# Germinating in a warmer world: Tropical plant species are at greater risk from climate change

Alexander Sentinella*†[1], David Warton[2], William Sherwin[1], Cathy Offord[3], and Angela Moles[1]

[1]School of Biological, Earth and Environmental Sciences (UNSW - BEES) – School of BEES The University of New South Wales SYDNEY 2052 NSW, Australia

[2]School of Mathematics and Statistics (UNSW) – University of New South Wales Sydney NSW 2052 Australia, Australia

[3]The Australian Botanic Garden – Australia

**Abstract**

Since Janzen's 1967 paper "Why mountain passes are higher in the tropics", tropical species have been hypothesised to withstand a narrower breadth of temperatures than species at higher latitudes. While this is true for animals, this assumption has yet to be tested for plants. We used 7721 records for 866 species from the Kew Gardens' global germination database to quantify global patterns in germination temperature. Surprisingly, we found no evidence for a latitudinal trend in the range of temperatures across which plant species can germinate. However, tropical plants are predicted to face the greatest risk from climate change, because they are closer to their upper thermal limits. By 2070, over half (84/149) of tropical plant species are predicted to exceed their optimum germination temperatures with some even exceeding their maximum (35/190). Conversely, 97% of species at higher latitudes (above 45○) are predicted to benefit from warming, with temperatures shifting closer to the species' optimal germination temperatures. Thus, the prediction that tropical species would be most at risk under future climate change was supported by our data, but through a different mechanism to that generally assumed.

*Speaker

†Corresponding author: a.sentinella@unsw.edu.au