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Double Knock Control of Common Sowthistle in Fallow

Trial ID: DH2228 Location: Rowena Trial Year: 2023
Investigator: Dean Hancock

Fallow control of stressed or advanced growth stages of common sowthistle remains an industry challenge. Recently a range of Group 14 herbicides (formerly Group G) have been registered at low rates in mixture with either glyphosate or paraquat. This project was designed to evaluate the efficacy of a range of Group 14 herbicides when used as mixtures with Gramoxone 250 (paraquat) and applied as a 2nd knock treatment.

Objective:	To evaluate double knock options of paraquat and Group 14 herbicides for common sowthistle in fallow
Situation:	Fallow following wheat 2022 with ~50% cereal stubble ground cover
Weed:	Common Sowthistle
Weed Stage At Application:	80% of weeds at first individual flowers visible (50 cm tall x 20 cm wide)
Weed Density At Application:	6 plants/m ²
Application Dates:	Application A on 11/01/2023 – 1 st knock Application B on 25/01/2023 (14 DAA) – 2 nd knock
Application A Treatment:	Roundup CT at 1.32 L/ha (2/3 of commercial rate to provide a sub lethal rate)
Nozzles:	AIXR11002
Volume:	100 L/ha
Trial Design:	Randomised complete block of 16 treatments x 3 replicates
Plot Size:	4 m x 12 m
Keywords:	Common sowthistle, double knock, fallow

The trial was conducted at Rowena in north west NSW on large common sowthistle.

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Gramoxone was evaluated at 1600 mL/ha alone or in mixture with each Group G herbicide + Hasten. Benchmark treatments of Gramoxone 2400 mL/ha alone or Gramoxone 1600 mL/ha + Hasten were included together with Sharpen, Terrad'or and Voraxor at stand-alone rates.

Pest Scientific Name Pest Name Assessment Date Assessment Type Assessment Unit Assessment Area Treatment-Evaluation Interval ARM Action Codes			<i>Sonchus oleraceus</i> Common Sowthistle		
			1/02/2023 BURNDOWN % Plot 21 DAA/7 DAB	8/02/2023 BURNDOWN % Plot 28 DAA/14 DAB AA	22/03/23 SURVIVING /m ² 4 x 1 m ² 70 DAA/56 DAB AA
Trt No.	Treatment	Product Rate			
1	Gramoxone 250	1600ml/ha	60efg	80cde	0.5-
2	Gramoxone 250	2400ml/ha	83abc	90a-d	0.2-
3	Gramoxone 250 Hasten	1600ml/ha 1% v/v	53g	71e	0.7-
4	Guerrilla	1333ml/ha	57fg	70e	0.6-
5	Cavalier Gramoxone 250 Hasten	75ml/ha 1600ml/ha 1% v/v	60efg	78de	0.1-
6	Terrad'or Gramoxone 250 Hasten	20g/ha 1600ml/ha 1% v/v	70c-f	77de	0.6-
7	Hammer Gramoxone 250 Hasten	25ml/ha 1600ml/ha 1% v/v	57fg	80cde	0.2-
8	Sledge Gramoxone 250 Hasten	50ml/ha 1600ml/ha 1% v/v	67d-g	77de	0.5-
9	Terrain Gramoxone 250 Hasten	30g/ha 1600ml/ha 1% v/v	73b-e	84b-e	0.2-
10	Sharpen Gramoxone 250 Hasten	9g/ha 1600ml/ha 1% v/v	80a-d	84b-e	0.2-
11	Sharpen Gramoxone 250 Hasten	26g/ha 1600ml/ha 1% v/v	92a	97a	0-
12	Voraxor Gramoxone 250 Hasten	25ml/ha 1600ml/ha 1% v/v	80a-d	80cde	0.1-
13	Voraxor Gramoxone 250 Hasten	100ml/ha 1600ml/ha 1% v/v	87ab	90a-d	0.2-
14	Sharpen Hasten	26g/ha 1% v/v	80a-d	93abc	0.3-
15	Terrad'or Hasten	40g/ha 1% v/v	80a-d	87a-e	0.3-
16	Voraxor Hasten	100ml/ha 1% v/v	90a	95ab	0.1-
LSD P=.05 Treatment Prob.(F=)			14.1 0.0001	11.9 - 17.4 0.0159	nsd 0.1508

Means followed by same letter or symbol (-) do not significantly differ (P=.05, LSD).

