



LIFE FROM THE ASHES - WHY ACACIAS HAVE RE-GROWN AT DIFFERENT DENSITIES AFTER BLACK SATURDAY

Valerie Densmore, Ph.D. Supervisors: Dr. Tina Bell and Prof. Mark Adams, Faculty of Agriculture and Environment, University of Sydney, NSW



vdensmore@sydney.edu.au

Significance

Understanding what geographical and environmental factors increase legume populations and thereby forest productivity will enhance the accuracy of fire risk models and support decisions to mitigate bushfire hazards.

Background

The Black Saturday bushfires removed understorey vegetation, creating open, blackened forests. Despite this, rapid regrowth occurred, including *Acacia* species that have not been seen for decades.



Acacias are important to restore nitrogen (N) after fire. Thus, dense populations of acacias may promote future forest productivity¹.

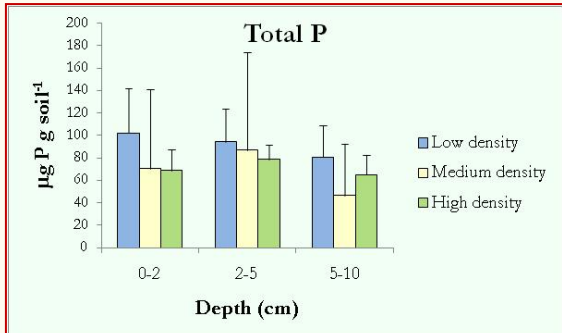
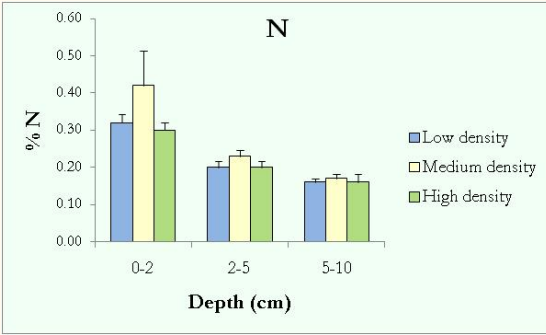
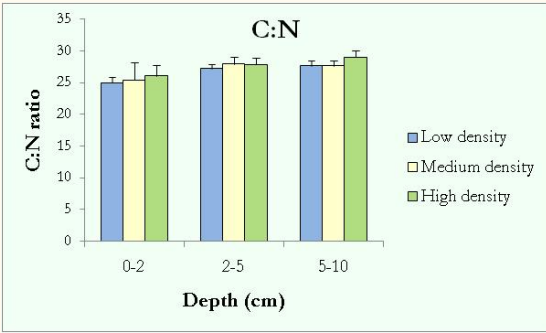
However, population densities after fire can vary widely, even over short geographical distances, and the reasons for this are unknown. A recent study suggested low levels of phosphorous (P) in soil might give acacias a competitive advantage².

The Black Saturday bushfires provide a rare opportunity to investigate whether soil nutrients or other factors influence how acacias regrow following fire and may affect future fuel loads in fire-prone landscapes.

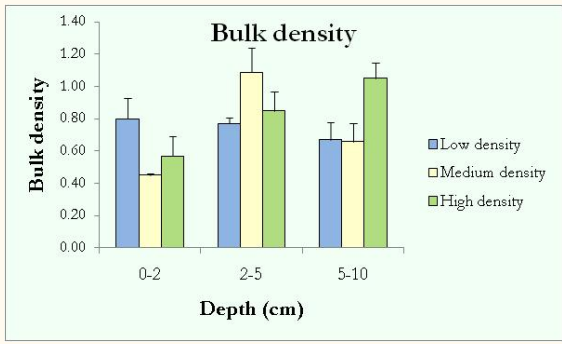
Soil analysis

Preliminary soil analysis suggests that total P content in soil relates to how densely *Acacia* spp. regenerate after fire.

Three 2 m² plots were set up at each site to collect soil from 0-2, 2-5, and 5-10 cm depths for chemical and physical analysis.



Highest levels of total P in soil were found at sites containing low population densities.



