New strategies and techniques to control *Phytophthora cinnamomi* within native plant communities in south-west Australia

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Phytophthora cinnamomi is one of the most destructive invasives pecies worldwide and its introduction into the south-west of Australia has resulted in a permanent loss of biodiversity in 1 million hectares of the highly vulnerable native plant communities across the region.

Recent management projects have aimed to prevent the spread, reduce the impact, contain and/or eradicate *P. cinnamomi* within the top priority protection areas including the International Biosphere Reserve encompassing the Fitzgerald River National Park.

The techniques described here were used for the containment and/or eradication of three *P. cinnamomi* disease centres. Management strategies were tailored for each infestation and aimed to address the four possible modes of further spread of the pathogen:

- the autonomous spread of the pathogen in surface and subsurface water flows;
- the root-to-root transmission of the pathogen between host plants;
- animal vectoring within the containment zone; and
- human vectoring including the risk posed by all on-ground activities relating to this project.

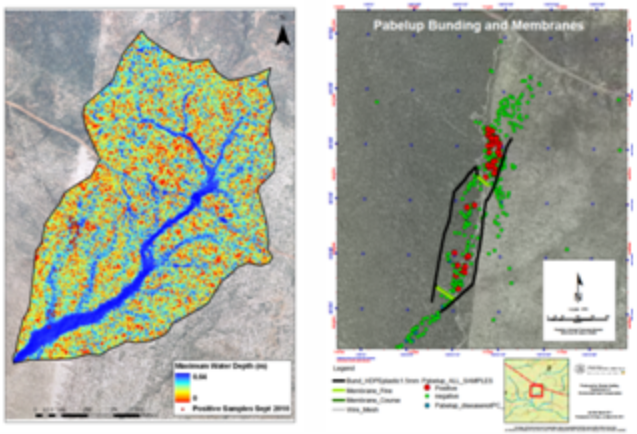
Risk Assessment Tools

Bayesian Belief Networks (BBNs) were used to undertake risk assessments to evaluate the contribution of the management strategies to the projects goals

Detecting the Pathogen/Strict Hygiene Protocols

(A) Extensive efforts were made to detect the occurrence of *P. cinnamomi* prior to all on-ground works including the use of *in situ* traps using Lupin seedlings as a bait. (B) Strict hygiene protocols were implemented throughout the projects to minimise the risk of human associated spread.

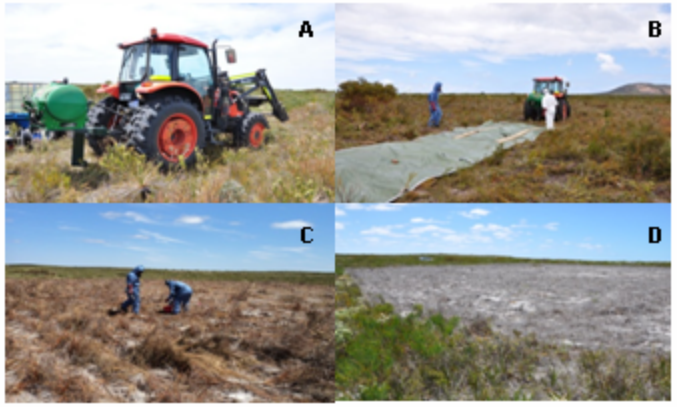
Hydrological Modelling & Engineering Controls



Detailed catchment characterisation was conducted using Digital Elevation Models (DEMs) and a range of rainfall scenarios were tested to develop appropriate hydrological engineering controls to prevent the future spread of *P. cinnamomi* in surface and subsurface water flows following rain events.

(A) Root impervious membranes and bunding were installed to prevent root-to-root transmission and water associated spread of *P. cinnamomi*. The aim of the bunding was keep clean water out of the infested areas reducing risk of hydrological discharge of the pathogen and ensuring any contaminated water flows were channelled through geotextile filtration systems. (B,C,D) A series of geotextile filtration systems were installed o prevent the spread of *P. cinnamomi* spores and inoculum within organic material during overland water flows after significant rain events.

Fumigation with Metham Sodium



(A) The fumigant Metham Sodium was applied as a liquid to eradicate *P. cinnamomi* disease centres occurring within native plant communities. (B) Significant effort was used to ensure no hygiene failures when crossing the buffer zone into the treatment area. (C) A granular form of Metham Sodium was used as a soil amendment to ameliorate any possible increase in *P. cinnamomi* activity following future rain events. (D) The resulting effect of fumigation created a vegetation free zone.

Conclusions

Three years of monitoring conducted to at the containment and the eradication sites has demonstrated that these techniques have been successful in containing and/or eradicating *P. cinnamomi*.

The strategies and techniques used in these projects have broad applicability in the management of *P. cinnamomi* and others oil-borne plant pathogens in a range of other management scenarios.

References

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2. Dunne, C.P., Crane, C.E., Biddulph, D., Lee, M., Young, G., Massenbauer, T., Barrett, S., Corner, S., Freebury, G.J.C., Utber, D.J., Grant, M.J., Shearer, B L. (2011) A catchment approach to managing *Phytophthora cinnamomi* in native plant communities of the Fitzgerald River National Park on the south-coast of Western Australia. New Zealand Journal of Forestry Science.

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