SFTIC Gene Conservation Specialist 2007 Report

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FAO Commission on Genetic Resources

In early June 2007 the Food and Agriculture Organization of the UN (FAO) Commission on Genetic Resources (CGR) adopted a position statement relative to forest genetic resources. In the statement, the Commission emphasized the urgency to address the need to conserve and sustainably use forest genetic resources, but recognized that there is a lack of information to guide decision making. Therefore, the Commission approved as part of its Multi-Year Plan of Work the inclusion of a project on The State of the World's Forest Genetic Resources. The latest document provided to the CGR supporting the need for this project can be found at

http://www.fao.org/ag/cgrfa/cgrfa11.htm

Look for document *CGRFA-11/07/Inf.9, Report of the Fourteenth Session of the FAO Panel of Experts on Forest Gene Resources*, or try the following link to go to the document directly.

ftp://ftp.fao.org/ag/cgrfa/cgrfa11/r11i9e.pdf

This is an important development which raises the profile of forest genetics within an organization primarily focused on food crops and traditional agriculture and plant breeding.

Carolina and Eastern Hemlock Conservation

1. Camcore (NCSU) received a $310,000 grant from the USDA Forest Service - Forest Health Protection to continue its conservation activities for Carolina and Eastern hemlock (*Tsuga caroliniana* and *Tsuga canadensis*, respectively) in the southern U.S. The species are threatened by an exotic pest, the hemlock woolly adelgid (*Adelges tsugae)*. The grant will fund seed collections of Eastern hemlock through 2009 and the establishment of conservation areas in Latin America.

2. The goal of the Eastern hemlock project is to locate 60 natural stands in Alabama, Georgia, Virginia, South Carolina, North Carolina, Kentucky and Tennessee and to sample at least 10 trees per population to capture major and minor genes (alleles) for *ex situ* conservation. Target planting locations for the *ex situ* conservation banks include the Ozarks in the US and southern Latin America. USDA Forest Service collaborators are Rusty Rhea (Forest Health Protection) and Barbara Crane (Regional Geneticist, R 8, National Forest System). Robert Jetton and Andy Whittier (Camcore) will lead the fieldwork.

3. This raises the total amount of seed collected by Camcore during the first 4 years of the hemlock project to 78 OP families from 12 provenances of Carolina hemlock (2003, 2005, and 2006 collections), and 49 OP families from 9 provenances of Eastern hemlock (2005 and 2006 collections).

4. Seed of Carolina hemlock has been sent to Camcore members in Brazil (Klabin Santa Catarina and Rigesa Mead-Westvaco) and Chile (Arauco Bioforest) with the goal to establish *ex situ* conservation banks.

5. Seed will also be sent to the USDA FS National Seed Laboratory (NSL) facilities in Macon, GA where it will be cleaned and dried to typical pine seed storage specifications, and prepared for accession and eventual long-term storage at the NSL Fort Collins, Colorado facilities.

6. A Carolina hemlock seedling-seed orchard was established in Ashe County NC using families from throughout the natural range of the species. The planting location is located on land controlled by NCDA & CS Upper Mountain Research Station. These trees will need to be treated with insecticide in order to protect them from the HWA. Plans are to try to establish a similar orchard with Eastern hemlock in western NC, and long-term to establish orchards in the Ozark region of Arkansas.

7. Genetic diversity studies are being conducted on both Carolina and Eastern hemlock. The Carolina hemlock population genetic research is being conducted using amplified fragment length polymorphisms (AFLPs). The Eastern hemlock study is being done in conjunction with Barb Crane (Regional Geneticist, USDA FS) and Valerie Hipkins (Director, USDA FS National Forest Genetics Laboratory). Foliage samples from 20 Eastern hemlock populations (20 trees per site) in the southeastern U.S were collected. Preliminary results indicate populations along the eastern periphery and in the Appalachian interior exhibit higher levels of diversity when compared to those along the western periphery. These data suggest that the glacial refuge for Eastern hemlock was likely in the Appalachian and Piedmont regions of the southern U.S., and indicate that *ex situ* conservation seed collections should be concentrated in these areas of higher diversity. Areas of lower genetic diversity may contain rare alleles and should be included in collections, but at lower site selection intensity.

Tropical Pine Conservation

1. Six Camcore members in South Africa have agreed to donate 20 hectares each to establish forest tree gene conservation parks. The parks will contain samples of important exotic forest tree species, and conserve genetic diversity at the provenance level. The legal status of the parks will be such that Camcore has long term legal tenure, ensuring that valuable genetic resources will be protected. The initial grafting / establishment of trees in the parks should begin in 2008.

2. Camcore is cooperating with climate researchers at the Food and Agriculture Organization in Rome (FAO) to investigate the impacts of climate change on the probable optimal distribution of pine plantations in southern Africa and South America. Progeny test data for *P. tecunumanii* and *P. patula* from throughout the southern hemisphere will be used as inputs for the study. The methodology and results should have some application to the situation in the southern U.S.

Relevant Publications

2004. Forest genetic resources conservation and management. Volume 1: Overview, concepts and some systematic approaches. Rome: International Plant Genetic Resources Institute (IPGRI), vi + 106 pp.

Eriksson, G. 2006. "Forest tree gene conservation. Theory and application for Castanea sativa." Advances in Horticultural Science 20, no. 1: 101.

Gapare, W. J., Aitken, S. N., and C. E. Ritland. 2005. Genetic diversity of core and peripheral Sitka spruce (Picea sitchensis (Bong.) Carr) populations: implications for conservation of widespread species. Biological Conservation 123, no. 1: 113.

Hamann, A., and T. L. Wang. 2005. Models of climatic normals for genecology and climate change studies in British Columbia. Agricultural and Forest Meteorology 128, no. 3/4: 211.

Hamann, A., Smets, P., Yanchuk, A. D., and S. N. Aitken. 2005. An ecogeographic framework for in situ conservation of forest trees in British Columbia. Canadian Journal of Forest Research 35, no. 11: 2553.

Murillo, O. 2005. Selecting populations for gene conservation purposes in forestry: a study case with Alnus acuminata in Costa Rica and Panama. Investigacion Agraria, Sistemas y Recursos Forestales 14, no. 1: 27.

Patino, F. 2004. Progress in country and regional assessments of forest tree genetic diversity." Forest Genetic Resources, no. 31: 53.