F25.15: Resilience of Southwestern White Pine Trees to Drought and Insect

Overview

Southwestern white pine is a native tree of Mexico and the southwestern US; it is threatened by a non native pathogen and climate change, but interactions with native insects have not been well studied. Trees produce oleoresin (resin ducts) to defend themselves against bark beetles, and more defenses leads to a greater ability for the tree to survive bark beetle attacks. Stressed trees are more susceptible to bark beetle attacks and may grow slower and have fewer, smaller resin ducts.

We are quantifying annual diameter growth and bark beetle defenses for southwestern white pine trees across Arizona and New Mexico, for which we also have data on climate responses to drought from a common garden study. We will analyze data to assess whether there are correlations among growth rates, defense capacity, and common garden traits such as drought response and survival.

What the student will DO and LEARN

This is an excellent opportunity those who want to learn about how trees growth and interact with their environments, including native insects and the climate. The intern will learn how to identify tree rings and correctly link tree rings to calendar years (cross-dating), measure tree ring growth to answer questions about tree resilience to disturbances and to measure resin ducts to assess insect defenses. The intern will also gain valuable experience working in a positive and lively research laboratory, will use a variety of research tools, and learn how to follow protocol and communicate effectively. The intern will assist with the processing and analyzing of southwestern white pine tree core samples alongside other undergraduate technicians working on similar tasks with ponderosa pine cores. Specifically, the intern will assist with tree core mounting, sanding and scanning. The intern will use a microscope and computer software to assist with cross-dating and growth measurements of tree core samples. The intern will then use an image processing software to assist with counting and measuring resin ducts in the tree cores. All training on tree core sample processing and analysis will be provided. Finally, the intern will learn how to summarize and analyze the data for relationships among tree growth, insect defenses, and drought response.

Additional benefits

The student will work closely with a faculty member in the School of Forestry and current lab technicians and graduate students and will learn about other research projects within the lab group. Finally, the student will contribute to research that will ultimately help guide forest managers tasked with increasing forest resilience to multiple disturbances.

Additional qualifications
Experience with tasks requiring attention to detail. This position is partially-funded by NAU's LSAMP program, so acceptance to this position is contingent upon LSAMP-eligibility

Time commitment
8 hrs/week for 30 weeks