

ADVANCING SPLATTER GUN TECHNOLOGY FOR RANGELAND WEEDS

Shane D. Campbell^{1,2}, Hayley McMillan², Dannielle A. Brazier¹, Melissa Setter³ and Stephen D. Setter³

¹Department of Agriculture and Fisheries, Tropical Weeds Research Centre, PO Box 187, Charters Towers, Queensland, 4820, Australia

²School of Agriculture and Food Science, The University of Queensland, Gatton, Queensland, 4343, Australia

³ Department of Agriculture and Fisheries, Centre for Wet Tropics Agriculture, PO Box 20, South Johnstone, Queensland, 4859, Australia

ABSTRACT

To determine whether more rangeland weeds could be susceptible to low-volume high-concentration herbicide applications (e.g., splatter guns), trials were initiated on gamba grass (*Andropogon gayanus*), rubber vine (*Cryptostegia grandiflora*), prickly acacia (*Vachellia nilotica*), and Chinee apple (*Ziziphus mauritiana*). For gamba grass, a rate response trial (0, 9, 18, 27, 36, 45 and 54 g a.i./L of mixture) of glyphosate has shown that 100% mortality can be achieved at rates ≥ 36 g a.i./L of mixture. A rubber vine trial is comparing the effect of timing of applications (between December and May) of two herbicides. Six months after treatment (MAT), Grazon™ Extra (triclopyr/picloram/aminopyralid) recorded the highest (i.e. December application) but most variable efficacy (0-80%) compared to 40-70% for Brush-off® (metsulfuron-methyl). The optimum way to spray plants using Hotshot™ (aminopyralid/fluroxypyr) is being investigated in a prickly acacia trial. Preliminary results, six MAT suggest that more severe damage occurs if the amount applied is calculated on the basis of the whole surface area of plants (i.e. both sides), but spraying from one side appears to be sufficient. For Chinee apple, a screening trial of five herbicides and two rates is showing that Brush-off® (metsulfuron-methyl) and Stinger™ (aminopyralid/metsulfuron-methyl) are the best performing herbicides, but only on smaller plants (< 2 m high) and at the highest applied rates 12 MAT. While promising, the variability in results indicates that many factors may affect efficacy, including the health, size and density of plants, herbicide choice and mixture/application rate, presence/absence of biological control agents and climatic conditions.

Keywords: Chinee apple, gamba grass, prickly acacia, rubber vine, woody weeds.

INTRODUCTION

Low-volume high-concentration foliar spraying using equipment such as splatter guns, has proven a practical alternative to traditional high volume foliar techniques for control of some remote and/or difficult to access invasive weeds, such as lantana (*Lantana camara*), bellyache bush (*Jatropha gossypifolia*) and Siam weed (*Chromolaena odorata*) (Somerville *et al.* 2011, Brooks *et al.* 2014). Other demonstrated benefits include reduced treatment times and labour costs, as well as minimal off-target damage (Somerville *et al.* 2011). In this paper, we provide a summary on the progress of a Commonwealth Government funded research project investigating whether more rangeland weeds can be controlled using this technique. The weeds being studied are three Weeds of National

Significance [gamba grass (*Andropogon gayanus*), prickly acacia (*Vachellia nilotica*), rubber vine (*Cryptostegia grandiflora*)] and Chinee apple (*Ziziphus mauritiana*).

MATERIALS AND METHODS

Targeted weeds

Gamba grass

At a site near Mt Garnett in north Queensland, a rate response trial using seven different concentrations of glyphosate (0, 9, 18, 27, 36, 45 and 54 g a.i./L of mixture) was implemented in April 2018. The site was slashed in December 2017 to overcome variability in height of plants due to grazing. At the time of application, the gamba grass regrowth averaged 1.9 ± 0.3 m tall.

