

Science News, in its April 13, 1985 issue, carries a story about the suspected nitrogen culprit in the unexpectedly heavy frost damage sustained by the mountain forests of Vermont during the 1983-84 winter, when thousands of red spruce and other trees "didn't show the winter hardiness that they would normally show."

Botanist Hubert W. Vogelmann of the University of Vermont, hypothesizes that an oversupply of nitrogen, deposited as ammonium or nitrate ions carried by windblown dust and by rain or snow, may have exacerbated frost damage not only in Vermont but in forests around the world. Sources are as diverse as heavily fertilized fields, feedlots, motor vehicles, and power plants.

The theory is that plant cells, heavily fertilized by nitrogen, continue to grow late into the year. The elongated, thin-walled cells that result cannot cope when caught by severe winter weather. Robert I. Bruck, a forest pathologist at North Carolina State University, has showed there was enough nitrogen in a simulated rain solution he and his colleagues used, to "perturb" the symbiotic relationships between fungus and root . . . influencing the way trees take in water, phosphorus, and other nutrients. Attention now appears to be shifting away from sulfur compounds — an early worry for trees and forest ecosystems — to the damaging effects of such other pollutants as ozone, combined with the effects of excess nitrogen, acidification, mobilization of metals like lead and aluminum, and the deposition of various organic, potentially growth-altering compounds that may number in the hundreds.

"These forests are being hammered by all of them," said Vogelmann.