N DYNAMICS ACROSS A CHRONOSEQUENCE OF UPLAND OAK-HICKORY FORESTS

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Changes in soil physical, chemical, and biological properties due to harvesting practices may have a significant impact upon N availability and cycling, thus future stand productivity and composition. Our study was designed to assess monthly rates of N min, nitrification, and N uptake by forest vegetation during the growing season. We selected five oak-hickory stands in Dubois County, Indiana for this study. We installed and collected PVC cores on a monthly basis from April to December. Soils were then analyzed for ammonium and nitrate.

Results show that seasonal N cycling rates are variable in all stands (figure 1). On an annual basis, the mature stand showed the highest rates of N min and N uptake and the lowest percentage of mineralized N converted to nitrate (29 percent) (table 1). The youngest stand had the lowest N min rate and the highest percentage of mineralized N converted to nitrate (77 percent). It was the only stand in which N min rates were appreciably lower than N uptake rates. The soil core method underestimates true N min rates within this stand because N min from logging slash is not reflected in the cores. For the other stands, there appears to be a tight internal cycling of N, preventing leaching losses.

Table 1—N cycling in a chronosequence of hardwood forests

Stand age	N mineralization	Nitrification	N uptake
	g N/hectare/day		
1	87.46	60.45	154.98
6	182.95	64.08	196.20
12	161.46	56.37	212.81
31	186.18	93.96	246.34
80-100	392.01	115.57	357.38

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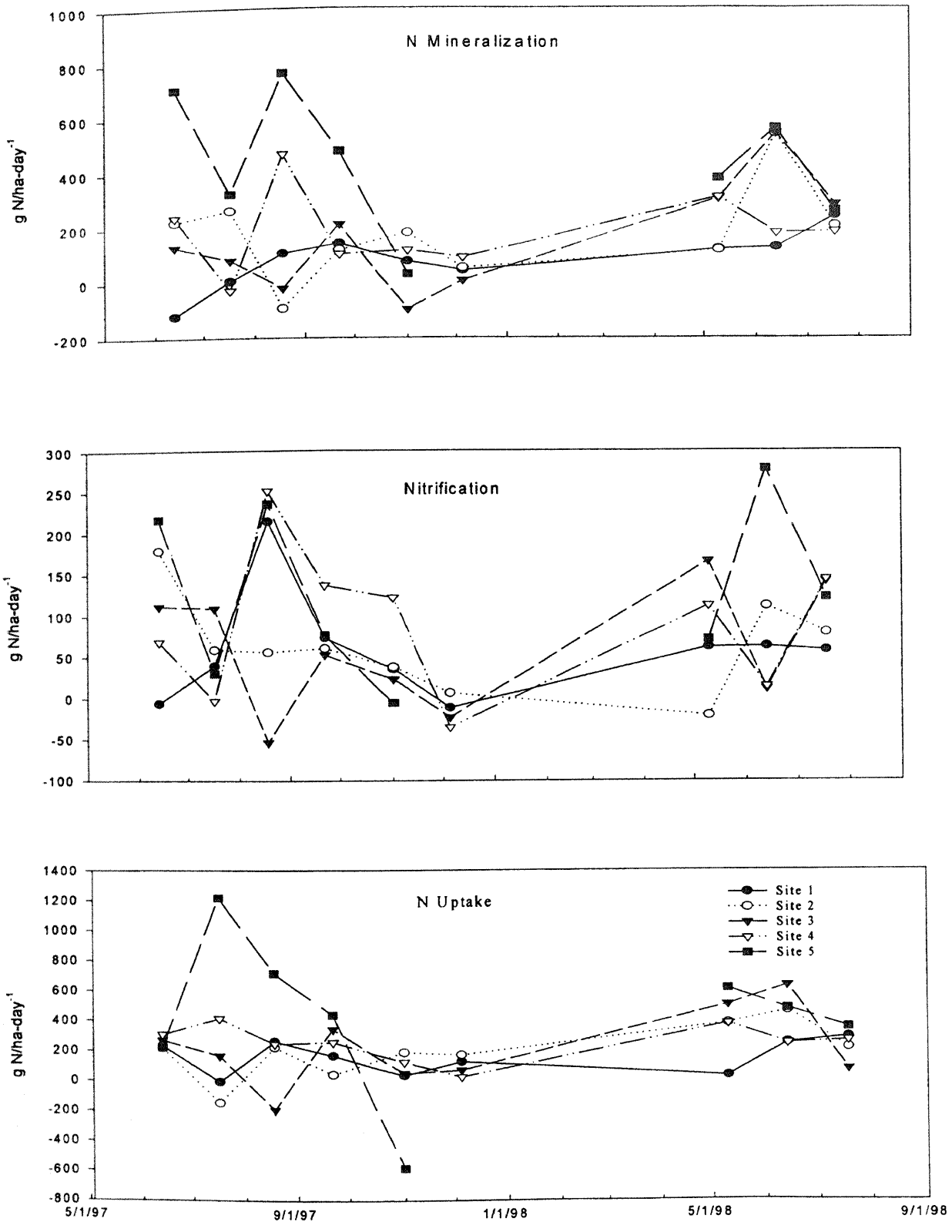

Figure 1. Nitrogen cycling across a chronosequence of hardwood forests. Stands cut in 1996, 1991, 1985, 1966 and 1900-1920, respectively.