Rubber vine

Given the variability in efficacy obtained from earlier splatter gun trials on rubber vine (see Campbell *et al.* 2016), further research was initiated in an attempt to define the optimal conditions (i.e. considering factors such as plant size, level of leaf rust and climatic conditions) for effective rubber vine control using splatter gun technology. On a cattle property about 30 km north-east of Charters Towers in northern Queensland, a factorial experiment commenced in December 2017. It incorporates six spraying times (c.a. four weeks apart between December and May) and three herbicide treatments; untreated control, Brush-off[®] (metsulfuron-methyl) at 3.6 g a.i./L of mixture and Grazon[™] Extra (triclopyr/picloram/aminopyralid) at 15/5/0.4 g a.i./L of mixture. Rubber vine plants were on average 2.2 ± 0.5 m high and 3.1 ± 1.1 m wide.

Prickly acacia

In earlier screening trials, Hotshot[™] (aminopyralid/fluroxypyr) was identified as the most effective herbicide option. An additional trial was established in April 2018 at a site near Aramac in north-west Queensland to determine whether plant size influences the amount of mixture to be applied, as well as the way plants should be sprayed. Small (average of 1.4 ± 0.4 m tall) and large (average of 2.7 ± 0.4 m tall) prickly acacia plants have been sprayed with Hotshot[™] (aminopyralid/fluroxypyr). A mixture rate of 0.7/9.8 g a.i./L was applied at two rates (i.e. based on 10 mL/m² of the surface area of single or double sides of plants) to either a single or both sides of plants.

Chinee apple

A trial was initiated near Charters Towers in March 2018 to screen five herbicides at two rates, against an untreated control. Smaller (average of 1.4 ± 0.3 m tall) and larger (average of 2.4 ± 0.3 m tall) Chinee apple plants have been sprayed with Hotshot[™] (aminopyralid/fluroxypyr) at 0.7/10 and 1.4/20 g a.i./L of mixture, Stinger[™] (aminopyralid/metsulfuron-methyl) at 1.5/1.2 and 4.5/3.6 g a.i./L of mixture, Starane[™] Advanced (fluroxypyr) at 10 and 20 g a.i./L of mixture, Brush-off[®] (metsulfuron-methyl) at 1.2 and 3.6 g a.i./L of mixture, and Grazon[™] extra (triclopyr/picloram/aminopyralid) at 10.5/3.5/0.3 and 15/5/0.4 g a.i./L of mixture.

Spraying

Treatments were implemented using either a gas or manually operated splatter gun (N.J. Phillips[®]). Each herbicide mixture received 2 mL/L of the non-ionic

wetter/spreader/penetrant Pulse[®] (Nufarm) (1020 g/L polyether modified polysiloxane) and in some instances 1 mL/L of red Spraymate[™] Spray Marker Dye (150 g/L Rhodamine B). Unless outlined otherwise in the above sections, 10 mL of mixture was applied per metre squared of surface area of the plant (Chinee apple, prickly acacia, rubber vine) or 4 mL of mixture/0.5 m height (gamba grass).

PRELIMINARY RESULTS

Gamba grass

Gamba grass mortality increased linearly with increasing rates of glyphosate, until 100% mortality was recorded at a rate of 36 g a.i./L of mixture.

Rubber vine

Six MAT herbicide efficacy varied depending on the herbicide and the spraying times. Grazon[™] Extra (triclopyr/picloram/aminopyralid) recorded the highest overall mortality (80%) from the December 2017 application, but it also had the greatest variability overall, ranging from 0–80% mortality across the six spraying times. In contrast, the highest mortality (70%) for Brush-off[®] (metsulfuron-methyl) was after spraying in January 2018 and mortality ranged between 40–70%.

Prickly acacia

Despite high brown out six-weeks after treatment (84–100%) plant size had no discernible effect on regrowth of herbicide treated plants and no herbicide treated plants had died six MAT. However, branch death was generally more severe when the amount of herbicide mixture applied was calculated based on the whole surface area of plants (i.e. both sides) and applied to one side of plants.

Chinee apple

Twelve months after treatment, Brush-off[®] (metsulfuron-methyl) and Stinger[™] (aminopyralid/metsulfuron-methyl) are the best performing herbicides, but only at the higher rates of 3.6 and 4.5/3.6 g a.i./L of mixture, respectively. However, control of larger plants (> 2 m in height) using both herbicides was poor with only 26% showing no signs of live growth. Efficacy was much higher for smaller plants less than 2 m in height, averaging 72% and 92% mortality for Brush-off[®] (metsulfuron-methyl) and Stinger[™] (aminopyralid/metsulfuron-methyl), respectively.

