The control of summer weeds using larger spray droplets and more adverse weather conditions

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Introduction

The benefits of controlling summer weeds to conserve soil moisture and fertility are well proven and accepted within the broad acre cropping industry. However, the control of weeds over summer can be difficult to achieve given limited spraying opportunities, hard to kill weed species and plant stress. Also, increasing pressure from environmental groups, other land use sectors and the government in recent years have created the need for broad acre crop producers to establish summer spraying treatments and methodologies which also improves environmental safety.

Objectives

To measure the efficacy of coarser spray droplets on the control of two identified common summer weed species, and the influence of more adverse weather conditions.

Method

Two trial sites were selected, based on the prevalence of the targeted summer weed species: silver leaf nightshade (*solanum elaeagnifolium*)(SLN) and heliotrope (*heliotropium europaeum*)

A range of treatments were assessed including:

- herbicides – glyphosate (translocated) and Spray.Seed (contact)
- water rates – 60 or 90L/ha
- droplet size – medium through to alternating extra coarse

Treatments were applied to trial plots using a ute with boom mounted to one side.

Each trial was a randomised complete block design with four replicates and the plots were 2.5 x 20m.

The spraying details, treatments and conditions for each site are described below.

Visual assessments were made at 15 and 32 days after treatment for site 1, and 16 and 24 days after treatment at sites 2 and 3 using a weed control score of 0 – 100, where 100 = complete ‘control’ (stunting or desiccation), and 0 = no effect.

Site 1.

- *Site location and spraying date*: Clare, Mid-North of South Australia, Feb 1st, 2012
- *Site condition*: previously a long term pasture with little residue remaining
- *Target species*: silver leaf nightshade at various stages from young 10cm plants to mature 60-70cm plants at full flowering to early berry set stage, varying density, averaging approx 3 plants per square metre
- *Spraying conditions*: temp 18.5 – 22°C, humidity 27 - 22%, sunny, delta T of 9.75.
- *Herbicide treatment:* Roundup Attack (570g/L) 1.4L/ha + Amicide Advance (700g/L) 800ml + Uptake 0.5%
- *Nozzle and water rate treatments:* as per Table 1. Rain water was used as the carrier.

Table 1. Clare SLN trial details.

Droplet size	Water Rate (L/ha)	Nozzle type	Orifice size	Pressure	Speed (km/hr)
Nil	0				
Medium	60	Turbo Teejet	O2	3 bar	17
Coarse	60	Lechler	O2	3 bar	17
Extremely coarse	60	TTI	O2	3.5 bar	17
Twin Coarse	60	TTJ	O2	3 bar	17
Alternating extremely coarse	60	TTI	O2	3.5 bar	17
Nil	0				
Medium	90	Turbo Teejet	O3	4 bar	17
Coarse	90	AIXR	O25	4 bar	15
Extremely coarse	90	TTI	O15	4 bar	12
Twin Coarse	90	AITTJ	O25	4 bar	15
Alternating extremely coarse	90	TTI	O15	4 bar	12

