Lantana best practice management – the decision support tool

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Summary To date the success of efforts to control lantana (*Lantana camara* L.), a Weed of National Significance, have been variable. Landholders all too often employ single ad hoc methods and achieve mixed results. To successfully control lantana on a local level, best practice methods are necessary. Adaptive management trials were run in Queensland and New South Wales aimed at identifying effective integrated management sequences under a range of environmental and management scenarios. Results of these trials were used to produce the Lantana Management decision support tool. This paper outlines the methodology used in the development of the tool.

Keywords Lantana, *Lantana camara*, control, best practice management, decision support tool.

INTRODUCTION

Lantana (*Lantana camara* L.) is recognised as a Weed of National Significance because it threatens primary production, biodiversity and recreational activities in Australia (QDNRM&E 2004). Lantana costs Queensland and New South Wales graziers approximately $104 million each year in lost production (AEC Group 2007) and has a dramatic impact on natural ecosystems where it smothers native plant species and reduces biodiversity (Stock and Wild 2006, Turner *et al.* 2007). The success of lantana control efforts has been variable, despite the significant number of options available. This suggests land managers are not integrating and applying control techniques to their best advantage or in a cost effective way. Prescribing integrated control strategies is seen as an important component of providing best practice solutions to weed control (Carter *et al.* 2006). To improve success, key variables that influence the type of options that can be used were analysed in terms of suitability, cost effectiveness and control outcomes, to produce a user friendly, decision support tool.

Adaptive management trials were run at 11 sites in Queensland and New South Wales. These trials identify suitable integrated management sequences under a range of environmental and management scenarios. Results of these trials will aid the production of the Lantana Best Practice Management Manual. In particular the results will help produce the decision support tool that will guide land managers through a series of questions to provide the most suitable sequence of control for their situation.

The following paper outlines the methodology used in the development of the decision support tool.

PRIOR INFORMATION

In order to get the best use from the decision support tool the land manager should complete a Property Pest Management Plan to establish clear and realistic goals to guide their control strategy.

Once a Property Pest Management Plan has been developed the land manager will have identified: (i) the infestations of lantana on their property and chosen those that are of the highest value; (ii) where they are likely to want to undertake works given their budget and equipment; (iii) timeframes for undertaking these works; and (iv) desired outcomes.

Once target areas have been selected, the next step will be to determine: (i) the area of the infestation; (ii) the density of lantana present; (iii) the accessibility to the lantana infestation; and (iv) climate suitability for implementing control options.

DETERMINING THE KEY VARIABLES

A landholder who chooses to use the decision support tool will have already determined their goals and timeframes they wish to complete a task within, however often the next step is taken without regard to the cost, effectiveness or outcomes desired.

A simple decision support tool uses three primary key variables that influence cost and outcomes. Through extensive consultation via a stakeholder workshop, it was determined that the variables that defined which control sequences were suitable and cost effective were:

- access to the infestation;
- density of the infestation; and
- size of the infestation.

DISCUSSION OF THE KEY VARIABLES

Light infestations in flat paddocks will require a much different approach to control than large

heavily infested hilly and wooded areas. A land manager will typically be confronted with a variety of infestation sizes, densities and accessibilities on the same property.

Access defined Access can be influenced by terrain, vegetation cover, geographical barriers and the presence of property infrastructure such as fence lines, dams, yards, houses and sheds. Access is thus categorised as either:

a. easy — can get personnel and larger machinery to lantana (e.g. open paddock, flat)
b. moderate — can get personnel but only smaller machinery to lantana (e.g. open woodland over a creek)
c. difficult — can get personnel but not most machinery to lantana (e.g. forested slope)

Density defined Density of an infestation can be categorised as either:

a. light density (plants are sporadic with grass areas between; <500 plants per hectare; <10% cover; usually less than 1.0 m high and access available to individual bushes);
b. medium density (plants in clumps with some grass areas; 500–2500 plants per hectare; 10–50% cover; about 1–2 m high and access diminished to vehicles but not to humans); or
c. high density (plants are generally impenetrable without cutting access trails; >2500 plants per hectare; >50% cover; usually >2 m high and access denied except through initial mechanical or fire treatments).

Size defined Scale of the infestation will determine its suitability for use of broad scale treatments such as fire, large machinery or aerial spraying. Significant saving on costs can be made due to economy of scale principles reducing the fixed costs of using equipment or contractors. Options like fire and aerial spraying can initially treat large areas quickly (within a day) and the overall costs per hectare are reduced as larger infestations are treated. However it is of course more expensive on the whole to control large infestations and land managers must be prepared for a long term invest over three to five years.

Size of infestation is categorised as either:

a. small infestation (<1 ha in area ~ small section);
b. medium infestation (1–10 ha ~ small to medium paddock);
c. large infestation (10–100 ha ~ large paddocks; or
d. very large infestation (>100 ha ~ several paddocks).

This part of the decision support tool will assist land managers to estimate the cost of a particular technique and what they can reasonably afford to achieve. It is better to tackle a smaller area and achieve control than waste money on a larger area that will reinfest due to poor follow-up application.

USING THE DECISION SUPPORT TOOL

The decision support tool will be produced in a hard copy version and an electronic version available on both CD and the internet. A land manager who has planned for tackling weeds on their property will be in a position to use the Decision Support tool.

The tool will work as follows:

1. The land manager will answer a series of questions concerning the key variables:
   - size of infestation
   - density of infestation
   - access to infestation
2. The decision support tool will act as a key, leading them to several possible sequences. These will be related to:
   - the control time required and cost incurred per area;
   - the overall timeline to achieve the sequence outcomes;
   - the likely efficacy of controls;
   - limitations and suitability of the techniques.

PRESENTING THE DECISION SUPPORT TOOL

For some situations only one sequence will be applicable, but for others, two or three might be needed. For instances where several sequences are presented, the land manager will be able to choose their desired sequence based on the cost, efficacy of control and timeframes for outcomes. As such, each sequence will have the following detail:

- each year of the sequence (up to four years);
- cost per year in $ per hectare and time per hectare; and
- efficacy per year per treatment.

INFORMATION FOR SEQUENCES

For some of these sequences secondary variables may end up favouring one sequence over another. Therefore the information package will provide details of any other issues relating to that particular sequence. Information that may be included is: whether the sequence is suitable in agricultural or conservation areas; whether the health of plants needs to be considered; which of the trial sites the information has been drawn from; details of whether contractor or private works were used and details of equipment used.

DISCUSSION

As previously mentioned many variables can influence the desire for, and success of lantana control. However, it was determined early in the project that the decision support tool needed to be easy to use while still delivering the desired aims of providing best practice management solutions for improving lantana control. Thus the three variables of lantana density, infestation size and access were determined to be the most useful in being able to simply, yet effectively, lead to best practice sequences

It was determined that a hard copy of the decision support tool, not just electronic options, needed to be produced to ensure that the tool is open to all land managers.

The decision support tool will be a key component of the Lantana Best Practice Management Manual, providing landholders with not only the background information on lantana, but defining the different control techniques with their advantages and disadvantages. The manual will also provide details on the production of property pest management plans as well as the latest information on best practice.

In conclusion, the decision support tool will give land managers better options in controlling their lantana, increasing best practice control.

ACKNOWLEDGMENTS

This project was funded through the Australian Government's 'Defeating the Weeds Menace' program. The authors would also like to thank the many landholders, council and other state government staff in Queensland and New South Wales for their valuable in-kind contributions to the project.

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