

UNDERSTANDING PEST AND PATHOGEN THREATS TO PINE UNDER EXPANDING GLOBAL CULTIVATION

(FABI WORK IN NATIVE PINE FORESTS IN GUATEMALA)

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To meet global demand for timber, fiber and forest products, tree growers worldwide rely heavily on introduced species, which typically outstrip native trees in productivity and show greater consistency in growth form when cultivated outside their native range in the absence of native pests and pathogens.

The global translocation of insects and fungi with increasing global trade threatens natural and cultivated tree species worldwide. For example, the recent discovery of the pitch canker fungus (*Fusarium circinatum*) in South Africa and South America has already led to huge losses for growers and nursery managers and is very likely to change the suite of species that can be efficiently grown. The invasive European wood wasp (*Sirex noctilio*) has likewise affected thousands of hectares of plantation forests around the globe including South Africa.



Mixed forest of *Pinus oocarpa*, *P. tecunumanii*, and *P. maximinoi* in San Jerónimo, Baja Verapaz, Guatemala. The source material for the vast majority of pine species planted in South Africa and worldwide has its origin in Mexico and Central America. Mexico and Central America are centers of pine diversity with over 54 of the 111 species worldwide.

A promising approach to combating biotic threats to pine growth and yield involves the production of hybrids, with the goal of combining high growth rates, timber and pulp properties with increased resistance to insects and disease.

However, very little is known about the community of insects and pathogens attacking these putative hybrid partners.

The main objective of our research is to establish a baseline understanding of insect and pathogen diversity and distribution on common pine species in Guatemala, particularly those under testing as hybrid partners with *Pinus patula* in South Africa and worldwide.

In October 2010, Juan Lopez of Camcore at NCSU, Jeff Garnas and Irene Barnes of FABI, University of Pretoria met with representatives of the National Institute of Forests, the University of San Carlos and the private forestry sector in Guatemala to discuss the project and avenues of future work and collaboration.

All parties were quite positive about the prospects of future collaboration on various basic and applied projects. Following the initial meeting, we spent 10 days traveling through important pine regions, sampling insects and potential pathogens.

Field observations and collections coupled with extensive knowledge sharing by local forest health professionals facilitated a basic understanding of the diversity, distribution and prevalence of pine species and their dominant insect pests and pathogens.

Overall, Guatemalan forests appear to be quite healthy, including both naturally-regenerated and plantation stands. Local areas with poor management and high levels of damage due to bark beetles (i.e., ongoing outbreaks of *D. adjunctus* on *P. hartwegii* in San Carlos Sija), *Cronartium* canker (countrywide, but particularly abundant near Jalapa) and *Dothistroma* needle blight (patchily distributed, but abundant on *P. oocarpa* planted at an unsuitably high elevation at Finca La Soledad, Jalapa) demonstrate that threats to forest health and productivity do exist.

As expected, in most sites, low intensity insect feeding and colonization by pathogens was present. While damage from these agents was typically quite minor, we were able to collect material for identification. Sample processing and the species designations for insects and pathogens collected on pine is currently in progress using taxonomic keys and genetic fingerprinting.

A second trip to Guatemala was conducted in June 2011. This trip was likewise focused on strengthening professional relationships and on reconnaissance and sampling of insects and fungi causing damage to pine, but included more directed site visits targeting potential forest health issues identified in 2010. During this trip, the group was also joined by Carlos Rodas (Cartón de Colombia), Roger Menard (USDA Forest Service) and Matthew Meyerpeter (MSc candidate, University of Alabama) who brought valuable experience in forestry, forest entomology and pathology of the region. Additional leveraged funding allowed Dr. Irene Barnes and Carlos Rodas to briefly visit Nicaragua in order to investigate reports of *Dothistroma* (red band needle blight) in low elevation forms of *Pinus tecunumanii* and add to our understanding of pests and diseases in the region. Overall during both visits, we visited 46 sites and collected over 700 samples of insects and fungi affecting pine in Guatemala.