

Soil Nitrogen Mineralization and Cellulose Decomposition in Northern Red Oak Stands With Four Levels of Canopy Cover in Northern Lower Michigan

Choonsig Kim¹, Terry L. Sharik¹, Martin F. Jurgensen¹, Richard E. Dickson²,
and William J. Mahalak³

Abstract: Although the effects of partial canopy removal in northern red oak (*Quercus rubra* L.) regeneration have received considerable attention, the relationship between the rates of N mineralization or organic matter decomposition and various levels of canopy cover is not well documented. A series of experimental plots with four levels of canopy, i.e., 0% (clearcut), 25%, 75%, and 100% (uncut), was established in northern red oak stands in northern Lower Michigan. We examined net N mineralization using an *in situ* soil incubation technique and decomposition of cellulose filter papers in the top 15 cm of mineral soil during the second growing season (1992, May-October) following stand manipulation. There was a significant correlation between net N mineralization rates and cellulose mass loss. Net N mineralization rates for the growing season were 57.7 kg ha⁻¹ for the clearcut, 54.2 kg ha⁻¹ for 25% canopy cover, 50.6 kg ha⁻¹ for 75% canopy cover, and 21.8 kg ha⁻¹ for the uncut treatment. Net N mineralization rates were significantly greater in canopy removal treatments than in the uncut treatment. However, there was no significant difference in net N mineralization rates among the three levels of canopy removal. These results indicate that even only small amounts of canopy removal (leaving 75% canopy cover) are sufficient to cause substantial increases the amount nitrogen available to oak seedlings.

¹School of Forestry and Wood Products, Michigan Technological University, Houghton, MI 49931.

²USDA Forest Service, Rhinelander, WI 54501.

³Michigan DNR, Roscommon, MI 48653.