TRIAL REPORT

Envirowet Weed Control in Fallow

Ghoolendaadi, New South Wales, 2024

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SUMMARY

A small plot trial was established near Ghoolendaadi, New South Wales in 2024 compare the effectiveness of Envirowet Multi-Phase Surfactant with industry standard wetting agents when used with Glyphosate and Paraquat herbicides to control weeds in fallow.

Treatments were compared with an untreated control (UTC) and included Glyphosate 450 at 1.5 L/ha or Paraquat 250 at 1.2 L/ha, each applied solo, or with Envirowet at 25, 50, or 100 mL/100 L, Axiwetta at 100 mL/100 L, or LI700 at 250mL/ha.

Treatments were applied as a single broadcast foliar spray to annual ryegrass (*Lolium rigidum*) at the six-tiller growth stage (BBCH 26) and sowthistle (*Sonchus oleraceus*) at the 7-leaf growth stage (BBCH 17) using a hand-held boom fitted with Albuz AVI 110° flat fan air induction nozzles delivering 100 L/ha and generating very coarse (> 386µm to <484µm) spray droplets.

Seasonal conditions were characterised by above-average autumn rainfall prior to treatment application with an uncharacteristically high amount of rain also falling within the trial period. However, this did not affect the reliability of the results of the trial.

Weed counts were conducted by species across the UTC plots prior to treatment application and across all plots at 34 days after application (DA-A). Weed control was visually assessed by species at 3, 10, 15 and 34 DA-A.

Visual control of annual ryegrass was higher across the plots treated with an adjuvant when compared with nil adjuvant, however this was not significant across the plots treated with Envirowet at 25 mL/100 L at 3, 10, or 15 DA-A or Envirowet at 50mL/100 L at 3 DA-A.

Annual ryegrass control was statistically equivalent between 10 and 34 DA-A across the plots treated with Envirowet at 25-100 mL/100 L or Axiwetta at 100mL/ha.

Visual control of annual ryegrass was significantly higher between 10 and 34 DA-A across the plots treated with LI700 at 350 mL/ha when compared with the plots treated with Envirowet at 25 mL/100 L.

Differences in annual ryegrass control between Envirowet at 50 or 100 mL/100 L and LI700 were not significant.

Visual control of sowthistle was higher across the plots treated with an adjuvant when compared with nil adjuvant, however this was not significant across the plots treated with Envirowet at 25 mL/100 L at 10 or 15 DA-A.

Visual sowthistle control was statistically equivalent between 3 and 34 DA-A across the plots treated with Envirowet at 25-100 mL/100 L and Axiwetta at 100mL/ha or LI700 at 250mL/ha.

INTRODUCTION

Aims

1. To compare the effectiveness of Envirowet Multi-Phase Surfactant with industry standard wetting agents when used with Glyphosate and Paraquat herbicides to control weeds in fallow.

Chronology of events

Date	Days after application A (DA-A)	Annual ryegrass growth stage		Sowthistle growth stage		Event
		BBCH scale	Description	BBCH scale	Description	
15-May-2024	0	13- 30	3 leaf – beginning of stem elongation	11-31	1 leaf – 1 node	Weed counts conducted. Treatments applied (timing A).
18-May-2024	3	13-30	3 leaf – beginning of stem elongation	13-31	3 leaf – 1 node	Weed control assessed.
25-May-2024	10	25-32	5 tiller – 2 node	14-33	4 leaf – 3 node	Weed control assessed.
30-May-2024	15	25-32	5 tiller – 2 node	14-52	4 leaf – 20% inflorescence emerged	Weed control assessed.
18-Jun-2024	34	30-34	Beginning of stem elongation – 4 node	31-59	1 node – first flower petals visible	Weed counts conducted. Weed control assessed.

Products

Product	Active ingredient	Active ingredient concentration	Form type	Batch no.
Glyphosate 450	Glyphosate	450 g/L	SL	Not provided
Envirowet	-	-	SL	Not provided
Axiwetta	Alcohol alkoxylate	1000 g/L	L	37841
LI700	Soyal phospholipids + propionic acid	350 g/L + 350 g/L	SL	Not provided
Paraquat 250	Paraquat	250 g/L	SL	AAC2L42481

Treatments

Trt No.	Treatment Name	Rate	Rate Unit	Other Rate	Other Rate Unit	Appl Code
Factor A (Herbicide)						
1	Glyphosate 450	1.5	L/ha	675	g ai/ha	A
2	Paraquat 250	1.2	L/ha	300	g ai/ha	A
Factor B (Adjuvant)						
1	Nil	-	-			A
2	Envirowet	25	mL/100 L			A
3	Envirowet	50	mL/100 L			A
4	Envirowet	100	mL/100 L			A
5	Axiwetta	100	mL/ha	100	g ai/ha	A
6	LI700	250	mL/ha	175	g ai/ha	A
Comparison Treatments						
1	Untreated Control					

