

The Efficacy of Ex Situ Conservation of the Mexican and Central American White Pines (*Pinus ayacahuite* and *P. chiapensis*) in Developing Countries

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Mexican white pine (*Pinus ayacahuite*) and Central American white pine (*P. chiapensis*) are two of the largest tree species in the highlands of Mexico and Central America. *Pinus ayacahuite* occurs from northern Mexico to central Honduras as three varieties: *brachyptera*, *veitchii*, and *ayacahuite*. Its southernmost variety, *P. ayacahuite* var. *ayacahuite*, is the most threatened of the three in its native environment. *Pinus chiapensis* has a smaller geographic range than *P. ayacahuite*, from central Mexico to western Guatemala. Many of the remnant populations of *P. chiapensis* are endangered throughout its geographic range. Locally, these white pines are used for rustic furniture and woodcarvings.

Over the last three decades, the International Tree Breeding and Conservation Program (Camcore) at North Carolina State University has made small research seed collections of 9,250 mother trees in 380 populations of 25 different pine species in Mexico and Central America for the establishment of field tests and ex situ conservation plantings in Latin America and southern Africa. In its genetic testing and ex situ conservation work of the white pines, Camcore sampled 16 populations and 428 mother trees of *P. ayacahuite* and 16 provenance and 380 trees of *P. chiapensis* in Mexico and Central America. Genetic material was subsequently established in Brazil, Colombia, and South Africa.

The two white pines are some of the most difficult for which to successfully develop ex situ conservation programs because of their strict site requirements and slow initial growth that requires long-term weed control and trial maintenance. However, most detrimental to conservation success is that no markets for white pine wood have been developed in the southern hemisphere to interest the private sector or the small grower to establish commercial plantings of the species, even though Camcore members have seed stands of *P. chiapensis* and second-generation progeny trials available to continue low-level breeding and improvement work. The places where a species like *P. chiapensis* thrives as an exotic are also the same locations best suited for short-rotation species, such as *Eucalyptus grandis* and its hybrids.

This presentation broadly addresses ex situ conservation efforts of the Central American and Mexican pines and highlights the challenges of protecting these species. A case study is provided on how the accidental introduction of a disease (pitch canker, caused by *Fusarium circinatum*) into South Africa has changed the private sector's view of the importance of pine ex situ conservation, the need for having access to alternate species, and the benefits of developing pine hybrids as a defense against future potential threats to exotic plantation forests.

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