Temperate grasslands seed longevity

Essential for effective *ex situ* seed banking

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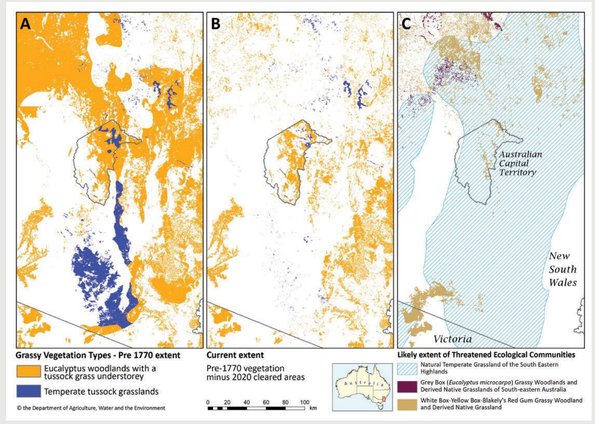
Introduction

Prior to colonisation, temperate grassy ecosystems (including grasslands and grassy woodlands) extended across south-eastern Australia. Today, grassy ecosystems are among the most degraded and altered vegetation communities on the continent[2].

Despite this, remnants persist and are home to more than 300 different native plant species including trees, grasses, daisies, lilies, orchids and legumes.

Temperate grassy ecosystems are listed as endangered or critically endangered[1] and are a priority for conservation seed banks.



Map shows the distribution of south-eastern Australian grasslands prior to 1770 (A) and today (B). Map C depicts where associated threatened ecological communities are likely to exist today[3].

Methods

- Seeds of 28 species were subjected to an artificial ageing test[6], reducing longevity to an observable time-span.
- At various intervals for up to 250 days, seeds were taken out of ageing conditions and tested for viability using germination tests.

To rapidly age the seeds, they were subjected to a warm and humid climate of 45°C and 60 % relative humidity for up to 250 days.

Acacia dealbata (Fabaceae) seeds.

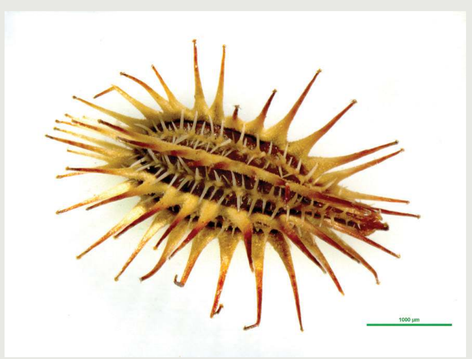
Seeds enclosed in a temperature- and humidity-controlled electrical box.

Brachyscome scapigera (Asteraceae) seeds germinating after two days of ageing.

Next steps

- We are currently preparing to subject 30+ more grassy ecosystem species to artificial ageing including grasses, forbs, shrubs and trees.
- p_{50} is the time (in days) taken for viability of a seed collection to decrease by 50 %.
- We will calculate p_{50} values to compare longevity with that of seeds from other plant communities in Australia and overseas.
- Seed and plant traits will be analysed for relationships with longevity.
- Relationships between longevity and persistence will be investigated.

Results will inform *ex situ* seed collection management, e.g. shorter-lived seeds will be prioritised for collecting and more regularly re-tested for viability and germinability.



Daucus glochidiatus (Apiaceae)

Dodonaea viscosa (Sapindaceae)

Ex situ seed conservation for endangered ecological communities

Ex situ seed banking is an effective method to safeguard threatened plant communities against extinction and is utilised to secure grassy ecosystem species.

Seed longevity is the life span of a seed *ex situ* and informs collection management and storage conditions.

Previous studies have explored seed longevity of Australian species:

- Life form and various other traits were associated with seed longevity in a study of 172 species[4].
- Seed longevity was related to elevation and seed mass in alpine seeds[5].

However, seed longevity of most grassy ecosystem species is unknown.

This study aimed to calculate the comparative seed longevity of south-eastern Australian grassy ecosystem species.

It was hypothesised that seeds would be relatively short-lived and that longevity would be related to various seed and plant traits including life form.

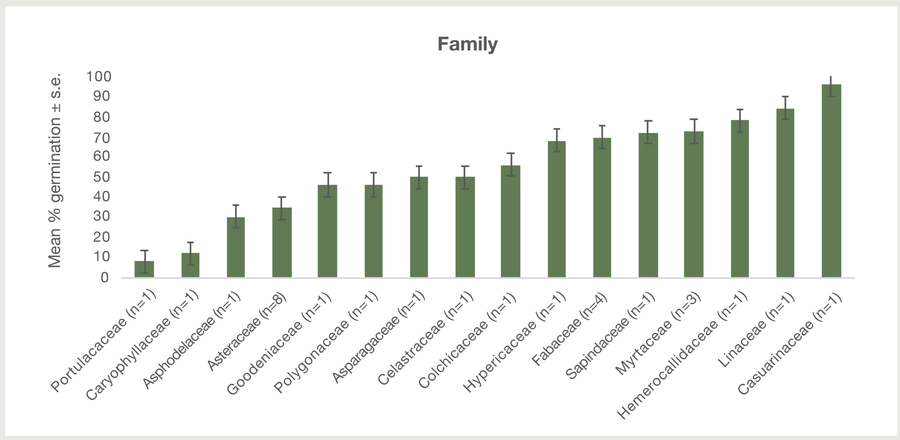
Brachyscome scapigera is a perennial herb common in temperate grassy ecosystems and was included in this study.

A collection of *Brachyscome scapigera* (Asteraceae) seeds from the National Seed Bank, Canberra.

Germination after 15 days ageing

Results so far suggest:

- **Typically larger life forms such as trees and shrubs are longer-lived than smaller, herbaceous life forms.**
- **Mean germination varied greatly among families.**



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This work is funded by the Mundango Charitable Trust and Sally and Geoffrey White.

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