Results

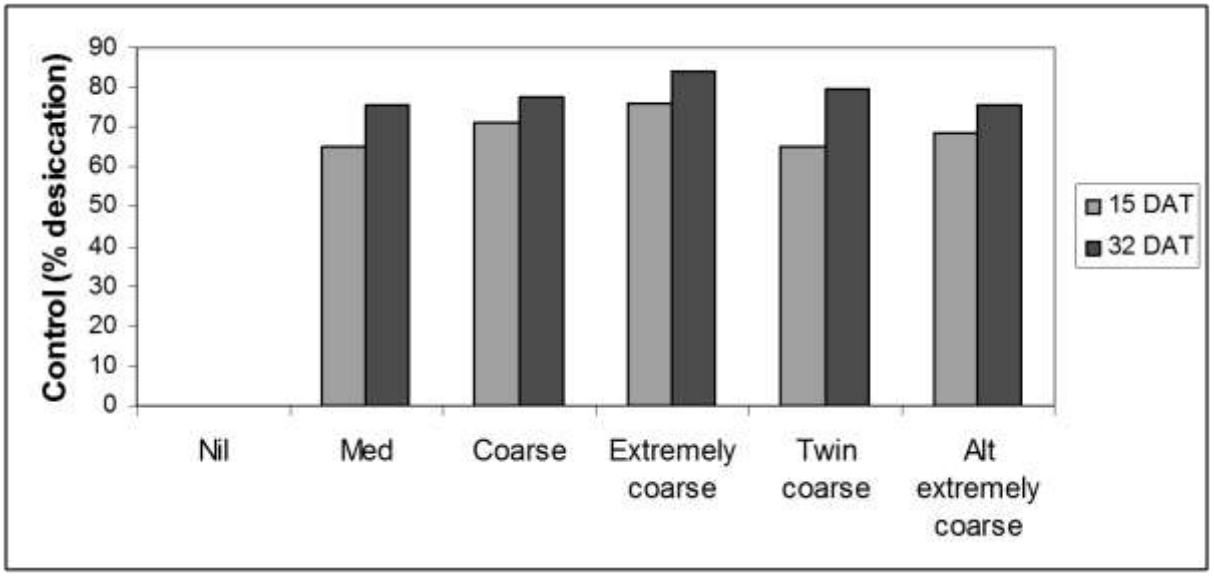
Site 1: Silver leaf nightshade at Clare

Assessment scores showed that the control of SLN progressed from 15 days after treatment (DAT) through to a maximum effect at day 32 DAT (Figure 1). The extremely coarse droplets gave the highest control at both assessment timings, however there were no significant differences in control between the various droplet sizes.

At 15 DAT the 90L/ha water rate (74.0%) had produced significantly greater control compared to the 60L/ha water rate (64.5%). However, by 32 DAT the average final results for the 90L/ha water rate (82.4%) were not statistically different to the 60L/ha rate (74.4%).

There were no interactions between water rate and droplet size.

Figure 1: Control (% desiccation) of silver leaf nightshade at 15 or 32 days after treatment using a range of droplet sizes for both water rates, using glyphosate and amicide at Clare 2012. LSD (0.05) for droplet size 12.5 at 15 DAT and 13.3 at 32 DAT.



Site 2.

- *Site location and spraying date:* Mintaro, Mid-North of South Australia, Feb 13th, 2012.
- *Site condition:* a bean stubble, with all residue laying on the ground
- *Target species:* heliotrope, 10-20cm high, flowering to seed set, variable density.
- *Spraying conditions:* temp 29.3 – 32.8°C, humidity 13-16%, delta T of 14.5 - 15.5, wind speed average 7.7km/h, gusts to 16.5km/h, very warm afternoon
- *Herbicide treatment: (a) Power Max (540g/L) 1.2L/ha + Amicide Advance (700g/l) 800ml + Garlon 85ml/ha + ammonium sulphate 0.5% + LI700 0.2% (b) Spray.Seed 1L/ha*
- *Nozzle and water rate treatments:* as per Table 2. Rain water was used as the carrier.

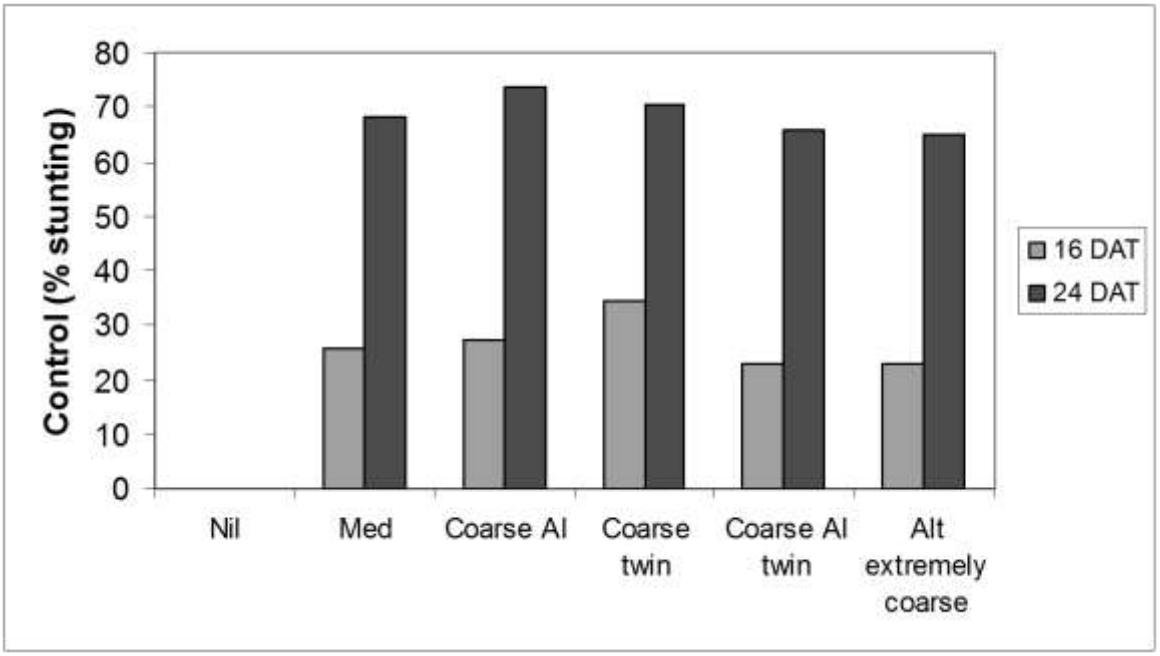
Table 2. Mintaro heliotrope trial details for glyphosate and SpraySeed.

