Does fire influence phosphite protection of Western Australian indigenous plant species against *Phytophthora cinnamomi*?

D. Hüberli[1], T. Paap[1], N. Moore[2], K. Howard[1], S. Barrett[2], G. Freebury[2], T. Spadek[3], B. Dell[1] & G. Hardy[1]

[1]Centre for *Phytophthora* Science & Management, School of Biol. Sc. & Biotech., Murdoch University, Perth, WA 6150, Australia; [2]Nature Conservation Section, Department of Environment & Conservation, Albany, WA 6330, Australia; [3]Chemistry Centre, East Perth, WA 6004, Australia.
Email: D.Huberli@murdoch.edu.au Website: www.cpsm.murdoch.edu.au

INTRODUCTION

Large areas of indigenous ecosystems in Australia are devastated by *Phytophthora* dieback caused by *P. cinnamomi* (*Pc*). Phosphite is effective in controlling this pathogen on several plant species (Hardy *et al*. 2001). Although fire is a regular event in the Australian landscape, nothing is known about the relative uptake of phosphite by shoots pre- and post-fire or how fire may alter the redistribution and persistence of phosphite within woody plants. The effect of fire on phosphite to reduce the severity of disease caused by *Pc* in 3 Proteaceous spp., one reseeder and two resprouters, treated with phosphite pre- and post-fire were examined.

METHODS

- 3 plant species susceptible to *Pc*.
- Plants selected in 4 plots (Stirling Range National Park, southwest Western Australia) scheduled for prescribed burn.
- 4 plot treatments: combinations of +/- phosphite and +/- fire.
- Prescribed burn occurred in late spring (Nov. 2006).
- Phosphite was applied 6 weeks pre-fire or 9 months post-fire.
- *Pc* colonisation after stem inoculation and phosphite concentration in leaves, stems, lignotubers and roots were measured.

RESULTS

Banksia attenuata (resprouter):

- Phosphite concentration in tissue was sufficient to contain *Pc* when applied pre-fire (Figs. 1 & 2).
- In post-fire spray, phosphite was less effective in containing *Pc* (Figs. 1 & 2).

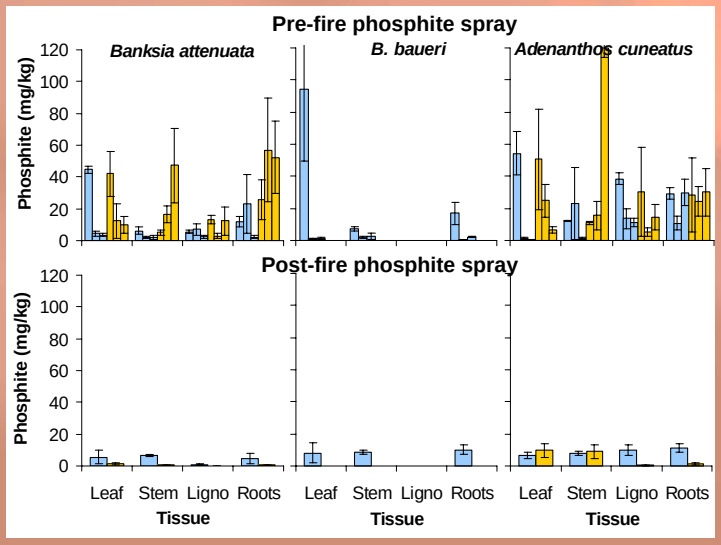

Fig. 1 Phosphite concentration (mg/kg dry tissue; ±SE) of plants in unburnt (□) and burnt (▨) plots treated with 24 kg/ha phosphite pre- and post- fire; 3 bars of each colour set harvested 6 weeks (prior to burn), and 10 and 13 months after phosphite spray for pre-fire harvests, and plants harvested 11 months post-fire (8 weeks after phosphite spray) for post-fire harvests.

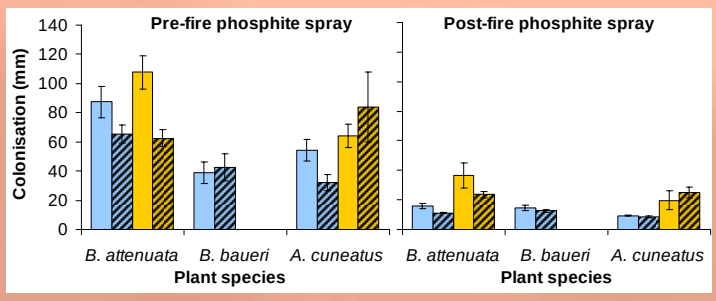

Fig. 2 Colonisation (±SE) of stems inoculated with *Phytophthora cinnamomi* in Oct (pre-fire phosphite spray) and Nov (post-fire phosphite spray) 2007 in plots treatments of fire (- □, + ▨) and phosphite (- □, + ▨).

Adenanthos cuneatus (resprouter):

- Phosphite did not control *Pc* when applied pre- or post- fire (Fig. 2).
- Phosphite concentration were equivalent to *B. attenuata* (Fig. 1).
- Fire may inactivate the ability of phosphite to control *Pc in planta*.

Banksia baueri (reseeder):

- Phosphite did not control *Pc* when applied at the 2 applications in unburnt plots despite phosphite being present in all tissues (Figs. 1 & 2).

Phosphite uptake:

- Despite differences in canopy and leaf structure, all 3 plant species took up phosphite and distributed it throughout the plant.

Banksia attenuata *Banksia baueri* *Adenanthos cuneatus*

CONCLUSIONS

- Apply phosphite at least 2 months prior to fire to protect resprouter species such as *B. attenuata* because *Pc* is more active after fire in some sites (Moore 2005).
  - Further work: What endangered susceptible plant species are responsive to pre-fire phosphite applications?
- Reapply phosphite post-fire to protect reseeders and resprouters such as *A. cuneatus*.
  - Further work: When are these species responsive to phosphite post-fire?
- *B. baueri* is susceptible to *Pc*, but does not respond to phosphite.

REFERENCES

Hardy G, Barrett S, Shearer BL (2001) *Aust. Plant Path.* **30**, 133.
Moore N (2005) Honours Thesis, Murdoch University, Perth, Aust.

ACKNOWLEDGEMENT

Project was funded by the Department of Environment, Heritage, Water and the Arts.

CPSM
Centre for *Phytophthora* Science and Management