Royal Botanic Gardens Victoria

MEDIA RELEASE

Seeds under pressure: New study reveals how climate change threatens Victoria's alpine plant populations.

03 June 2026 — A new study led by researchers from Royal Botanic Gardens Victoria and Deakin University has uncovered alpine species may be more vulnerable to climate change as their seeds rely on specific temperature cues and seasonal signals to germinate.

The team examined seeds from 21 Australian plant species, including *Eucalyptus pauciflora subsp. acerina* (Alpine Snow Gum), *Callistemon kenmorrisonii* (Betka bottlebrush), *Brachyscome decipiens* (common alpine daisy), collected across a dramatic elevation range, from near sea level to alpine regions.

The research found that elevation plays a key role in shaping seed behaviour as it shapes both dormancy (whether seeds delay germination) and the temperatures at which they will sprout.

Seeds from alpine and subalpine species were more likely to remain dormant, requiring specific cues before they would germinate. Even when conditions were suitable, these species showed a preference for warmer temperatures between 20 and 30 degrees Celsius and performed poorly at cooler temperatures. This narrow temperature range suggests they are highly specialised and have likely evolved to avoid germinating too early when frost or snow could kill young seedlings.

By contrast, seeds from lowland species were far more flexible. Many showed little or no dormancy and were able to germinate across a wide range of temperatures, including cooler conditions. This broader tolerance suggests these species are adapted to more variable environments, where timing is less tightly constrained.

"While some species show remarkable flexibility, many alpine plants are highly specialised. Understanding these differences is key to protecting them as the climate continues to change," said Dr Megan Hirst, Research Scientist (Seed Ecology) at Royal Botanic Gardens Victoria.

"These differences have major implications as the climate changes. Alpine species rely on specific environmental signals, such as temperature patterns and seasonal cues, to determine when to germinate," says Dr Hirst. "As warming temperatures and declining snow cover alter these signals, seeds may begin to germinate at the wrong time, reducing their chances of survival. This could lead to mismatches between when seeds germinate and when conditions are suitable for growth, placing additional pressure on already vulnerable alpine ecosystems."

Not all plant groups responded in the same way. Some, including certain Eucalyptus species and alpine grasses, showed strong dormancy patterns linked to elevation, while others—such as bottlebrush species in the genus *Callistemon*—showed no dormancy at all, regardless of where they grew. A third group of native daisies displayed mixed responses, with variation not only between species but even between populations of the same species.

This variation highlights the complex interplay between evolutionary history and local environmental conditions. Even within a single species, seeds collected from different locations responded differently depending on factors such as moisture and microclimate. In some cases, offspring from plants grown in new environments showed changes in germination behaviour, suggesting a capacity for adaptation across generations

The findings are particularly important for conservation and restoration efforts. Understanding how seeds respond to temperature can help identify which species are most at risk from climate change and guide decisions about when and where to use seeds in restoration projects. The research also reinforces the importance of seed banking, with many seeds in the study successfully germinating even after more than a decade in storage at the Victorian Conservation Seed Bank.

As climate change continues to reshape ecosystems, the timing of germination—one of the earliest stages of life—may ultimately determine which species persist and which decline. The study reveals that while some plants may have the flexibility to adapt, others, particularly those in alpine environments, may be running out of time.

END

Link to paper: https://www.cambridge.org/core/journals/seed-science-research/article/to-grow-or-not-to-grow-questioning-seed-dormancy-and-thermal-germination-responses-along-elevational-gradients-in-four-plant-taxa/74B8A36D1F3369191888692D01DC8D51

Images and media release:
https://www.dropbox.com/scl/fo/tfbcbd8l9yuj8znrps5u1/ADt9l0yA2AT4PU7_zB9GX-Y?rlkey=ojanx63uvrob13vai511tufud&st=nzzxfi3m&dl=0

Media contact:

MEDIA RELEASE

Andie Dittman
Communications and Media Coordinator
Royal Botanic Gardens Victoria
andie.dittman@rbg.vic.gov.au
0457 227 347

Experts available for interview:

Dr Megan Hirst, Research Scientist (Seed Ecology)

Megan Hirst is a plant ecologist with specialist experience in ex situ seed banking and plant conservation through her work with the Victorian Conservation Seedbank at Royal Botanic Gardens Victoria. Meg holds a PhD in plant ecology from the University of Melbourne and is a teacher and researcher with experience in growing, tending and studying plants in both scientific, public gardens and experimental settings.

Background information

About Royal Botanic Gardens Victoria:

Royal Botanic Gardens Victoria is one of the world's leading botanic gardens and a centre of excellence for horticulture, science and engagement. Thanks to our knowledge, expertise, drive and innovation, we are renowned for our science, our horticulture, and our innovative learning and engagement programs.

We are focused on our mission to safeguard plants for the wellbeing of people and the planet toward a vision where all life is sustained and enriched by plants.

The organisation encompasses two diverse sites at Melbourne and Cranbourne and the State Botanical Collection housed at the National Herbarium of Victoria. Royal Botanic Gardens Victoria is managed by the Royal Botanic Gardens Board Victoria, which is responsible to the Minister for Environment.

Species studied:

Eucalyptus pauciflora subsp. *pauciflora* (snow gum)
Eucalyptus pauciflora subsp. *acerina* (alpine snow gum)
Eucalyptus pauciflora subsp. *hedraia* (high-altitude snow gum)
Eucalyptus pauciflora subsp. *niphophila* (snow-loving snow gum)
Eucalyptus pauciflora subsp. *parvifructa* (small-fruited snow gum)

Callistemon kenmorrisonii (Betka bottlebrush) Endangered
Callistemon forresterae (Forrester's bottlebrush)

Callistemon nyallingensis (Nyalling bottlebrush)
Callistemon pityoides (alpine bottlebrush)
Callistemon brachyandrus (prickly bottlebrush)

Brachyscome barkerae (Barker's daisy)
Brachyscome decipiens (alpine daisy)
Brachyscome dentata (lobe-seed daisy)
Brachyscome foliosa (leafy daisy)
Brachyscome melanocarpa (black-fruit daisy)
Brachyscome muelleroides (Müller's daisy)
Brachyscome nivalis (snow daisy)
Brachyscome spathulata (spoon-leaved daisy)
Brachyscome tadgellii (Tadgell's daisy)

Deyeuxia affinis (alpine bent grass)
Deyeuxia talariata (subalpine bent grass)

Find out more about these species on VicFlora: https://vicflora.rbg.vic.gov.au/