DISCUSSION

The preliminary results from the current trials on gamba grass, rubber vine, prickly acacia and Chinee apple highlight the potential of splatter gun technology for rangeland weeds, but also demonstrate the variable responses that can occur. Gamba grass was highly susceptible, but whether similar results can be achieved on mature plants that contain a combination of new and old growth is the focus of further research. The differential responses obtained in the rubber vine trial where mortality varied between 0 to 80% depending on the timing of application and the herbicide used (i.e. triclopyr/picloram/aminopyralid or metsulfuron-methyl) is consistent with earlier trials

(Campbell *et al.* 2016), and suggests that a number of factors may be influencing efficacy using this technique. Similarly, the ongoing Chinese apple trial is producing mixed results across the size classes. This indicates that either larger plants are more tolerant or, that insufficient herbicide was applied to them to cause mortality. The treatment effects should become clearer in the second year of assessment. Preliminary findings from the prickly acacia work suggests that the way plants are sprayed and how the amount of mixture to apply is calculated can influence plant damage, although further monitoring is also needed to see if this translates into higher mortality, and whether or not a size class effect becomes evident.

Based on the findings to date, some of the key factors that appear to have contributed to variability in efficacy, particularly for the woody weeds, include the health, size and density of plants, herbicide choice and mixture/application rate, presence/absence of biological control agents (i.e. presence of the leaf rust *Maravalia cryptostegiae* on rubber vine) and climatic conditions. This is similar to previous reports for variability in herbicide applications on rangeland weeds (Vitelli and Pitt 2006). On-going monitoring of the current trials and implementation of new research will help refine this technique.

ACKNOWLEDGMENTS

This research would not have been possible without Commonwealth Government funding and support from the Department of Agriculture and Fisheries, Desert Channels Queensland, Kyle Barton and Tropical Weeds Research Centre staff.

REFERENCES

- Brooks, S.J., Gough, K.L. and Campbell, S.D. (2014). Refining low-volume, high-concentration herbicide applications to control *Chromolaena odorata* (L.) King & Robinson (Siam weed) in remote areas. *Plant Protection Quarterly* 36: 459-67.
- Campbell, S.D. and Brazier, D.A. (2016). Developing additional herbicide control options for rubber vine (*Cryptostegia grandiflora* R.BR.), *Proceedings of the 20th Australasian Weeds Conference*, The Weeds Society of Western Australia, Perth, pp. 284-287.
- Somerville, S., Somerville, W. and Coyle, R. (2011). Regenerating native forest using splatter gun techniques to remove lantana. *Ecological Management and Restoration* 12: 164-74.
- Vitelli, J.S. and Pitt, J.L. (2006). Assessment of current weed control methods relevant to the management of the biodiversity of Australian rangelands. *The Rangeland Journal* 28: 37-46.



Weed Society of Queensland



PAWS 2019

PEST ANIMAL & WEED SYMPOSIUM 2019

20-23 MAY 2019, SEA WORLD RESORT CONFERENCE CENTRE,
GOLD COAST, AUSTRALIA

Get on board

Proceedings of the 1st Queensland Pest Animal and Weed Symposium



Contents

DAY TWO

Plenary session one

Keynote address: THE IMPORTANCE OF THINKING	5
J.R. Clarkson	
INVASIVE PESTS CONTROL SCHEME - A NEW APPROACH TO MANAGING PESTS AT THE LOCAL GOVERNMENT LEVEL	9
Mathew Warren, Craig Magnussen	
PROPERTY PEST MANAGEMENT PLANS, INNOVATIVE TOOLS OR ADMINISTRATIVE BURDEN: A WHITSUNDAY PERSPECTIVE	15
Scott Hardy and James Gubby	