Trt No.	Treatment Name	Rate	Rate Unit	Other Rate	Other Rate Unit	Appl Code
1	Untreated Control	-	-	-	-	-
2	Glyphosate 450 Nil	1.5	L/ha	675	g ai/ha	A A
3	Glyphosate 450 Envirowet	1.5 25	L/ha mL/100 L	675	g ai/ha	A A
4	Glyphosate 450 Envirowet	1.5 50	L/ha mL/100 L	675	g ai/ha	A A
5	Glyphosate 450 Envirowet	1.5 100	L/ha mL/100 L	675	g ai/ha	A A
6	Glyphosate 450 Axiwetta	1.5 100	L/ha mL/ha	675 100	g ai/ha g ai/ha	A A
7	Glyphosate 450 LI700	1.5 250	L/ha mL/ha	675 175	g ai/ha g ai/ha	A A
8	Paraquat 250 Nil	1.2 -	L/ha -	300 -	g ai/ha -	A -
9	Paraquat 250 Envirowet	1.2 25	L/ha mL/100 L	300	g ai/ha	A A
10	Paraquat 250 Envirowet	1.2 50	L/ha mL/100 L	300	g ai/ha	A A
11	Paraquat 250 Envirowet	1.2 100	L/ha mL/100 L	300	g ai/ha	A A
12	Paraquat 250 Axiwetta	1.2 100	L/ha mL/ha	300 100	g ai/ha g ai/ha	A A
13	Paraquat 250 LI700	1.2 250	L/ha mL/ha	300 175	g ai/ha g ai/ha	A A

Factor	Description
A	Herbicide
B	Adjuvant

RESULTS

Table 1 – Annual ryegrass (Lolium rigidum) count per m² at 0 and 34 DA-A (ANOVA)

Assessment Date					15-May-2024	18-Jun-2024
Part Assessed					PLANT, P	PLANT, P
Assessment Type					COUNT	COUNT
Assessment Unit					NUMBER	NUMBER
Reporting Basis					1 m2	1 m2
Number of Subsamples					4	1
Pest Stage Majority/Min/Max					26, 13, 30	31, 30, 34
Trt-Eval Interval					0 DA-A	34 DA-A
ARM Action Codes					T1	AS T2
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	2	13
1	Untreated Control				106.0	195.0a
2	Glyphosate 450		1.5L/ha	A		181.0ab
	Nil			A		
3	Glyphosate 450		1.5L/ha	A		153.0bc
	Envirowet		25 mL/100 L	A		
4	Glyphosate 450		1.5L/ha	A		123.0d
	Envirowet		50 mL/100 L	A		
5	Glyphosate 450		1.5L/ha	A		142.0cd
	Envirowet		100 mL/100 L	A		
6	Glyphosate 450		1.5L/ha	A		122.0d
	Axiwetta		100mL/ha	A		
7	Glyphosate 450		1.5L/ha	A		145.0cd
	LI700		250mL/ha	A		
8	Paraquat 250		1.2L/ha	A		76.0e
	Nil			A		
9	Paraquat 250		1.2L/ha	A		54.0ef
	Envirowet		25 mL/100 L	A		
10	Paraquat 250		1.2L/ha	A		28.0gh
	Envirowet		50 mL/100 L	A		
11	Paraquat 250		1.2L/ha	A		39.0g
	Envirowet		100 mL/100 L	A		
12	Paraquat 250		1.2L/ha	A		54.0f
	Axiwetta		100mL/ha	A		
13	Paraquat 250		1.2L/ha	A		18.0h
	LI700		250mL/ha	A		
LSD P=.05					.	NA
Standard Deviation					.	0.90t
CV					.	9.41t
Levene's F					.	1.998
Skewness					0.9407	-0.3118
Kurtosis					1.5	-1.1184
Replicate F						16.565
Replicate Prob(F)						0.0001
Treatment F						53.090
Treatment Prob(F)						0.0001

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).
Could not calculate LSD (% mean diff) or mean separation letters for columns 2,1 because error variance is 0.
* An asterisk next to the Levene's statistic indicates that homogeneity of variance cannot be assumed, and no statistical differences can be confirmed.
AS = Data transformed using square root transformation of X+0.5 with resulting letters of separation applied to original means.
T1 = [C1]*4
T2 = [12]*4

Table 2 – Annual ryegrass (Lolium rigidum) count per m^2 at 34 DA-A (Factorial)

