

GOA Individual Trial Site report

Project Name

Timing of double knock for the control of mature Windmill grass (*Chloris truncata*)

Trial Code

GOA11130

Trial Location

Wongarbon, NSW.

Trial commencement date

September 2011

Background

The control of mature Windmill grass (WG) in the summer fallow has increasingly becoming a problem for producers in the past few years, with high rainfall during the summer months and a lack of products on the market that are registered for the use in fallow on WG.

Previous trial work by GOA has identified the application of the Group A selective herbicide Targa (99 g/L quizalofop-p-ethyl) which has a current permit for use with the APVMA (permit number PER13460) followed by a double knock (DK) of Gramoxone (250 g/L paraquat) to be effective in controlling the mature WG. In these initial trials an arbitrary time interval of 7 days between the application of the Targa and the DK was employed. This timing was untested and based upon experience with other DK intervals on a number of other problematic weeds.

Although effective as the Targa followed by Gramoxone had shown to be, in some conditions it was still unreliable and sometimes disappointing in its effectiveness. It was questioned if the time interval to the DK was optimal at 7 days, how flexible was this timing and could there be a better and more optimal timing of the DK.

Aims

- To compare the set timings of a DK strategy in the control of mature WG.

Methods

- Randomised complete block with three replicates in small plots of 3m x 10m
- The site was established in farmer fallow paddocks with a significant mature WG population and no herbicide applied prior to establishing the trial.
- An initial treatment of Targa was applied at a rate of 500mL/ha + 1% hasten in 60 L/ha of water.
- The initial application was applied by a commercial spray rig (rest of the paddock treated at the same time)
- The DK treatments of Gramoxone were applied at a rate of 2 L/ha in 100 L/ha of water applied by hand boom at their scheduled intervals.
- WG control was assessed using a visual plant death assessment after 46, 60 and 124 days after the initial treatment (DAA1).

Table 1. Treatment table

The initial application was applied after 24 mm nine days before application and a further 5mm five days before application.

Treatment	Timing after initial treatment
1	UTC
2	10 min
3	2hrs
4	1 day
5	7 days
6	14 days
7	21 days
8	28 days

Application details

At the initial application the WG was at the boot to heading stage. The surface was dry but there was good moisture at 2cm.

Targa Application (using a ute mounted commercial boom sprayer)	Date	Water rate	Nozzle	Pressure
	20/10/11	60 L/ha	AIXR02	4 bar
	Start time	Temp °C	Wind vel. km/hr	Wind Dir.
	8.30am	27	light	-
	Finish time	Δt	% Humidity	% Cloud
	8.35	8.5	42	50
DK application: 10 mins & 2 hrs.	Date	Water rate	Nozzle	Pressure
	20/10/11	100 L/ha	AIXR015	3 bar
	Start time	Temp °C	Wind vel. km/hr	Wind Dir.
	8.45am	27.0	0.0	-
	Finish time	Δt	% Humidity	% Cloud
	10.45am	8.5	42.0	60
DK application: 1 day	Date	Water rate	Nozzle	Pressure
	21/10/11	100 L/ha	AIXR015	3 bar
	Start time	Temp °C	Wind vel. km/hr	Wind Dir.
	8.30am	20.4	0	0
	Finish time	Δt	% Humidity	% Cloud
	8.35am	5.0	61.2	0
DK application: 7 days	Date	Water rate	Nozzle	Pressure
	28/10/11	100 L/ha	AIXR015	3 bar
	Start time	Temp °C	Wind vel. km/hr	Wind Dir.
	7.30am	21.3	9.7	SW
	Finish time	Δt	% Humidity	% Cloud
	7.35am	5.8	58.0	0
DK application: 14 days	Date	Water rate	Nozzle	Pressure
	03/11/11	100 L/ha	AIXR015	3 bar
	Start time	Temp °C	Wind vel. km/hr	Wind Dir.
	7.30am	18.3	8.4	NW
	Finish time	Δt	% Humidity	% Cloud
	7.35am	4.3	53.0	10

DK application: 21 days	Date	Water rate	Nozzle	Pressure
	11/11/11	100 L/ha	AIXR015	3 bar
	Start time	Temp °C	Wind vel. km/hr	Wind Dir.
	8.00am	19.4	6.3	NNE
	Finish time	Δt	% Humidity	% Cloud
	8.05am	4.0	69.0	5
DK application: 28 days	Date	Water rate	Nozzle	Pressure
	18/11/11	100 L/ha	AIXR015	3 bar
	Start time	Temp °C	Wind vel. km/hr	Wind Dir.
	8.30am	19.4	4.3	NNW
	Finish time	Δt	% Humidity	% Cloud
	8.35am	2.0	84.0	100

Rainfall results

Month	Rainfall total (mm)	Days of rain
October	55.4	11
November	101.6	10
December	74.8	11
January	98.0	13
February	118.0	11
March	125.0	6

