CALOTROPE (CALOTROPIS PROCERA): A WEED ON THE MOVE IN NORTHERN QUEENSLAND

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ABSTRACT

Calotrope (*Calotropis procera*) is an exotic woody shrub threatening the biodiversity and productivity of the rangelands in central and northern Queensland. It is widespread throughout the Gulf of Carpentaria region but is spreading into new areas where many land managers are not familiar with it. A collaborative research project funded by MLA has been initiated to better understand its rate of spread, ecology and invasiveness, as well as to improve the range of effective control options. To date, foliar herbicide trials have identified a limited number of chemicals that are effective in certain seasons. Soil applied herbicides are demonstrating good efficacy when applied by hand or aerially and work is continuing to refine effective rates. The susceptibility of plants to being cut off at ground level and several depths below ground is being determined to quantify the potential of mechanical control options. A site affected by a dieback phenomenon is being monitored to determine the fate of plants over time.

Keywords: Control, rangelands, rubber bush, woody weed

INTRODUCTION

Calotrope (*Calotropis procera*), a native of tropical and subtropical Africa and Asia (Grace 2006), is spreading across large areas of northern Australia (Grace 2006), including northern Queensland (Figure 1). However, its current distribution is still only a small proportion of its potential distribution, which includes most of the rangelands of northern Australia (Grace 2006).

Although calotrope is not a declared weed in Queensland under the *Land Protection (Pest and Stock Route Management) Act 2002*, many local governments, community groups and individual landholders are concerned about it. In the Gulf of Carpentaria region, infestations have thickened extensively in recent years. In other areas, such as middle reaches of the Burdekin catchment, calotrope is a new problematic weed.

Prevention and early intervention are the most cost effective strategies for land managers to minimise any negative impacts caused by calotrope. There is a need for greater education and awareness of calotrope in susceptible areas, as it is a weed that is proving difficult and expensive to control once infestations become large and dense. In areas where it is in the early stages of invasion, it can gain a foothold before people recognise it as a problem. Distinguishing features of calotrope include large rounded leaves that have a waxy appearance and grey-greenish colour, flowers that are white with distinctive purple blotches at the tips, bladder-like pods that split open to release white-plumed seeds, and a milky sap (latex) that is released from plant parts when damaged (Grace 2006; Smith 2011). Plants can grow up to 6 m high as a spreading shrub or small tree with single or multiple stems. Calotrope seeds can be wind-dispersed and plants may appear far from watercourses and remain undetected for several years.

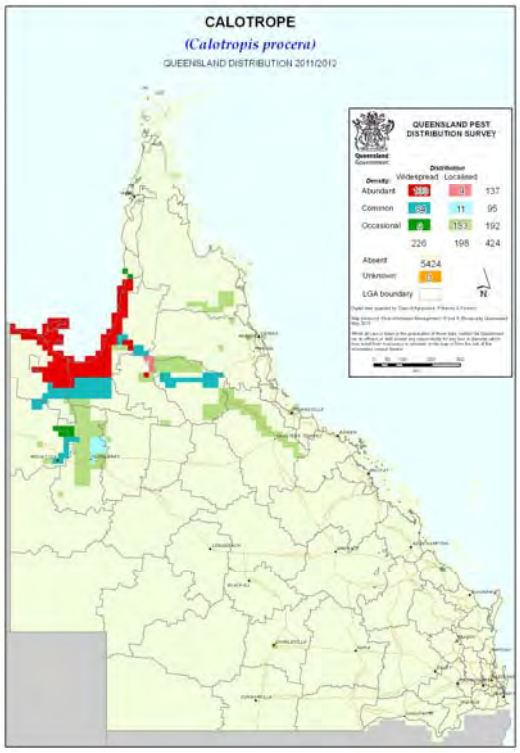

Figure 1. The estimated distribution of calotrope in Queensland in 2011/12. Refer to http://www.daff.qld.gov.au/4790_9824.htm for a description on how the distribution was derived.

Thick infestations of calotrope are thought to negatively impact production and biodiversity (Grace 2006). Some authors believe it is a highly competitive plant capable of replacing pastures in good condition, whilst others consider it a weed of disturbed or degraded areas (Bastin *et al.* 2003; Grace 2006). The plant contains toxic compounds, although there are few reports of domestic animals dying from it (Grace 2006). At times animals will even heavily graze calotrope plants and help keep them in check.

A minor use permit (PER12497) has been issued by the Australian Pesticides and Veterinary Medicines Authority for the control of calotrope in Queensland. This permit incorporates certain herbicides and application techniques (overall spray, basal bark and cut stump) trialled by Vitelli *et al*. (2008). More options, though, are needed to deal with the range of densities, infestation sizes and habitats where calotrope is growing.