Assessment Date					18-Jun-2024
Part Assessed					PLANT, P
Assessment Type					COUNT
Assessment Unit					NUMBER
Reporting Basis					1 m2
Number of Subsamples					1
Pest Stage Majority/Min/Max					31, 30, 34
Trt-Eval Interval					34 DA-A
ARM Action Codes					T2
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	13
TABLE OF R MEANS					
Replicate 1					112.7
Replicate 2					101.3
Replicate 3					94.7
Replicate 4					69.7
TABLE OF A (Herbicide) MEANS					
1	Glyphosate 450		1.5L/ha	A	144.3a
2	Paraquat 250		1.2L/ha	A	44.8b
LSD P=.05					10.69
Standard Deviation					18.21
CV					19.25
TABLE OF B (Adjuvant) MEANS					
1	Nil			A	128.5a
2	Envirowet		25 mL/100 L	A	103.5b
3	Envirowet		50 mL/100 L	A	75.5c
4	Envirowet		100 mL/100 L	A	90.5bc
5	Axiwetta		100mL/ha	A	88.0bc
6	LI700		250mL/ha	A	81.5c
LSD P=.05					18.52
Standard Deviation					18.21
CV					19.25
TABLE OF A (Herbicide) B (Adjuvant) MEANS					
1	Glyphosate 450		1.5L/ha	A	181.0-
1	Nil			A	
2	Paraquat 250		1.2L/ha	A	76.0-
1	Nil			A	
1	Glyphosate 450		1.5L/ha	A	153.0-
2	Envirowet		25 mL/100 L	A	
2	Paraquat 250		1.2L/ha	A	54.0-
2	Envirowet		25 mL/100 L	A	
1	Glyphosate 450		1.5L/ha	A	123.0-
3	Envirowet		50 mL/100 L	A	
2	Paraquat 250		1.2L/ha	A	28.0-
3	Envirowet		50 mL/100 L	A	
1	Glyphosate 450		1.5L/ha	A	142.0-
4	Envirowet		100 mL/100 L	A	
2	Paraquat 250		1.2L/ha	A	39.0-
4	Envirowet		100 mL/100 L	A	
1	Glyphosate 450		1.5L/ha	A	122.0-
5	Axiwetta		100mL/ha	A	
2	Paraquat 250		1.2L/ha	A	54.0-
5	Axiwetta		100mL/ha	A	
1	Glyphosate 450		1.5L/ha	A	145.0-
6	LI700		250mL/ha	A	
2	Paraquat 250		1.2L/ha	A	18.0-
6	LI700		250mL/ha	A	
LSD P=.05					26.19
Standard Deviation					18.21
CV					19.25

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).
T2 = [12]*4

FACTORIAL/POOLED ERROR AOV For 18-Jun-2024 PLANT P COUNT NUMBER 1 m2 1 31 30 34 34 DA-A T2 (Data Column 13)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	159887.666667				
R	3	11921.000000	3973.666667	11.987	0.0001	
A	1	118803.000000	118803.000000	358.397	0.0001	10.7
B	5	14601.666667	2920.333333	8.810	0.0001	18.5
AB	5	3623.000000	724.600000	2.186	0.0795	26.2
ERROR	33	10939.000000	331.484848			

Table 3 – Annual ryegrass (Lolium rigidum) control at 3, 10, 15 and 34 DA-A (ANOVA)

