CARBON STORAGE IN NORTHEASTERN US FOREST SOILS

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Ongoing climate change negotiations have focused attention on the role of forests in the global carbon cycle; this role is also important in international sustainability agreements such as the Montreal Process. Consequently, understanding the effects of forest management on forest carbon cycles is a high priority. The soil carbon pool is poorly understood; little is known about the rate of carbon accumulation, the maximum amount of carbon that can be stored in soils, the effects of vegetation type on carbon dynamics, or the effects of forest management on soil carbon cycles. This study utilizes pre-existing thinning studies in the Northeastern and North Central Research Station areas to obtain baseline data and to assess the effects of management practices on soil carbon storage.

Soils from thinned and unthinned stands were sampled from the following forests over a 3-year period: Argonne Experimental Forest (EF), Bartlett EF, Fernow EF, SUNY Heiberg Memorial Forest, Kane EF, Middle Mountain Research Area (Monongahela National Forest), and the Penobscot EF. Thinning treatments varied by study site, though experimental designs were often similar. Generally, three replicate plots per treatment were available for sampling in each forest. Most of the studies were installed in the mid-1970s and had been thinned once. When available, old growth stands or stands without histories of recent management were also sampled.

Soil carbon content from 0-20 cm depth was variable across forests, ranging from about 30 – 70 metric tons of carbon per hectare (MT C/ha), with most plots between about 45-60 MT C/ha. Forest floor carbon content varied between 2.5 and 28 MT C/ha, with many sites falling between 7-10 MT C/ha. No consistent relationship between thinning intensity and soil or forest floor carbon content or concentration was found. In general, thinning treatments appeared to have no significant effect on carbon storage. At a few forests, however, significant differences were apparent. Work continues to identify which local factors may affect the response of the soil carbon pool to forest management treatments, including soil texture, parent material, and management history.