Mean comparisons performed only when AOV Treatment P (F) is significant at mean comparison OSL.

nsd – No significant difference

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Location:

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2023

Assessment Type

BURNDOWN = % burndown/brown out

SURVIVING = Number of surviving weeds

ARM Action Codes

AA = Automatic arcsine square root % transformation

DAA = Days after Application A

DAB = Days after Application B

Conclusions:

This trial was established to evaluate the efficacy of Group 14 herbicides when mixed with paraquat as 2nd knock options for the control of common sowthistle. The trial was conducted on a population of ~20 cm diameter common sowthistle, just prior to first flower. All treatments followed a 'sub-lethal' 1st knock application of Roundup CT 1.32 L/ha. 2nd knock treatments were applied at 14 DAA (14 days after application A).

All Group 14 herbicides were evaluated when tank mixed with Gramoxone 250 at 1600 mL/ha + Hasten 1%. Gramoxone alone was applied at rates of 1600 and 2400 mL/ha for benchmarking purposes with Gramoxone 1600 mL/ha + Hasten 1% applied as an additional check. Sharpen, Terrad'or and Voraxor were also applied alone at label rates. Guerrilla (paraquat + amitrole) was also applied at the equivalent paraquat rate as Gramoxone 1600 mL/ha.

Visual % burndown rating of common sowthistle was conducted 7 days after 2nd knock application (7 DAB). Both rates of Sharpen and Voraxor in mixture with Gramoxone significantly increased the burndown rating compared to Gramoxone 1600 mL/ha alone. There was a significant dose response to Gramoxone with similar burndown ratings at 2400 mL/ha to the Sharpen or Voraxor mixtures with Gramoxone 1600 mL/ha. Sharpen, Terrad'or and Voraxor applied alone all provided significantly increased burndown than Gramoxone at 1600 mL/ha. No benefit in burndown was seen from Guerrilla or the addition of Hasten to Gramoxone.

A second burndown rating was conducted at 14 DAB. Sharpen at 26 g/ha in mixture with Gramoxone significantly increased rating compared to Gramoxone 1600 mL/ha alone. Voraxor applied alone also had significantly increased burndown compared to Gramoxone at 1600 mL/ha. No benefit in burndown was seen from Guerrilla or the addition of Hasten to Gramoxone.

Surviving weed counts were taken at 56 DAB. All treatments had surviving common sowthistle counts <1/m². There were no significant differences between treatments. The mixture of Sharpen 26 g/ha with Gramoxone + Hasten was the only 2nd knock to provide complete control of common sowthistle.

In this trial all double knock options provided good levels of common sowthistle control (89-100%). Under these conditions, there was no significant benefit in final sowthistle control from any alternative 2nd knock compared to Gramoxone 1600 mL/ha alone. Mixtures of Sharpen or Voraxor with Gramoxone were the only Group 14 options to provide a benefit in level of burndown compared to Gramoxone 1600 mL/ha. Guerrilla or the addition of Hasten to Gramoxone did not provide any benefit compared to Gramoxone 1600 mL/ha and actually trended to reduced burndown ratings at both early assessments.

Pest Stage at Application A	
Weed:	Common Sowthistle
Stage Majority, %:	80% at first individual flowers visible, buds still closed
Stage Minimum, %:	15% at rosette, 2 side shoots detectable
Stage Maximum, %:	5% at full flowering
Diameter Average:	20 cm
Height Average:	50 cm
Density Average:	6 Plants/m ²

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Application Description		
	A	B
Application Date:	11/01/2023	25/01/2023
Application Start Time:	10:30 AM	8:30 AM
Application Stop Time:	11:30 AM	10:00 AM
Application Timing:	Late post-emergent	14 days after Application A
Air Temperature Start, Stop:	29, 32.5 C	25.6, 28.3 C
% Relative Humidity Start, Stop:	46, 40	39, 36
Wind Velocity & Direction Start:	9.8 km/h, N	7.7 km/h, S
Wind Velocity & Direction Stop:	12.2 km/h, N	8.5 km/h, S
Wet Leaves (Y/N) :	No	No
% Cloud Cover:	0	0

Application Equipment	
Equipment Name:	Polaris
Equipment Type:	BOOM
Operation Pressure:	400 kPa
Nozzle Model	AIXR11002
Nozzle Spacing	50 cm
Boom Length	4 m
Boom Height	50 cm
Ground Speed:	11 km/h
Application Amount:	100 L/ha

Rainfall:

Weather Station Name:	Kylebride
Distance:	~5 km

Month	Rainfall Total (mm)	Comment
Jan 2023	20	1 st knock application on 11/01; 2 nd knock application on 25/01
Feb 2023	0	Burndown assessments on 01/02 and 08/02
Mar 2023	48	Survivor counts on 08/03 and 22/03