Assessment Date					18-May-2024	25-May-2024	30-May-2024	18-Jun-2024
Part Assessed					PLOT, P	PLOT, P	PLOT, P	PLOT, P
Assessment Type					CONTRO	CONTRO	CONTRO	CONTRO
Assessment Unit					%UNCK	%UNCK	%UNCK	%UNCK
Reporting Basis					1 PLOT	1 PLOT	1 PLOT	1 PLOT
Number of Subsamples					1	1	1	1
Pest Stage Majority/Min/Max					26, 13, 30	29, 25, 32	29, 25, 32	31, 30, 34
Trt-Eval Interval					3 DA-A	10 DA-A	15 DA-A	34 DA-A
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	4	6	8	10
1	Untreated Control				0.0d	0.0f	0.0f	0.0g
2	Glyphosate 450	1.5	L/ha	A	0.0d	12.5e	11.3e	10.0f
	Nil			A				
3	Glyphosate 450	1.5	L/ha	A	0.0d	15.0de	13.8de	12.5ef
	Envirowet	25	mL/100 L	A				
4	Glyphosate 450	1.5	L/ha	A	2.5d	18.8cde	18.8d	22.5d
	Envirowet	50	mL/100 L	A				
5	Glyphosate 450	1.5	L/ha	A	5.0d	22.5c	17.5de	25.0d
	Envirowet	100	mL/100 L	A				
6	Glyphosate 450	1.5	L/ha	A	7.5d	18.8cde	18.8d	23.8d
	Axiwetta	100	mL/ha	A				
7	Glyphosate 450	1.5	L/ha	A	2.5d	20.0cd	18.8d	18.8de
	LI700	250	mL/ha	A				
8	Paraquat 250	1.2	L/ha	A	36.3c	76.3b	76.3c	72.5c
	Nil			A				
9	Paraquat 250	1.2	L/ha	A	43.8bc	77.5b	80.0bc	86.3ab
	Envirowet	25	mL/100 L	A				
10	Paraquat 250	1.2	L/ha	A	45.0ab	86.3a	87.5a	91.3ab
	Envirowet	50	mL/100 L	A				
11	Paraquat 250	1.2	L/ha	A	51.3ab	81.3ab	81.3abc	91.3ab
	Envirowet	100	mL/100 L	A				
12	Paraquat 250	1.2	L/ha	A	48.8ab	81.3ab	83.8ab	83.8b
	Axiwetta	100	mL/ha	A				
13	Paraquat 250	1.2	L/ha	A	52.5a	87.5a	87.5a	93.8a
	LI700	250	mL/ha	A				
LSD P=.05					7.64	7.04	6.50	7.68
Standard Deviation					5.33	4.91	4.54	5.35
CV					23.47	10.69	9.91	11.02
Levene's F					1.868	0.85	1.469	1.591
Skewness					0.2683	0.1239	0.1304	0.1074
Kurtosis					-1.7312*	-1.8499*	-1.8837*	-1.8174*
Replicate F					1.220	2.684	7.044	4.356
Replicate Prob(F)					0.3164	0.0611	0.0008	0.0102
Treatment F					75.350	202.435	252.616	195.431
Treatment Prob(F)					0.0001	0.0001	0.0001	0.0001

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

Table 4 – Annual ryegrass (Lolium rigidum) control at 3, 10, 15 and 34 DA-A (Factorial)

Assessment Date					18-May-2024	25-May-2024	30-May-2024	18-Jun-2024
Part Assessed					PLOT, P	PLOT, P	PLOT, P	PLOT, P
Assessment Type					CONTRO	CONTRO	CONTRO	CONTRO
Assessment Unit					%UNCK	%UNCK	%UNCK	%UNCK
Reporting Basis					1 PLOT	1 PLOT	1 PLOT	1 PLOT
Number of Subsamples					1	1	1	1
Pest Stage Majority/Min/Max					26, 13, 30	29, 25, 32	29, 25, 32	31, 30, 34
Trt-Eval Interval					3 DA-A	10 DA-A	15 DA-A	34 DA-A
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	4	6	8	10
TABLE OF R MEANS								
Replicate 1					22.5	46.7	45.0	47.9
Replicate 2					26.3	49.6	49.2	52.5
Replicate 3					25.8	50.4	50.4	54.6
Replicate 4					23.8	52.5	53.8	55.4
TABLE OF A (Herbicide) MEANS								
1	Glyphosate 450	1.5L/ha		A	2.9b	17.9b	16.5b	18.8b
2	Paraquat 250	1.2L/ha		A	46.3a	81.7a	82.7a	86.5a
LSD P=.05					3.25	2.98	2.71	3.23
Standard Deviation					5.54	5.08	4.62	5.51
CV					22.53	10.21	9.32	10.47
TABLE OF B (Adjuvant) MEANS								
1	Nil			A	18.1c	44.4c	43.8c	41.3c
2	Envirowet	25	mL/100 L	A	21.9bc	46.3bc	46.9bc	49.4b
3	Envirowet	50	mL/100 L	A	23.8abc	52.5a	53.1a	56.9a
4	Envirowet	100	mL/100 L	A	28.1a	51.9a	49.4ab	58.1a
5	Axiwetta	100mL/ha		A	28.1a	50.0ab	51.3ab	53.8ab
6	LI700	250mL/ha		A	27.5ab	53.8a	53.1a	56.3a
LSD P=.05					5.63	5.17	4.70	5.60
Standard Deviation					5.54	5.08	4.62	5.51
CV					22.53	10.21	9.32	10.47
TABLE OF A (Herbicide) B (Adjuvant) MEANS								
1	Glyphosate 450	1.5L/ha		A	0.0-	12.5-	11.3-	10.0-
1	Nil			A				
2	Paraquat 250	1.2L/ha		A	36.3-	76.3-	76.3-	72.5-
1	Nil			A				
1	Glyphosate 450	1.5L/ha		A	0.0-	15.0-	13.8-	12.5-
2	Envirowet	25	mL/100 L	A				
2	Paraquat 250	1.2L/ha		A	43.8-	77.5-	80.0-	86.3-
2	Envirowet	25	mL/100 L	A				
1	Glyphosate 450	1.5L/ha		A	2.5-	18.8-	18.8-	22.5-
3	Envirowet	50	mL/100 L	A				
2	Paraquat 250	1.2L/ha		A	45.0-	86.3-	87.5-	91.3-
3	Envirowet	50	mL/100 L	A				
1	Glyphosate 450	1.5L/ha		A	5.0-	22.5-	17.5-	25.0-
4	Envirowet	100	mL/100 L	A				
2	Paraquat 250	1.2L/ha		A	51.3-	81.3-	81.3-	91.3-
4	Envirowet	100	mL/100 L	A				
1	Glyphosate 450	1.5L/ha		A	7.5-	18.8-	18.8-	23.8-
5	Axiwetta	100mL/ha		A				
2	Paraquat 250	1.2L/ha		A	48.8-	81.3-	83.8-	83.8-
5	Axiwetta	100mL/ha		A				
1	Glyphosate 450	1.5L/ha		A	2.5-	20.0-	18.8-	18.8-
6	LI700	250mL/ha		A				
2	Paraquat 250	1.2L/ha		A	52.5-	87.5-	87.5-	93.8-
6	LI700	250mL/ha		A				
LSD P=.05					7.97	7.31	6.65	7.92
Standard Deviation					5.54	5.08	4.62	5.51
CV					22.53	10.21	9.32	10.47

