

SUGAR MAPLE AND BEECH DYNAMICS IN BEECH BARK DISEASE AFTERMATH FORESTS OF THE CATSKILL MOUNTAINS, NY

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Beech bark disease (BBD) has been present in forests of the Catskill Mountains since the mid 1940's, and currently these forests are in the aftermath stage of disease progression. Previous work has shown that BBD in these aftermath forests is most severe in both elevation bands and watersheds that have the highest basal area of beech. In this study we examined 30 years of stand-level change (1970-2000) in BBD-affected Catskill forests to determine if effects of the disease during this period match the elevational distribution of disease severity. Beech basal area and density declined in mid-elevation aftermath stands, but increased in high and low-elevation aftermath stands. Changes in sugar maple basal area and density mirrored changes in beech; sugar maple basal area and density increased in mid elevation aftermath stands and decreased or remained constant in high and low-elevation aftermath stands. The effects of BBD on community structure in aftermath forests paralleled the distribution of disease severity across elevation found in previous studies. In BBD aftermath forests of the Catskills, the overall abundance of beech and sugar maple has not changed dramatically during the aftermath period. However, BBD has altered the elevational distribution of these two major co-dominant forest species.

EFFECTS OF BEECH BARK DISEASE ON CARBON AND NITROGEN CYCLING IN CATSKILL FORESTS

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Our research in the Catskill Mountains of southeastern NY indicates that one of the effects of beech bark disease in this region is increased dominance of the forest by sugar maple. Because the chemical quality of sugar maple litter is different from that of beech litter, the shift from mixed beech-maple forests to maple-dominated forests may entail significant changes in nutrient cycling. We identified 22 stands along a gradient from relatively healthy mixed beech-maple stands to stands which formerly had a significant beech component but are now dominated by sugar maple. Across this gradient, we found that increasing dominance of sugar maple was correlated with increases in: (1) litter decomposition rates, (2) nitrification fraction (the percentage of mineralized nitrogen that is nitrified), (3) ¹⁵N in soils, and (4) nitrate leaching in soil solution. These results indicate that shifts in species composition resulting from beech bark disease are increasing rates of carbon turnover and N cycling in soils, especially the production of nitrate. This change alters the ability of these forests to retain atmospherically deposited nitrogen.

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