

Role of Climate in the Dieback of Northern Hardwoods

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Abstract

The incidence of freezing and drought stresses, reconstructed from daily minimum/maximum temperature and precipitation records in areas of severe, recurrent dieback on sugar maple, was not happenstance but clustered at intervals of 8 to 12 years over the 1910 to 1995 period. Initial episodes of severe dieback on sugar maple (*Acer saccharum* Marsh.), as well as ash (*Fraxinus* spp.),

white/yellow birch (*Betula papyrifera* Marsh. and *B. allegheniensis* Brit.), and red spruce (*Picea rubens* Sarg.) occurred within five years of rotation age and coincided with extreme winter thaw followed by sudden freezing. Regional thaw-freeze events correlated significantly with high El Niño-low Southern Oscillation Index, and hence with elements of change in global climate. New insights on biome-wide and century-long patterns of dieback and on climate mechanisms are being applied to innovative management approaches including early warning of risk and optimization of stand resistance to dieback.

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