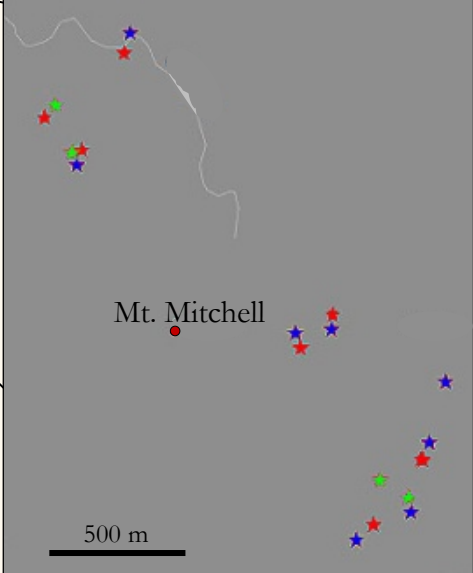
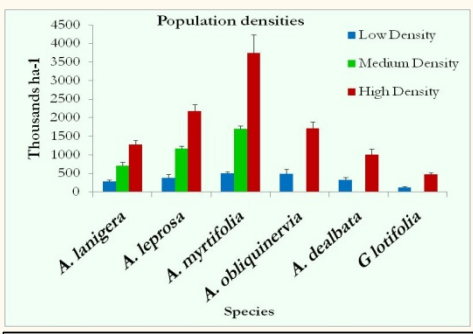
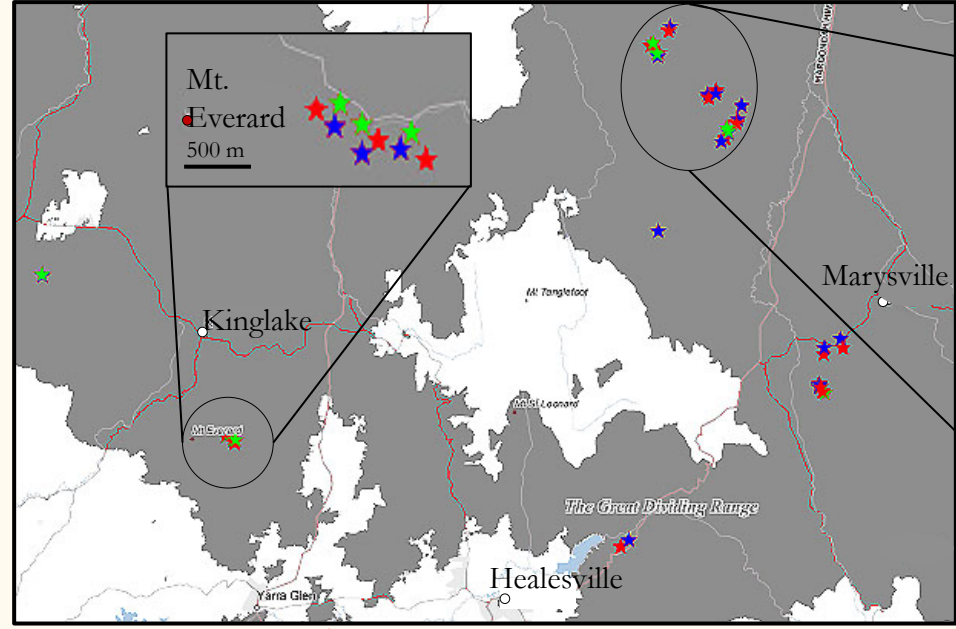
pH & EC at 0-2 cm (mean ± SE)			
	Population density		
	Low	Medium	High
pH	5.09±0.1	5.08±0.05	5.16±0.05
EC (µS cm ⁻¹)	28.1±2.9	31.2±3.5	29.1±2.4

Field work

The numbers of individuals within a 2 m² box were used to calculate population density. Six species were identified growing at two to three densities.



Field sites for six species within the Murrindindi & Kilmore (Black Saturday) fire boundaries (grey).



Conclusions

- Soil P levels may be related to population density of acacias. However, bulk density, pH, EC, and C:N ratio did not have any obvious correlations.

Overall, initial data support the hypothesis that acacias are favoured when soil P levels are low.

References

1. Forrester, D.I. *et al.* **Tree Physiology**. 27:1319, 2007.
2. Houlton, B.Z. *et al.* **Nature**. 454:327, 2008.