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

FACTORIAL/POOLED ERROR AOV For 18-May-2024 PLOT P CONTRO % 1 PLOT 1 26 13 30 3 DA-A (Data Column 4)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	24541.666667				
R	3	112.500000	37.500000	1.222	0.3171	
A	1	22533.333333	22533.333333	734.420	0.0001	3.3
B	5	666.666667	133.333333	4.346	0.0038	5.6
AB	5	216.666667	43.333333	1.412	0.2455	8.0
ERROR	33	1012.500000	30.681818			

FACTORIAL/POOLED ERROR AOV For 25-May-2024 PLOT P CONTRO % 1 PLOT 1 29 25 32 10 DA-A (Data Column 6)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	50497.916667				
R	3	210.416667	70.138889	2.716	0.0605	
A	1	48768.750000	48768.750000	1888.746	0.0001	3.0
B	5	554.166667	110.833333	4.292	0.0041	5.2
AB	5	112.500000	22.500000	0.871	0.5108	7.3
ERROR	33	852.083333	25.820707			

FACTORIAL/POOLED ERROR AOV For 30-May-2024 PLOT P CONTRO % 1 PLOT 1 29 25 32 15 DA-A (Data Column 8)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	54441.666667				
R	3	470.833333	156.944444	7.355	0.0007	
A	1	52668.750000	52668.750000	2468.264	0.0001	2.7
B	5	554.166667	110.833333	5.194	0.0013	4.7
AB	5	43.750000	8.750000	0.410	0.8383	6.6
ERROR	33	704.166667	21.338384			

FACTORIAL/POOLED ERROR AOV For 18-Jun-2024 PLOT P CONTRO % 1 PLOT 1 31 30 34 34 DA-A (Data Column 10)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	58399.479167				
R	3	405.729167	135.243056	4.461	0.0098	
A	1	55013.020833	55013.020833	1814.485	0.0001	3.2
B	5	1621.354167	324.270833	10.695	0.0001	5.6
AB	5	358.854167	71.770833	2.367	0.0610	7.9
ERROR	33	1000.520833	30.318813			

Table 5 – Sowthistle (Sonchus oleraceus) count per m^2 at 0 and 34 DA-A (ANOVA)

