ADVANCING PRICKLY ACACIA MANAGEMENT THROUGH THE WAR ON WESTERN WEEDS INITIATIVE

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ABSTRACT (SUMMARY)

Prickly acacia (*Vachellia nilotica*) is a landscape level weed problem affecting large areas of western Queensland and other areas of the state. Following high rainfall related mass germination events of 2010 – 2012, the Department of Agriculture and Fisheries (DAF) launched the War on Western Weeds (WoWW) initiative in 2013. WoWW focussed on three key areas: refining new tools and approaches; improving biosecurity systems; and, exploring biocontrol opportunities. Notable outcomes have included: refinement of misting, weed sniper and skattergun as control options; two Good Neighbour Program case studies demonstrating the practicalities of property boundary weed-free buffer zones; ecological studies as a basis for seed spread prevention actions; and, renewed biological control investigations involving searches for prospective agents in India and North Africa. Initiative results have been extended through forums, field days and publication of a decision support tool factsheet series. The increased capacity, skills, tools and motivation from the WoWW initiative is helping to achieve practical and cost-effective outcomes for prickly acacia management – helping land managers to help themselves.

Keywords: Prickly acacia, *Vachellia nilotica,* War on Western Weeds

INTRODUCTION

The WoWW project is a five year DAF-funded initiative aimed at improving the management of prickly acacia through refinement of new tools and approaches; improving biosecurity systems; and, exploration of biocontrol opportunities. Complementary to these is the promotion of best practice management to reduce long term impacts of the weed. Delivery of the WoWW initiative is through a '*Community of Practice*' approach that utilises community and industry input for all project processes. In particular, a project advisory group directs and supports research and extension priorities.

REFINING NEW TOOLS AND APPROACHES

Adaptive management trials - harnessing community innovation

Nine new management tools driven by community innovation were evaluated under field conditions. Spray misting, heli-drop and the skattergun are examples of successful community innovations for herbicide application where few similar tools were available.

Spray misting using an agricultural mist blower has been shown to be an effective, lower labour method for foliar herbicide application to both long linear infestations (e.g. drainage lines) and denser thickets of immature prickly acacia. Following early landholder development, trials were conducted to formalise the herbicide application rates, weather conditions and methods for prickly acacia spray misting. This has resulted in the APVMA issuing minor use permit PER82366 for the use of spray misting for prickly acacia control.

Cloncurry Mustering Company have developed a herbicide applicator called the 'weed sniper' which when combined with a R22 helicopter delivers measured doses of the granular herbicide tebuthiuron for the control of prickly acacia. The use of the weed sniper allows the rapid detection and treatment of individual prickly acacia plants scattered across large and sometimes inaccessible landscapes. Field trials demonstrated that this device performed well in terms of cost and efficacy compared to basal bark spraying using Access™ and diesel but was slightly more costly than hand applied tebuthiuron in prickly acacia densities of 35 plants per hectare (all plant sizes) (Vogler and Carlos 2015).

The skattergun is a compressed air driven applicator for soil applied herbicides developed by Brett Epple. This device is mounted on a suitable vehicle and allow the operator to 'shoot' measured doses of tebuthiuron up to 20 metres away from the distribution point. This enables the rapid treatment of low to high density prickly acacia infestations. Trials have confirmed that it is an efficient and cost effective tebuthiuron application method that reduces labour whilst enabling significant areas of prickly acacia to be treated quickly.

Figure 1. Agricultural mister, weed sniper and skattergun prickly acacia herbicide application equipment.

Good Neighbour Program approaches

The establishment of weed-free property boundary buffer zones as part of Good Neighbour Program approaches was tested through case studies in the Hughenden and Muttaburra areas of western Queensland (March and Cullen 2017). Respective minimum buffer widths of 10 m and 250 m for fence lines and watercourses were deemed to be feasible with control operations usually quick, easy and of low to moderate cost. The identified benefits of GNPs included an immediate reduction of weed seed spread between properties and an incentive for landholders to progress their properties or some paddocks to weed-free status.

IMPROVING BIOSECURITY SYSTEMS

To improve biosecurity systems, a number of ecology studies were undertaken to address key gaps in knowledge and develop or refine spread prevention actions.

Riparian spread

While seeds have no intrinsic buoyancy, studies found that pods could float for up to 12 days (average 5 days) in agitated water. Subsequent field studies found that most seed deposition occurred within 7 km of a seed source and, along one creek, immature plants were observed as far as 15.2 km downstream (March et al 2015). The results have implications for riparian surveys, catchment based strategic control and Good Neighbour Programs.

Seed and pod maturity

Observations and laboratory studies found that pod and seed maturity is driven primarily by seasonal conditions with some seeds viable as early as July. Visual cues for pods and seeds were identified – firstly, that seed from flat pods and soft seeds were rarely viable, and secondly, that viability increases when pods change from green to grey. The results highlighted for the need to manage risks associated with cattle grazing maturing pods and not just during latter periods of pod drop (Carlos and Vogler 2015).

Seed passage in cattle

To examine seed passage in cattle, 45 cattle were fed prickly acacia pods and sorghum stubble hay. Faeces were collected daily and seed retrieved. By the fourth day, cattle had passed 93% of seed. By day six 98% of seed had passed with the final seed found in faeces eight days after ingestion. The results indicate that to prevent seed spread, cattle movement must be carefully managed, including holding cattle in areas free of prickly acacia pods for at least six and up to eight days before or after transport or moving cattle.

Seed longevity

Two seed longevity trials are currently being conducted using different seed sources. Seed lots have now been buried for either 3 or 8 years with viability averaging 13 and 5% respectively, which highlights the potential long term persistence of soil seed banks (Campbell 2017).

Revised biosecurity systems

Ecology research findings, relative importance of dispersal vectors and priority actions for spread prevention were discussed in a WoWW workshop at Longreach in 2015. Workshop outcomes were synthesised into recommended actions and guidelines to further reduce prickly acacia seed spread.

EXPLORING BIOCONTROL OPPORTUNITIES

Biological control efforts commenced in the early 1980s with limited success to date. The need for an effective biological control for prickly acacia remained a high priority and was consequently progressed as a key component of the WoWW initiative.

Four prospective insects were prioritised from India for host specificity tests – a scale insect (*Anomalococcus indicus*), a brown leaf-webber (*Phycita* sp.), a green leaf-webber (*Phycita* sp.) and a leaf weevil (*Dereodus denticollis*). The scale insect and the brown leaf webber were not sufficiently host-specific to release. Host testing of the green leaf-webber and leaf weevil were abandoned due to continued difficulties in rearing them in quarantine.

With no more prospective agents available in India, survey efforts to find new biological control agents have been redirected to Africa. Based on climatic similarities and plant phenotypic matching, Ethiopia in East Africa and Senegal in West Africa have been prioritised for native range surveys. Surveys have commenced in Ethiopia and Senegal in partnership with researchers from Central Ethiopia Environment and Forest Research Center. Gall thrips and a gall mite were identified as potential biological control agents. Host specificity tests are in progress for the gall thrips in Australia while the gall mite has been exported to a facility at South Africa for colony establishment and host specificity testing. Future surveys will focus on yet-to-be-explored countries in North Africa.

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