

Preserving the Hemlock

March 4 2008

As part of an ongoing effort to preserve the imperiled eastern hemlock tree species, researchers from North Carolina State University have successfully located the most genetically diverse populations of the species in the southern portion of its range. They hope that by collecting the seeds from these trees the species—which is suffering both from insect infestation and prolonged drought conditions—can be saved from extinction.

Dr. Kevin Potter, research assistant professor in the Department of Forestry and Environmental Resources at NC State, and colleagues from Camcore, the largest international tree conservation partnership in the world, surveyed 20 separate populations of eastern hemlock in the southeastern United States to determine which ones contained the most genetic diversity. Their findings appear in the March edition of the journal *New Forests*.

Eastern hemlock (*Tsuga canadensis*) is an aesthetically and ecologically important species of tree found from eastern Canada to the Great Lakes states and south along the entire Appalachian mountain range. Since the hemlock tends to grow alongside streams, it plays an important role in regulating water temperature, and its loss could affect the many species of fish and insect life that inhabit mountain streams.

The tree is threatened by the prolific spread of an exotic insect known as the hemlock wooly adelgid (*Adelges tsugae*), which kills the trees in as few as four years. In the past decade, the hemlock wooly adelgid has infested more than 50 percent of the eastern portion of the hemlock's

range, and the number is expected to grow because the adelgid, an introduced species from Asia, has no natural predators in North America.

Some researchers believe the best hope for the tree's salvation lies in "ex situ," or "off-site," preservation efforts, like those spearheaded by Camcore. Ex situ preservation involves collecting seeds from a species and planting them in preservation areas in other countries, with the hope that the species can one day be reintroduced.

Potter and his colleagues studied 20 populations of eastern hemlock scattered throughout the Southeast, an area believed to have served as a population refuge for the tree during the last ice age. They discovered the greatest genetic variation in isolated populations located on the eastern side of the Appalachian range, with a trend of decreased genetic diversity moving west into the Appalachians and to the opposite side of the mountain chain. The results will guide Camcore's collection efforts.

"You need as much genetic diversity as possible in your sample," says Potter, who conducted the research while a post-doctoral fellow with Camcore. "When a species goes through this sort of a 'genetic bottleneck' event, where its numbers really decline, you may find that the survivors may express traits that are beneficial in terms of surviving insect infestation, but that they've lost traits that help them survive other events, like drought. For preservation to be successful, you need trees with the largest possible variety of beneficial traits."

Source: NC State University, by Tracey Peake

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