. The soils in the Monongahela National Forest (MNF) in West Virginia are acidic due to leaching of base cations, uptake of Ca and Mg by vegetation, and release of organic acids by organic matter (OM) decomposition, and acid deposition has exacerbated the acid soil conditions.³ In anticipation of a large liming project, soils at 10 sites were sampled and analyzed in 2009 by the United States Forest Service (USFS). In 2018, lime was applied by helicopter to a total of 323 ha in the MNF near Richwood, WV. Liming material particle size varied from silt to chip size and the liming rate was 10 Mg ha⁻¹. One year after liming, the same 10 sites sampled in 2009 representing five limed and five unlimed areas were resampled in 2019 using the same procedures and analyzed. The objectives were to determine whether soils had changed in acidity between 2009 and 2019, and to evaluate changes in soils due to liming in 2019 for pH, acidity, and aluminum (Al) and calcium (Ca) concentrations. Unlimed sites sampled in 2019 showed slightly higher pH in O, A, and upper B horizons compared to 2009, suggesting that soils had changed only slightly in the 10-year interval. Liming increased soil pH in O horizons from 4.6 to 5.9. Liming reduced acidity values by 73% and Al concentrations by 80% in O horizons. Liming increased Ca concentrations by at least three times in O and A horizons. Based on these first-year results, liming had a significant effect on soil properties of O and A horizons. A second resampling of these 10 sites was completed in the summer of 2021, three-years after liming, which followed the same procedures done in the past. Samples were collected and sent to the University of Maine for analysis. The new data will show whether the liming effects documented after the first year have continued to the third year.

Additional Key Words: acid deposition, aluminum, acidity, calcium, pH.

-
1. Oral paper presented at the 2022 National Meeting of the American Society of Reclamation Sciences, Duluth, MN. June 12 - 16, 2022. Published by ASRS; 1305 Weathervane Dr., Champaign, IL 61821.
 2. Jeff Skousen, (*presenter), Professor of Soil Science, and Loren Gormley MS Student, West Virginia University, Morgantown, WV 26506; Stephanie Connolly, Forest Soil Scientist, US Forest Service, Elkins, WV. 26241.
 3. Work reported here was conducted near 38°22'37" N; 80°27'56" W.