Concurrent session 1

TILAPIA BUSTERS – IT’S ALL ABOUT THE BASS, NO TREBLE	22
Iain Jamieson and Pete Ker	
COMMUNITY LED ACTION IN THE BULIMBA CREEK CATCHMENT - EMPOWERING INDIVIDUALS THROUGH SIMPLE, HANDS-ON ACTIONS	26
Stefan Hattingh, Carly Murphy	
USING A PARTICIPATORY APPROACH TO ENCOURAGE MODEL ADOPTION IN MANAGING INVASIVE SPECIES	32
J.V. Murray, J. Froese, P.J. Adams and R.D. van Klinken	
COMMUNITY-BASED INVASIVE SPECIES MONITORING – FERALS SCAN UPDATE AND FUTURE DIRECTIONS	38
Peter West	
PARTNERING TO IMPROVE EARLY DETECTION OF MARINE PEST THREATS	41
Anita Ramage, Paul Doyle and Carolyn Trewin	

Concurrent session 2

ENVIRONMENTAL DNA AS A TOOL FOR PEST SPECIES DETECTION AND MONITORING	45
Cecilia Villacorta-Rath, Damien Burrows, Richard Edmunds and Jan Strugnell	
DO DINGOES SUPPRESS FERAL CATS? SPATIAL AND TEMPORAL ACTIVITY OF SYMPATRIC FERAL CATS AND DINGOES IN CENTRAL QUEENSLAND	50
Bronwyn Fancourt, Peter Cremasco, Cameron Wilson and Matthew Gentle	
AUTOWEED: DETECTING HARRISIA CACTUS IN THE GOONDIWINDI REGION FOR SELECTIVE SPOT-SPRAYING	52
Brendan Calvert, Alex Olsen, Bronson Philippa, Mostafa Rahimi Azghadi	

INTERACTIVE DASHBOARDS FOR ADAPTIVE PREDATOR MANAGEMENT ON APN COUNTRY58

Jens G. Froese, Justine V. Murray, Justin Perry, Sandy Whyte

WETBLADE TECHNOLOGY: COMBINING MECHANICAL CLEARING AND HERBICIDE APPLICATION TO OPEN NEGLECTED FIREBREAKS AND ACCESS TRACKS IN EUCALYPT PLANTATION FORESTRY63

Kathryn Crowe , Christopher Love and Geoffrey Messer

Concurrent session 3

FALLOW DEER CONTROL ON THE GRANITE BELT70

Dr David Berman, Holly Hosie and Craig Magnussen

WILL AUSTRALIAN ENDEMIC PATHOGENS WEAKEN THE MIGHT OF GIANT RAT'S TAIL (GRT) GRASS?76

Joseph S. Vitelli, David G. Holdom, Roger G. Shivas, Claire Lock, Yu Pei Tan, Kaylene Bransgrove, Annerose Chamberlain, Natasha Riding, James Hosking and Brett Cawthray

CONTROLLING WEED RECRUITMENT IN ISOLATED AREAS OF CAPE YORK PENINSULA82

Melissa Setter, Stephen Setter, Darryn Higgins, Simon Brooks and Wayne Vogler

PERSISTENCE, DEDICATION AND COLLABORATION - THE KEY TOWARDS ERADICATION OF BITOU BUSH ON WORLD HERITAGE LISTED K'GARI-FRASER ISLAND88

Linda Behrendorff

Concurrent session 4

USE OF HOGGONE® meSN™ FERAL PIG BAIT FOR THE REDUCTION OF FERAL PIG POPULATIONS IN AUSTRALIA.....91

Linton Staples & Jason Wishart

EFFICACY AND STRATEGIC USE OF PAPP-BASED EJECTORS FOR THE CONTROL OF DINGOES AND FOXES.....97

Benjamin L. Allen

ADVANCING SPLATTER GUN TECHNOLOGY FOR RANGELAND WEEDS 101

Shane D. Campbell, Hayley McMillan, Dannielle A. Brazier, Melissa Setter and Stephen D. Setter