Assessment Date					15-May-2024	18-Jun-2024
Part Assessed					PLANT, P	PLANT, P
Assessment Type					COUNT	COUNT
Assessment Unit					NUMBER	NUMBER
Reporting Basis					1 m2	1 m2
Number of Subsamples					1	1
Pest Stage Majority/Min/Max					17, 11, 31	35, 31, 59
Trt-Eval Interval					0 DA-A	34 DA-A
ARM Action Codes					T4	AS T3
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	16	15
1	Untreated Control				3.2	17.0a
2	Glyphosate 450	1.5	L/ha	A		9.0b
	Nil			A		
3	Glyphosate 450	1.5	L/ha	A		7.0b
	Envirowet	25	mL/100 L	A		
4	Glyphosate 450	1.5	L/ha	A		5.0bc
	Envirowet	50	mL/100 L	A		
5	Glyphosate 450	1.5	L/ha	A		3.0cd
	Envirowet	100	mL/100 L	A		
6	Glyphosate 450	1.5	L/ha	A		1.0de
	Axiwetta	100	mL/ha	A		
7	Glyphosate 450	1.5	L/ha	A		6.0bc
	LI700	250	mL/ha	A		
8	Paraquat 250	1.2	L/ha	A		2.0de
	Nil			A		
9	Paraquat 250	1.2	L/ha	A		1.0de
	Envirowet	25	mL/100 L	A		
10	Paraquat 250	1.2	L/ha	A		1.0de
	Envirowet	50	mL/100 L	A		
11	Paraquat 250	1.2	L/ha	A		1.0de
	Envirowet	100	mL/100 L	A		
12	Paraquat 250	1.2	L/ha	A		1.0de
	Axiwetta	100	mL/ha	A		
13	Paraquat 250	1.2	L/ha	A		0.0e
	LI700	250	mL/ha	A		
LSD P=.05					.	NA
Standard Deviation					.	0.60t
CV					.	32.59t
Levene's F					.	0.498
Skewness					1.761	0.6054
Kurtosis					3.1017	-0.2581
Replicate F						1.313
Replicate Prob(F)						0.2853
Treatment F						11.792
Treatment Prob(F)						0.0001

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).
Could not calculate LSD (% mean diff) or mean separation letters for columns 16 because error variance is 0.
AS = Data transformed using square root transformation of X+0.5 with resulting letters of separation applied to original means.
T3 = [14]*4
T4 = [3]/24

Table 6 – Sowthistle (Sonchus oleraceus) count per m^2 at 34 DA-A (Factorial)

Assessment Date					18-Jun-2024
Part Assessed					PLANT, P
Assessment Type					COUNT
Assessment Unit					NUMBER
Reporting Basis					1 m2
Number of Subsamples					1
Pest Stage Majority/Min/Max					35, 31, 59
Trt-Eval Interval					34 DA-A
ARM Action Codes					T3
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	15
TABLE OF R MEANS					
Replicate 1					2.3
Replicate 2					3.3
Replicate 3					3.7
Replicate 4					3.0
TABLE OF A (Herbicide) MEANS					
1	Glyphosate 450		1.5L/ha	A	5.2a
2	Paraquat 250		1.2L/ha	A	1.0b
LSD P=.05					1.16
Standard Deviation					1.97
CV					63.96
TABLE OF B (Adjuvant) MEANS					
1	Nil			A	5.5a
2	Envirowet		25 mL/100 L	A	4.0ab
3	Envirowet		50 mL/100 L	A	3.0bc
4	Envirowet		100 mL/100 L	A	2.0bc
5	Axiwetta		100mL/ha	A	1.0c
6	LI700		250mL/ha	A	3.0bc
LSD P=.05					2.01
Standard Deviation					1.97
CV					63.96
TABLE OF A (Herbicide) B (Adjuvant) MEANS					
1	Glyphosate 450		1.5L/ha	A	9.0a
1	Nil			A	
2	Paraquat 250		1.2L/ha	A	2.0de
1	Nil			A	
1	Glyphosate 450		1.5L/ha	A	7.0ab
2	Envirowet		25 mL/100 L	A	
2	Paraquat 250		1.2L/ha	A	1.0de
2	Envirowet		25 mL/100 L	A	
1	Glyphosate 450		1.5L/ha	A	5.0bc
3	Envirowet		50 mL/100 L	A	
2	Paraquat 250		1.2L/ha	A	1.0de
3	Envirowet		50 mL/100 L	A	
1	Glyphosate 450		1.5L/ha	A	3.0cd
4	Envirowet		100 mL/100 L	A	
2	Paraquat 250		1.2L/ha	A	1.0de
4	Envirowet		100 mL/100 L	A	
1	Glyphosate 450		1.5L/ha	A	1.0de
5	Axiwetta		100mL/ha	A	
2	Paraquat 250		1.2L/ha	A	1.0de
5	Axiwetta		100mL/ha	A	
1	Glyphosate 450		1.5L/ha	A	6.0b
6	LI700		250mL/ha	A	
2	Paraquat 250		1.2L/ha	A	0.0e
6	LI700		250mL/ha	A	
LSD P=.05					2.84
Standard Deviation					1.97
CV					63.96

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).
T3 = [14]*4
T4 = [3]/20

FACTORIAL/POOLED ERROR AOV For 18-Jun-2024 PLANT P COUNT NUMBER 1 m2 1 35 31 59 34 DA-A T3 (Data Column 15)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	519.666667				
R	3	11.666667	3.888889	1.000	0.4051	
A	1	208.333333	208.333333	53.571	0.0001	1.2
B	5	97.666667	19.533333	5.023	0.0016	2.0
AB	5	73.666667	14.733333	3.789	0.0080	2.8
ERROR	33	128.333333	3.888889			

