

## COLLABORATIVE RESEARCH FOR SUSTAINABLE MANAGEMENT OF SOUTHWESTERN WHITE PINE

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A collaborative team of researchers from the United States and Mexico have begun an exciting new research project funded by The National Science Foundation's Macrosystems Biology program. The project is to study ecological and evolutionary processes affecting the distribution of southwestern white pine, an important tree species of mixed conifer forests in the Southwest and Mexico. Southwestern white pine sustainability is threatened by changing climate, and a non-native tree disease, white pine blister rust. White pine blister rust causes extensive tree decline and mortality where it occurs in North America, including where it overlaps with southwestern white pine, an ever-expanding area. The climate may change too rapidly for southwestern white pine to adapt. The dual threats of climate change and invasive species make forecasting future tree distributions across continental scales an urgent challenge. The goal is to determine how gene movement among populations, adaptation to disease and drought, heritable changes beyond DNA mutations, and a changing environment interact to govern the success of southwestern white pine. This project will develop tools to help forecast and manage the future of the species, including genomics, common gardens, tree disease resistance testing, engineering and technology innovation to measure drought tolerance, and computer modeling in landscape ecology and genomics. The research team is using the Southwest Experimental Garden Array, set of common gardens, that allows scientists to quantify the ecological and evolutionary responses of species to changing climate conditions.

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