Alleviation of thermal stress in *Pinus ponderosa* by plant-growth promoting rhizobacteria isolated from mixed-conifer forests

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Climate change enhances the occurrence of extreme weather: wildfires, drought, rising summer temperatures—all of which dramatically decline forest growth and increase tree mortality in the mixed-conifer forests of Sierra Nevada, California. However, microbiota living in mutualistic relations with plant rhizospheres have been found to mitigate the effects of suboptimal environmental conditions. The goal of this research is to isolate native beneficial bacteria—plant-growth promoting rhizobacteria (PGPR)—that can alleviate heat stress in *Pinus ponderosa* seedlings. Bacteria were isolated from the rhizosphere of *Pinus ponderosa* juveniles located in mixed-conifer stand, and further characterized for PGP potential based on their ability to produce key growth regulatory phytohormones including auxin, cytokinin, and gibberellic acid. Out of ten soil samples taken, sixteen colonies were isolated and qualitatively confirmed to produce indole-3-acetic acid (auxin) using Salkowski's reagent. Future testing will be conducted to quantitatively assess phytohormone production in bacterial isolates. Furthermore, bioassays will be performed to determine isolates abilities to increase tolerance in heat-stressed *Pinus ponderosa* seedlings. Upon completion of this research, a PGPR could be utilized to support the growth and transplantation of conifer seedlings as summer temperatures continue to rise due to the effects of climate change.

Biography

Ms. Kelli Thorup studies Biological Sciences in the Master's program at California State University, Chico under the supervision of Dr. Kris Blee and plans to graduate in 2022. Previous to her master's program, she spent four years at the same institution earning her BS, double-majoring in Cellular and Molecular Biology and General Microbiology, and graduated in 2020. As an undergraduate, she joined the research group of Dr. Cawa Tran in 2018 to study coral symbiosis, and later joined Dr. Blee's laboratory group in 2019 to study bacterial transformation.