

THE TEN THOUSAND OAKS PROJECT

As part of the Ten Thousands Oak Project, this research will explore how standing genomic variation, somatic mutations, and phenotypic plasticity contribute to drought adaptation in the Oregon white oak (*Quercus garryana*) across its range. The project will involve the detection and characterization of somatic variation within individual oak trees across the Pacific Northwest to evaluate its role in drought adaption. Efforts will be made to assess how existing population structures (genetic) align with projected climate conditions, and particularly with respect to climatic drought using genomic offset analysis. Additionally, the project will examine how phenotypic plasticity influences plant growth and drought resilience. To achieve these goals, the study will integrate field-based genetic sampling, greenhouse experiments, high-throughput partial-genome sequencing (Illumina), Geographic Information Systems (GIS) analysis, and high-performance computing.

Research Questions

1. Do individual trees accumulate distinct somatic mutations across different branches, and can these mutations generate novel adaptations for drought resilience?
2. How much of the observed drought tolerance in white oaks is driven by standing genomic variation compared to phenotypic plasticity?
3. Can genomic offset analyses predict which populations structures are most vulnerable under future climate scenarios?
4. To what extent can genomic offset analysis be used in conservation efforts to enhance climate resilience of the Oregon white oak?