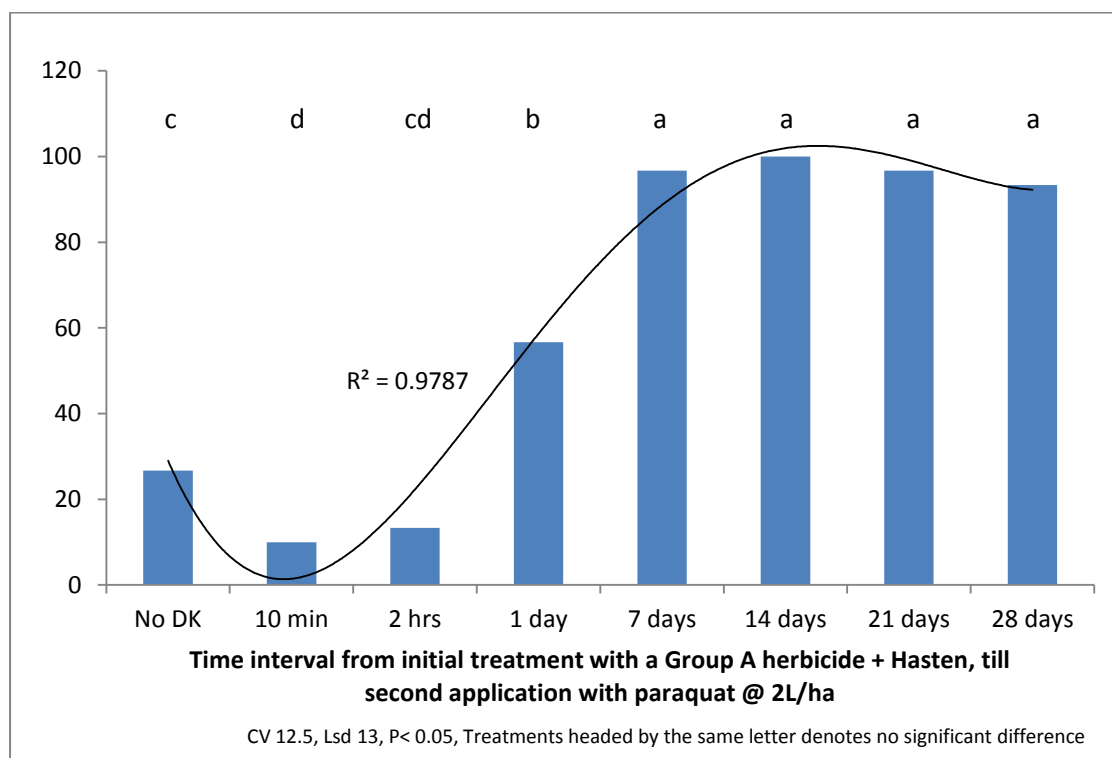
Trial Results

Table 2. Percentage mature plant death assessments

Treatment	46 DAA1		60 DAA1	
UTC	73.3	ab	26.7	c
10 min	46.7	b	10	d
2hrs	43.3	b	13.3	cd
1 day	73.3	ab	56.7	b
7 days	98.3	a	96.7	a
14 days	90	a	100	a
21 days	86.7	a	96.7	a
28 days	86.7	a	93.3	a
LSD (0.05)	35.07		13.58	
CV	26.78		12.57	
p value	0.0361		0.0001	

Means within columns followed by the same letter are not significantly different at the 5% level according to least significant difference (LSD) test. Assessments from 124 DAA1 are not included due to the length of time since application and subsequent commercial applications of fallow sprays to the trial area.

Graph 1. Effect of time interval from initial treatment to second application with paraquat upon control of mature windmill grass 60 DAA, Wongarbron 2011



Discussion

The assessment at 46 DAA1 showed statistically significant effects on the mature WG control however, this assessment was only 18 days after the final DK so these figures should be used as reference only.

The 60 DAA1 assessments demonstrated the same trends as observed as in the 46 DAA1 assessments. Control significantly declined from the No DK treatment when the DK was applied quickly following the initial applications of the Group A at 10 minutes or 2 hrs. The DK applied 1 day after the initial application improved and was significantly better than the no DK treatment. Control further improved with the final four timings and there was no statistical difference between these timings.

The final assessment was made at 124DAA1 which continued to show the same trends as the first two assessments.

It appears that the 10mins, 2hrs and to a lesser extent the 1 day treatments showed strong levels of antagonism between the initial treatment and the timing of the DK. This could be due to the herbicide still moving towards their sites of action and/or the defoliation with the Gramoxone preventing or inhibiting any further movement of the herbicide. However, this effect appears to progressively fade out up to and past the 7 day interval.

The timing of the DK appears to be maximised from 7 days and is then maintained up until the final application at 28 days. This is reinforced through the regression line ($R^2=0.98$) indicating optimisation slightly later.

This scenario may contradict experience with other problem species where control reaches a peak and then declines well within this time frame. However a second of these trials (GOA 10130) demonstrated a similar outcome as did this trial with control peaking around 7-14 DAA1 but then maintaining through the later timings.

Conclusions

The data collected in this trial showed a clear and statistically significant influence in mature WG control through DK timing; specifically the best timing seemed to be 7 DAA1 treatments however, between 7 to 28 DAA1 resulted in a commercially acceptable level of control of WG.

From this trial it could indicate that commercially growers should aim to allow at least 7-14 days interval between the initial application and the DK but also that this optimal window may extend beyond this without penalty. Shorter intervals could be contributing to reduction in final control.

Seedling WG may behave differently to the results in this trial possibly seeing a shortening in this optimal window due to the reduced plant size and greater mobility of herbicides within the plants. This should also be taken into account when planning the DK however; earlier trials conducted by GOA indicated that either the Targa or the Gramoxone applications alone can be sufficient to control seedlings (3 leaf or pre tillering stage).

It should be noted that the climatic conditions during this trial were optimal for WG growth with high rainfall and mild warm temperatures, this allowed for the products to work to their full potential, however, in less optimal conditions WG control has been shown to vary greatly dependant mostly on the moisture availability leading up to and during the trial.