A better understanding of the invasiveness of calotrope and of its ecology, spread and control is important. Meat and Livestock Australia (MLA) is currently funding collaborative research by the Department of Agriculture, Fisheries and Forestry (Queensland), Charles Darwin University and the Northern Territory Department of Land Resource Management with input from a range of stakeholders. The next section provides an overview of the research within the MLA project to improve control options for calotrope.

IMPROVING CONTROL OPTIONS FOR CALOTROPE

Herbicide control

Beginning in April 2011, multiple herbicide trials were initiated to identify practical options to control isolated calotrope plants, increase the range and efficacy of foliar herbicides and test aerial applications of a granular herbicide for control of large, dense infestations. These trials will continue for two years after establishment to ensure the accuracy of mortality assessments. Several follow-up trials were established in 2012 based on trends from the first set of trials.

A trial began in June 2011 to test both frill and cut stump applications of a picloram gel (Vigilant Gel®) and glyphosate (Roundup PowerMAX®) applied neat for treatment of isolated plants. The picloram gel comes in an easy-to-carry tube; glyphosate can also be easily transported in a small spray pack. For small to medium sized plants, either a tomahawk (for frilling) or cutting instruments such as a pruning saw (for cut stumping) can be used. Initial results were promising and further testing of the efficacy of diluted formulations of glyphosate-based products (Roundup® and Roundup® Attack) commenced in July 2012.

Granular herbicides are also easily transported and applied with ground based applications. These are also being tested for control of isolated plants. In October 2011, the highest currently registered rates of tebuthiuron (Graslan*), hexazinone (250 g/L formulation) (Velpar® L), hexazinone (150 g/kg formulation) (Velmac®) and hexazinone/bromacil/diuron (Dymac®) were applied and will be compared with an untreated control. Preliminary findings from this work have led to additional trials to refine rates for the most promising tebuthiuron and hexazinone treatments. Monitoring of a Dow AgroScience aerial application trial using tebuthiuron on dense calotrope growing amonst gidyea (*Acacia cambagei*) regrowth is also being undertaken. Three rates of tebuthiuron were used initially with a second trial underway to refine rates.

In April 2011, a trial was initiated to identify additional foliar spray options for treating calotrope. Either one or two rates of the currently available herbicides metsulfuron methyl (Brush-off®), 2,4-D amine (Amine 625), 2,4-D amine + metsulfuron methyl (Amine 625 + Brush-Off®), 2,4-D/picloram (Tordon™ 75-D), fluroxypyr (Starane™ Advanced), aminopyralid/fluroxypyr (Hotshot™), triclopyr (Garlon™600), triclopyr/picloram (Tordon* Double Strength), and glyphosate (both Roundup PowerMAX® and Roundup® Dual Salt Technology®) were applied. Four new chemicals (either from DuPont Australia or Dow AgroSciences) were also included. A second rate response trial, including a seasonality component, was later implemented.

Pilot mechanical trial

A pilot study commenced in October 2011 to determine the type of damage that mechanical techniques would need to impose to cause high mortality of calotrope. Medium-sized calotrope plants had their roots severed at 0, 10 or 20 cm below ground and their growth afterwards (number of stems, height, time to flowering and podding) is being compared against an untreated control.

Dieback monitoring

Calotrope dieback has been observed at the project sites and appears to be pathogen related. Plants initially lose their leaves and the tips of stems die. Eventually whole branches die back. Wilkinson *et al.* (2005) reported on a leaf spot disease (*Passalora calotropidis*) in northern Queensland capable of causing such symptoms. Preliminary investigations are underway by the University of Queensland to confirm the cause of the dieback at several locations in northern Queensland. Six transects have also been established in a dieback affected area in the Gulf of Carpentaria to determine whether plants eventually recover or die. This will have significant implications on the population dynamics of infestations.

CONCLUSION

Past research indicated that a timeframe of two years is appropriate for accurately monitoring the effects of imposed treatments on calotrope (Vitelli *et al.* 2008). Therefore, several of the trials in the current research program will conclude over coming months. The initial foliar herbicide screening trial ended in May 2013 and the results are currently being analysed. Preliminary findings of current trials suggest that a broader range of control options will be identified for land managers by completion of the project. For any effective herbicide options, registration will be sought through the the AVPMA.

ACKNOWLEDGEMENTS

The authors wish to thank MLA for providing funding and the Woollett, Nelson and Mathews families for allowing research to be undertaken on their properties. The support of Dow AgroSciences is gratefully acknowledged, particulary for allowing monitoring of the aerial applications of tebuthiuron in the Gulf of Carpentaria region. Apart from the co-authors, several technical and operational staff from the Tropical Weeds Research Centre have contributed to implimentation and monitoring of treatments and their input is gratefully acknowledged. Thanks also to Simon Brooks, Barbara Madigan, Wayne Vogler and Joe Scanlan for commenting on drafts of this paper.

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