Frequent burning reduces Lantana density

Tom Lewis* & Valerie Debuse (DAF)

Presentation for SE Queensland Fire and Biodiversity Consortium Fire and Weeds Forum
October 2015
Presenter
Approx. 17 biocontrol agents have become established. Success of control is variable – but agents may reduce the vigour of the plant.

Large spreading root systems that can resprout after fire.

Has potential to alter local fire regimes.
Fire acts as a disturbance, modifying the soil and biomass – more light = more opportunity of invasion – particularly in rainforest environments.

Anecdotal evidence is more plentiful but inconsistent - dependent on variation in fire regime used, fire history of the site and the ecosystem.


To help answer some of the questions regarding ecological resilience and the impacts of frequent (and infrequent) burning we can make use of long-term fire experiments.

They are important for understanding:
- Species dynamics and responses to fire regimes
- The relative importance of fire versus other long-term factors (e.g. climate)

Experiments can look at the impact of frequent fire on managing understorey weeds.

Ecological impacts of prescribed burning.
Treatments cover large areas
Six monitoring plots in each treatment. Monitoring plots are 0.4 ha in size (100 x 40 m). The relatively high frequencies in this experiment are particularly relevant for landholders who manage this type of forest. Burning is conducted in winter and spring. We rely heavily on other government agencies and volunteers to carry out the burns.
The treatments

Annual

Triennial

Wildfire

Long unburnt
Lantana abundance was recorded within 100 x 1 m belt transects
Importance of long-term studies

Typical funding period for research

Mean lantana density increased in the long unburnt treatment, but declined 3 fold in the annually burnt treatment over the same period.
Unburnt plot 1962
Changes over time 1959-1972

Most change in the smaller size classes
Lantana camara densities in the annual and triennial burn treatments remained low at <=2 plants 100 m\(^2\) during 1974–2007. Density decreased in the unburnt treatment over this time.
Lantana camara regeneration (0-1 m) was generally the dominant height class.
Factors influencing *Lantana camara* regeneration density.
Other factors - summary

- Conspecific interactions.
- Rainfall had a positive influence on lantana regeneration in the unburnt treatment.
- Canopy cover not so important in open forest.
- Positive relationships between lantana regeneration and soil C:N and pH.
- Allelopathic chemical influence on pH?
- Higher C:N related to higher moisture content?
- Other drivers?
Temporal drivers?

Related changes in C:N?
repeated fire steadily reduces the density of *Lantana camara* and may suppress population growth, through its impact on plant mortality. Contrary findings – mainly due to the nature of the different ecosystems studied. Rainforest more sensitive to fire, whereas dry eucalypt forest is quite resilient.
Management implications

- Fire has a potential role in managing lantana densities in dry sclerophyll eucalypt forest.
- Impacts of frequent fire on local native plant species (i.e. diversity) in these systems are minimal.
- Where such frequent fire cannot be applied, fire is still a useful management tool for lantana control:
  - Easy access for other weed control techniques.
  - Herbicide treatment on lantana re-sprouting after fire.

Care required on rainforest margins and around watercourses – often where the lantana is.
Summary

- Long-term annual burning significantly reduced lantana density.
- Triennial burning maintained low densities of lantana.
- Relative rainfall and soil C:N ratio, pH were significant correlates of changes in lantana density.
- Considerable long-term variability in lantana density in unburnt treatment only partially accounted for by model.
- Repeated burning reduced temporal variation in lantana dynamics.

_Lantana camara_ populations undergo large temporal fluctuations in the absence of anthropogenic disturbance.
Questions?

Acknowledgments:
Past and present research staff that have measured and maintained the experiments, university collaborators, SEQ Fire and Biodiversity Consortium, QPWS, DAF Forestry, HQ Plantations and Rural Fire Service Queensland.

More detail see: