

LONG-TERM EFFECTS OF LIMING ON SOIL CHEMISTRY IN NORTHERN HARDWOOD FORESTS

Paul J. Lilly

State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210

Most studies on forest liming and soil acidity deal with short-term (<10 yrs) effects (Johnson et al. 1995). The few that have revisited limed sites after longer periods of time (e.g. Persson et al. 1995) suggest that while pH effects from liming may dissipate relatively quickly, other effects—changes in base saturation, exchangeable cations, distribution of organic matter—can be more persistent. Since these properties are normally related, this uncoupling suggests that in the long term, liming causes fundamental changes in the chemical properties of the treated soil.

In order to characterize these long-term effects, I located four previously established liming experiments in northern hardwood or mixed hardwood stands across the northeast. In all cases, lime or dolomite had been applied to mature stands; application rates ranged from 1.1 to 6.9 T/ha. The oldest experiment is in the Bartlett Experimental Forest in Bartlett, NH, and is part of a fertilization study that was put in place in 1963. The next oldest is located in the Harvard Forest near Petersham, MA, and was initiated 1984-85. The third experiment is at Woods Lake, part of the Integrated Lake-Watershed Acidification Study initiated in the early 1980s to address the acidification of lakes in the Adirondacks; the lime application was done in 1989. The fourth and youngest experiment is located at the Proctor Maple Research Center, near Burlington, VT, and was limed in 1990.

Samples of organic horizons and of the top 15 cm of the B horizon were taken from treatment and control locations at each experiment during the summer/fall of 2004. Horizon depths were measured at the time of sampling as well. The long-term effects of liming on pH, organic carbon content, exchangeable cations and acidity, effective and total CEC, and organically bound Al will be presented; initial analysis of horizon data indicates that liming resulted in an increased occurrence of A horizons and a decrease in the depth of Oe horizons.

Literature Cited

- Johnson, D.W.; Swank, W.T.; Vose, J.M. 1995. **Effects of liming on soils and streamwaters in a deciduous forest: comparison of field results and simulations.** *Journal of Environmental Quality*. 24(6): 1104-1117.
- Persson, T.; Rudebeck, A.; Wiren, A. 1995. **Pools and fluxes of carbon and nitrogen in 40-years-old forest liming experiments in southern Sweden.** *Water, Air, and Soil Pollution*. 85: 901-906.