Table 7 – Sowthistle (Sonchus oleraceus) control at 3, 10, 15 and 34 DA-A (ANOVA)

Assessment Date				18-May-2024	25-May-2024	30-May-2024	18-Jun-2024
Part Assessed				PLOT, P	PLOT, P	PLOT, P	PLOT, P
Assessment Type				CONTRO	CONTRO	CONTRO	CONTRO
Assessment Unit				%UNCK	%UNCK	%UNCK	%UNCK
Reporting Basis				1 PLOT	1 PLOT	1 PLOT	1 PLOT
Number of Subsamples				1	1	1	1
Pest Stage Majority/Min/Max				17, 13, 31	31, 14, 33	31, 14, 52	35, 31, 59
Trt-Eval Interval				3 DA-A	10 DA-A	15 DA-A	34 DA-A
ARM Action Codes					AA	AA	AS
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	5	7	9	11
1	Untreated Control				0.0e	0.0f	0.0e	0.0f
2	Glyphosate 450	1.5	L/ha	A	3.8de	18.8e	17.5d	16.3e
	Nil			A				
3	Glyphosate 450	1.5	L/ha	A	8.8cd	21.3de	22.5cd	20.0e
	Envirowet	25	mL/100 L	A				
4	Glyphosate 450	1.5	L/ha	A	12.5c	26.3cd	25.0c	31.3c
	Envirowet	50	mL/100 L	A				
5	Glyphosate 450	1.5	L/ha	A	10.0cd	31.3c	27.5c	32.5c
	Envirowet	100	mL/100 L	A				
6	Glyphosate 450	1.5	L/ha	A	12.5c	25.0cde	26.3c	30.0cd
	Axiwetta	100	mL/ha	A				
7	Glyphosate 450	1.5	L/ha	A	10.0cd	27.5cd	26.3c	26.3d
	LI700	250	mL/ha	A				
8	Paraquat 250	1.2	L/ha	A	77.5b	82.5b	83.8b	75.0b
	Nil			A				
9	Paraquat 250	1.2	L/ha	A	82.5ab	87.5ab	87.5ab	90.0a
	Envirowet	25	mL/100 L	A				
10	Paraquat 250	1.2	L/ha	A	88.8a	90.0a	90.0a	91.3a
	Envirowet	50	mL/100 L	A				
11	Paraquat 250	1.2	L/ha	A	88.8a	86.3ab	88.8ab	90.0a
	Envirowet	100	mL/100 L	A				
12	Paraquat 250	1.2	L/ha	A	86.3a	88.8a	90.0ab	86.3a
	Axiwetta	100	mL/ha	A				
13	Paraquat 250	1.2	L/ha	A	88.8a	90.0a	90.0a	92.5a
	LI700	250	mL/ha	A				
LSD P=.05					6.70	NA	NA	NA
Standard Deviation					4.67	3.21t	3.66t	0.31t
CV					10.65	7.0t	7.97t	4.64t
Levene's F					0.555	0.605	1.236	0.624
Skewness					0.1513	-0.2412	-0.2204	-0.5458
Kurtosis					-1.964*	-1.2001	-1.2901	-0.5689
Replicate F					0.411	0.168	1.201	1.353
Replicate Prob(F)					0.7459	0.9171	0.3232	0.2727
Treatment F					297.749	228.652	183.788	330.506
Treatment Prob(F)					0.0001	0.0001	0.0001	0.0001

Means followed by same letter or symbol do not significantly differ (P=.05, LSD).
AA = Data transformed using arcsine square root % transformation with resulting letters of separation applied to original means.
AS = Data transformed using square root transformation of X+0.5 with resulting letters of separation applied to original means.

Table 8 – Sowthistle (Sonchus oleraceus) control at 3, 10, 15 and 34 DA-A (Factorial)

