Temperature sensitivity of seed germination in four common conifer species from different altitudes in the Pacific Northwest, USA.

Arthur Hsin-Wu Hsu and Soo-Hyung Kim
School of Environmental and Forest Sciences, University of Washington

Introduction

- Seed germination is an essential process for plants to establish in a new colony and is highly sensitive to temperature.
- Determining the temperature dependence of seed germination is pivotal to evaluate species response to temperature and predict the range shift in their distribution under climate change.

Materials and Methods

- Common conifer species in Pacific Northwest
  - *Pinus contorta* (PICO)
  - *Picea engelmannii* (PIEN)
  - *Pinus ponderosa* (PICO)
  - *Pseudotsuga menziesii* (PSME).

- Their seeds were collected at different altitudes ranging from 150 m to 2,600 m from PNW.
- We applied eight incubation temperatures (5, 10, 15, 20, 25, 30, 35, 40°C) on the seed germination and investigated seed germination percentage (GP) changes from different elevations of each species.




Results

- None of the species showed a consistent trend that seeds from higher elevation have greater GP in lower temperatures and vice versa (Fig. 1).
- The variability in GP was smallest around the optimal temperature regardless of elevations of their habitat (Fig. 1).

- Wide-ranging species (PIPO and PSME) seem to have a broader range of optimal temperatures while narrow-ranging species (PICO and PIEN) have a narrower field of optimal temperatures (Fig. 1).

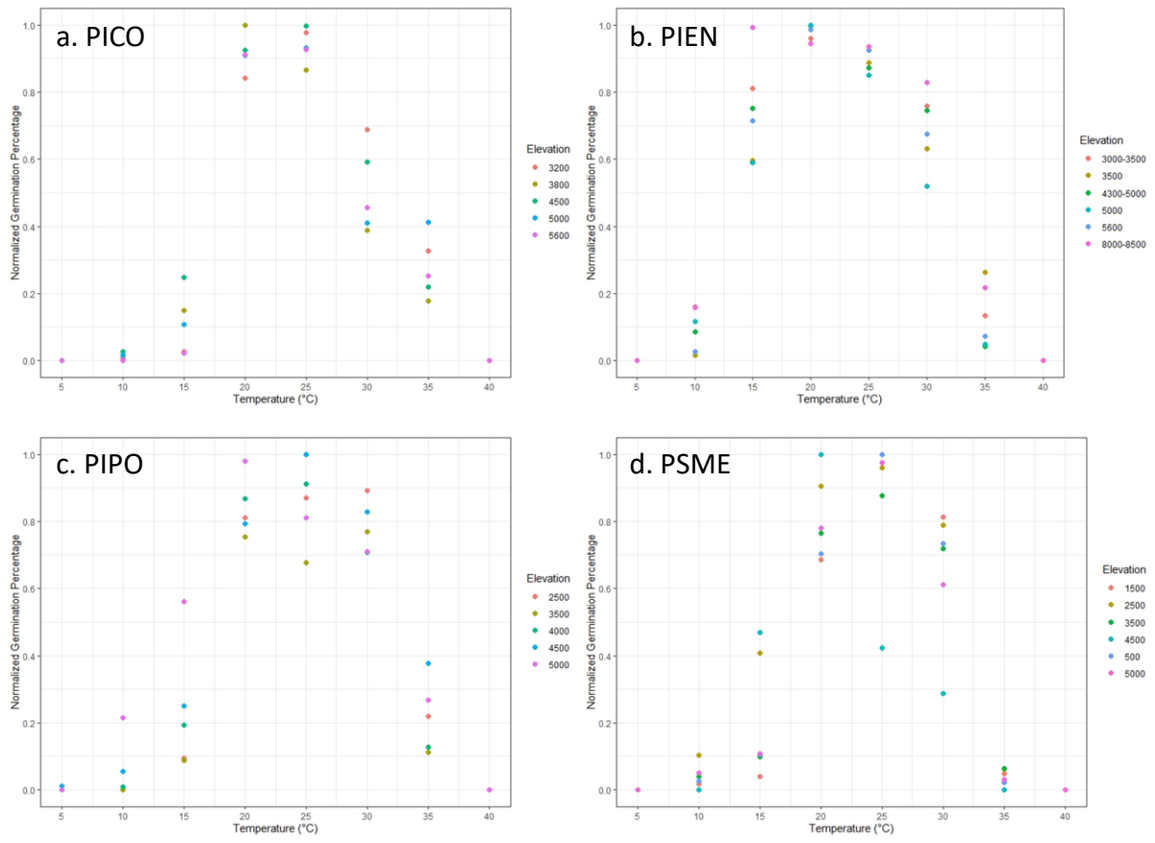

Fig. 1 Normalized seed germination percentage of (a) *Pinus contorta* (PICO), (b) *Picea engelmannii* (PIEN), (c) *Pinus ponderosa* (PIPO), and (D) *Pseudotsuga menziesii* (PSME) from different elevations (feet) at different temperatures (5, 10, 15, 20, 25, 30, 35, 40°C).

Conclusions

- Our findings and data can be valuable for modeling the temperature response of seed germination to provide insights for understanding the reproductive biology associated with the ecological resilience of these species in a changing climate.

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