Droplet size	Water Rate (L/ha)	Nozzle type	Orifice size	Pressure	Speed (km/hr)
Nil	0				
Medium	60	Turbo Teejet	O2	4 bar	18
Coarse air inducted	60	AIXR	O2	4 bar	18
Coarse twin	60	TTJ	O2	3 bar	16
Coarse air inducted twin	60	AITTJ	O2	4 bar	18
Alternating extremely coarse	60	TTI	O2	4 bar	18
Nil	0				
Medium	90	Turbo Teejet	O25	4 bar	15
Coarse air inducted	90	AIXR	O25	4 bar	15
Coarse twin	90	TTJ	O25	3 bar	15
Coarse air inducted twin	90	AITTJ	O25	4 bar	15
Alternating extremely coarse	90	TTI	O2	5 bar	14

Results

Site 2: Heliotrope at Mintaro, glyphosate treatments

Figure 2: Control (% stunting) of heliotrope at 16 or 24 days after treatment using a range of droplet sizes for both water rates, using a glyphosate mix at Mintaro 2012. LSD (0.05) for droplet size 8.3 at 16 DAT and 11.5 at 24 DAT.



Assessment scores for the glyphosate mix at 16 DAT were all under 35% control, but by the final assessment at 24 DAT all treatments were above 65% (Figure 2). At 16 DAT the coarse air inducted (34.4%) treatment had produced significantly greater control. However, 8 days later there was no significant difference between the droplet size treatments, although the coarse air inducted treatment was still the best at 73.8%.

There was no significant difference between water rates.

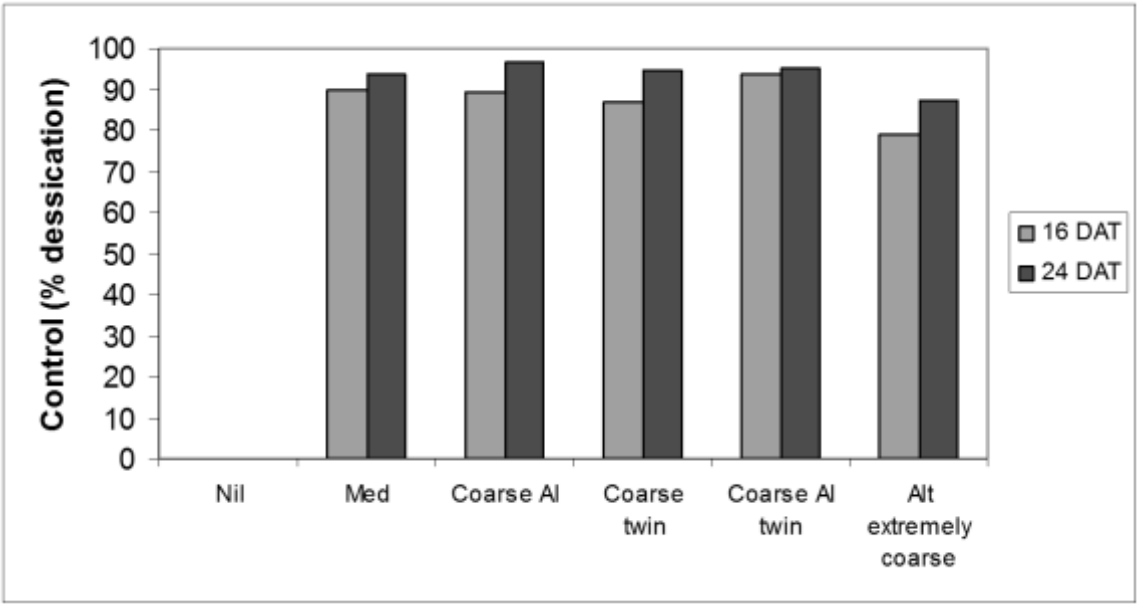
Results

Site 2: Heliotrope at Mintaro, Spray.Seed treatments

At 10 DAT all treatments had over 70% control and by 24 DAT maximum control was 98% (Figure 3). At both assessment timings the alternating extremely coarse treatment produced significantly lower control of heliotrope. Control was improved at the higher water rate to 92%, but was still below the other treatments.

There was no significant difference between the other droplet sizes or water rates.

Figure 3: Control (% dessication) of heliotrope at 16 or 24 days after treatment using a range of droplet sizes for both water rates, using Spray.Seed at Mintaro 2012. LSD (0.05) for droplet size 8.6 at 16 DAT and 5.9 at 24 DAT.



Conclusions

Trials conducted in 2012 have shown that larger droplets and variations in droplet application direction can successfully control summer weeds, compared to the traditionally favoured medium droplets.

This includes a variation of weed species, different herbicides types and application within conditions that are not generally conducive to summer spraying.

The work has shown that for contact herbicides like Spray.Seed extremely coarse droplets can give reduced control, regardless of water rate.

Acknowledgements

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