OLD DOGS AND NEW TRICKS: SCC COASTAL FOX PROGRAM..... 105

Anthony Cathcart, Rita Everitt, Gene Stanton

Plenary session two

RESTORING PARADISE: PARTNERSHIPS IN PEST MANAGEMENT ON THE GOLD COAST 111

Wal Mayr	
EXCLUSION FENCING AND HOLISTIC OUTCOMES	117
John Cuskelly	

Speed presentations

IMPLICATIONS OF A HIDDEN SEED BANK FOR THE ERADICATION OF RED WITCHWEED	121
Anna M. Williams, Joseph S. Vitelli and Natasha Riding	
TILAPIA: TO EAT OR NOT TO EAT?.....	125
Bonnie Holmes	
HOST SPECIFICITY TESTING OF A NEW CANDIDATE FOR THE BIOCONTROL OF MOTHER-OF-MILLIONS	126
Natasha Riding, Tamara Taylor and Michael Day	
CONTROL OF PROBLEM TREES: THE INJECTA® SYSTEM FOR APPLICATION OF DI-BAK® PARKINSONIA AND DI-BAK HERBICIDE CAPSULES.....	129
Ken C Goulter, Victor J Galea, Peter Riikonen	
POLICY TO Paddock: LESSONS LEARNT FROM THE IMPLEMENTATION OF NEW BIOSECURITY LEGISLATION	130
Shauna Potter and Matt Sheehan	

DAY FOUR

Plenary session three

Keynote address: MAKING A REAL DIFFERENCE IN THE DAMAGE CAUSED BY PEST ANIMALS AND WEEDS	134
David Berman	
REORGANISING THE RABBIT CONTROL TOOLBOX: DO WE NEED TO REACH FOR VIRUS FIRST?	139
P.G. Elsworth	
COUNTING DEER, NOT TOURISTS, ON THE SUNSHINE COAST	145
Matt Amos, Anthony Cathcart and Mark Kimber	

Concurrent session 5

EVALUATION OF DIFFERENT BAITING STRATEGIES FOR THE CONTROL OF FERAL CATS IN EASTERN AUSTRALIA.....	151
Bronwyn Fancourt, Peter Cremasco, Glen Harry, James Speed, Cameron Wilson and Matthew Gentle	

THE CARROT IS MIGHTIER THAN THE STICK; GOVERNMENT LED COMMUNITY MOBILISATION IN MANAGING YELLOW CRAZY ANTS.....	156
Z. Severino, C. Clerc and G. Humphreys	
MANAGING WILD DOGS AND FOXES AT A LANDSCAPE SCALE ON THE GOLD COAST	160
Kellie Pforr	
PESTS, PARTNERSHIPS AND PEOPLE POWER ON THE WESTERN DOWNS	166
Carissa Hallinan	
WHAT REALLY GOES ON OUT THERE? MONITORING PEST ANIMALS OVER A LANDSCAPE SCALE	173
Chris Gaschk	

Concurrent session 6

OCCURRENCE OF BACTERIAL PATHOGENS AND ANTIMICROBIAL RESISTANCE IN PERI-URBAN WILD DOGS	179
Lana Harriott, Caitlin Wood, Matthew Gentle, Rebecca Traub Ricardo Soares-Magalhaes, Nigel Perkins, Sarah Tozer, Rowland Cobbold	
TROPICAL SODA APPLE - CAN WE PREVENT ITS ESTABLISHMENT IN QLD FROM THE LESSONS LEARNT FROM NORTHERN NSW.....	183
Philip Courtney	
DRONES VS HELICOPTERS FOR BROAD-SCALE ANIMAL SURVEYS – CONSIDERATIONS FOR FUTURE USE	184
Matthew Gentle, Neal Finch, James Speed and Anthony Pople	
USING ODOUR DETECTION DOGS AND TODAY'S TECHNOLOGY.....	189
Dennis Gannaway	
FERAL RUSA DEER AND COMMUNITY ENGAGEMENT IN THE GYMPIE REGION...	193
Jess Bracks, Bree Galbraith, Julie Whelan, and Ben Curley	

Plenary session four

PREVENTING THE NATURALISATION OF HIGH-RISK ANIMALS AND PLANTS IN QUEENSLAND	201
Steve Csurhes	
BORDER CONTROL. IT'S NOT JUST AN AMERICAN PROBLEM.....	205
Charisse Anderson	
FIELD EVALUATION OF WILD DOG BAITS: DOGGONE OR NOT?	209
Darryn G. Higgins	
HABITAT SELECTION OF RED FOXES IN COASTAL ENVIRONMENTS.....	215
Olivia Kimber, Dr Thomas Schlacher, Dr Ben Gilby and Dr Andrew Olds	