



Why study Hairpin Banksia?

Hairpin Banksia (*Banksia spinulosa* var *cunninghamii*) is a tall shrub that grows in forests in south-eastern Victoria. It is important in providing nectar as a food source for native fauna.

The species has characteristics that make it vulnerable to local extinction due to short fire intervals – it does not resprout after fire, takes long periods to produce seeds, and no seeds are stored in the soil. It is at risk of decline from increased fire frequency, combined with warmer drier weather.

Declines of Hairpin Banksia have been recorded in populations east of Melbourne, as well as very low seed production and seedling recruitment rates.

Previous Research

ARI research on Hairpin Banksia seed production between 2014 and 2016 provided evidence for minimum fire intervals needed to maintain populations (Muir *et al* 2017). We found that below 10 years most Banksias produced no seed – and maximum seed production occurred between 15 and 25 years after fire.

However, population persistence is dependent on successful recruitment, and data collected in 2016 showed that post-fire seedling germination was low. There was some evidence that recruitment could be increased by higher burn severity to trigger seed release, but this needed testing.

Project aims

This project (2017 to 2019) aims to find out how fire severity affects seedling recruitment of Hairpin Banksia. We are investigating the relationships among:

- cone opening (release of viable seed), fuel moisture, flame heights and burn severity (2017-18)
- seedling recruitment, pre-fire cones numbers, post-fire cone opening and flame heights (2018-19).

Methods

Our study site at Cockatoo (east of Melbourne) comprised two sites located within an Autumn planned burn in 2018. These were last burnt 17 years and 35 years ago. Within each site, 60 Banksia plants were tagged for either moderate or low intensity treatments. Various measurements were made on each plant.

Pre-burn data collection:

- fuel moisture and rainfall prior to the burn
- heights of lowest and highest closed cones
- count of closed cones (potential viable seed)

During burn:

- observations of Banksia canopy ignitions, in relation to lighting patterns and weather conditions.

Post-burn measurements:

- rainfall after the burn
- Banksia canopies burnt, scorched or green
- count of newly opened cones (seed released)

In Spring 2018 we will be counting seedling numbers under each tagged Banksia. Seedling data will be compared with data collected on cone opening and flame heights. This small pilot study at Cockatoo will need replication at other sites to confirm results.

Fire effects on Hairpin Banksia recruitment

Interim Results

Banksia age and closed cones (viable seed)

- The 17-year-old plants had twice as many closed cones per plant, compared to the 35-year-old plants.

Fire conditions and Banksia canopy burn

- After the fire Banksia canopies were 27% green (alive), 63% scorched and 10% burnt.

Banksia canopy burn and viable seed release

- Most cones opened by the fire were present at heights of 1 to 3 m on the Banksias.

Weather conditions precluded burning of the 17-year-old site. However, there was enough variation in fire intensity across the other site for data on burn heights and cone opening.

Research informing management

Our previous research found that fire intervals of greater than 15 years are needed for adequate seed production for Hairpin Banksia. This has been used to modify Regional Fire Plans on public land where the species occurs.

Results in 2019 from our current research on fire severity and recruitment will further inform fire planning. A conservative approach in the interim would be to vary fire intensities and patchiness, and to minimise burning during predicted low rainfall periods.

Fire and biodiversity policy

The persistence of fire sensitive species such as Hairpin Banksia can be used by DELWP to evaluate how fuel management programs affect ecosystem resilience (Monitoring Evaluation and Reporting Framework for Bushfire Management on Public Land, DELWP 2015).

Improved guidance on management of a near-threatened species such as Hairpin Banksia contributes to DELWP's biodiversity targets (Protecting Victoria's Environment – Biodiversity 2037, DELWP 2017).

Project support

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Reference

Muir, A., Bluff, L., Moloney, P. and Whitchurch, A. (2017). *Banksia spinulosa* var. *cunninghamii* demography to inform fire planning—Alpine Greater Gippsland and East Central Bushfire Risk Landscapes. Unpublished Client Report for Forest, Fire and Regions Division, DELWP. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Victoria.

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