

Changes in Base Cations in Forest Floors

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Abstract

Cation loss from forest soils may be a contributing factor in some cases of sugar maple decline. We undertook three studies examining changes in base cations in forest floors. First, we described the pattern of change in forest floor calcium and magnesium in an intensively studied site at the Hubbard Brook Experimental Forest in New Hampshire. We analyzed samples collected at eight different times between 1970 and 1997. Concentrations and contents of Ca were higher in forest floor samples collected in 1970 than in those collected from 1976 to 1997. Changes over time were not significant between 1976 and 1997 for either Ca or Mg. Second, we questioned whether losses of base cations from the forest floor were regionally important. We analyzed

samples collected from 28 mature stands of a variety of forest types in the northeastern United States. About half of the stands lost Ca and Mg from the forest floor between 1980 and 1990, but the other half showed gains. The average change in cation content or concentration during this period was not significant. Third, we hypothesized that cation loss from the forest floor might be associated with forest regrowth following logging. We sampled forest floors in a successional sequence of 13 northern hardwood stands in the White Mountains over a 15-year interval. Contrary to our prediction, young stands gained Ca, Mg, and K relative to forest floor amounts measured 15 years previously. Middle-aged stands, harvested between 1930 and 1960, were most likely to show losses of base cations from the forest floor between 1979-80 and 1994-95. None of our studies rules out the possibility of important cation losses from forest floors before the late 1970s. However, the forest floor appears to aggrade, along with living biomass, early in stand development, and may not be a good indicator of changes in mineral soil fertility.

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