Assessment Date					18-May-2024	25-May-2024	30-May-2024	18-Jun-2024
Part Assessed					PLOT, P	PLOT, P	PLOT, P	PLOT, P
Assessment Type					CONTRO	CONTRO	CONTRO	CONTRO
Assessment Unit					%UNCK	%UNCK	%UNCK	%UNCK
Reporting Basis					1 PLOT	1 PLOT	1 PLOT	1 PLOT
Number of Subsamples					1	1	1	1
Pest Stage Majority/Min/Max					17, 13, 31	31, 14, 33	31, 14, 52	35, 31, 59
Trt-Eval Interval					3 DA-A	10 DA-A	15 DA-A	34 DA-A
ARM Action Codes								
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	5	7	9	11
TABLE OF R MEANS								
Replicate 1					47.1	55.4	53.8	55.8
Replicate 2					47.5	56.3	57.1	55.8
Replicate 3					46.7	57.1	57.1	57.1
Replicate 4					48.8	56.3	57.1	58.3
TABLE OF A (Herbicide) MEANS								
1	Glyphosate 450	1.5L/ha		A	9.6b	25.0b	24.2b	26.0b
2	Paraquat 250	1.2L/ha		A	85.4a	87.5a	88.3a	87.5a
LSD P=.05					2.86	2.55	3.02	2.79
Standard Deviation					4.87	4.34	5.15	4.74
CV					10.26	7.71	9.15	8.35
TABLE OF B (Adjuvant) MEANS								
1	Nil			A	40.6c	50.6b	50.6b	45.6c
2	Envirowet	25 mL/100 L		A	45.6b	54.4ab	55.0ab	55.0b
3	Envirowet	50 mL/100 L		A	50.6a	58.1a	57.5a	61.3a
4	Envirowet	100 mL/100 L		A	49.4ab	58.8a	58.1a	61.3a
5	Axiwetta	100mL/ha		A	49.4ab	56.9a	58.1a	58.1ab
6	LI700	250mL/ha		A	49.4ab	58.8a	58.1a	59.4ab
LSD P=.05					4.96	4.41	5.24	4.82
Standard Deviation					4.87	4.34	5.15	4.74
CV					10.26	7.71	9.15	8.35
TABLE OF A (Herbicide) B (Adjuvant) MEANS								
1	Glyphosate 450	1.5L/ha		A	3.8-	18.8-	17.5-	16.3e
1	Nil			A				
2	Paraquat 250	1.2L/ha		A	77.5-	82.5-	83.8-	75.0b
1	Nil			A				
1	Glyphosate 450	1.5L/ha		A	8.8-	21.3-	22.5-	20.0de
2	Envirowet	25 mL/100 L		A				
2	Paraquat 250	1.2L/ha		A	82.5-	87.5-	87.5-	90.0a
2	Envirowet	25 mL/100 L		A				
1	Glyphosate 450	1.5L/ha		A	12.5-	26.3-	25.0-	31.3c
3	Envirowet	50 mL/100 L		A				
2	Paraquat 250	1.2L/ha		A	88.8-	90.0-	90.0-	91.3a
3	Envirowet	50 mL/100 L		A				
1	Glyphosate 450	1.5L/ha		A	10.0-	31.3-	27.5-	32.5c
4	Envirowet	100 mL/100 L		A				
2	Paraquat 250	1.2L/ha		A	88.8-	86.3-	88.8-	90.0a
4	Envirowet	100 mL/100 L		A				
1	Glyphosate 450	1.5L/ha		A	12.5-	25.0-	26.3-	30.0c
5	Axiwetta	100mL/ha		A				
2	Paraquat 250	1.2L/ha		A	86.3-	88.8-	90.0-	86.3a
5	Axiwetta	100mL/ha		A				
1	Glyphosate 450	1.5L/ha		A	10.0-	27.5-	26.3-	26.3cd
6	LI700	250mL/ha		A				
2	Paraquat 250	1.2L/ha		A	88.8-	90.0-	90.0-	92.5a
6	LI700	250mL/ha		A				
LSD P=.05					7.01	6.24	7.41	6.82
Standard Deviation					4.87	4.34	5.15	4.74
CV					10.26	7.71	9.15	8.35

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

FACTORIAL/POOLED ERROR AOV For 18-May-2024 PLOT P CONTRO % 1 PLOT 1 17 13 31 3 DA-A (Data Column 5)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	70450.000000				
R	3	29.166667	9.722222	0.410	0.7472	
A	1	69008.333333	69008.333333	2907.160	0.0001	2.9
B	5	568.750000	113.750000	4.792	0.0021	5.0
AB	5	60.416667	12.083333	0.509	0.7673	7.0
ERROR	33	783.333333	23.737374			

FACTORIAL/POOLED ERROR AOV For 25-May-2024 PLOT P CONTRO % 1 PLOT 1 31 14 33 10 DA-A (Data Column 7)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	48075.000000				
R	3	16.666667	5.555556	0.295	0.8285	
A	1	46875.000000	46875.000000	2491.611	0.0001	2.5
B	5	412.500000	82.500000	4.385	0.0036	4.4
AB	5	150.000000	30.000000	1.595	0.1890	6.2
ERROR	33	620.833333	18.813131			

FACTORIAL/POOLED ERROR AOV For 30-May-2024 PLOT P CONTRO % 1 PLOT 1 31 14 52 15 DA-A (Data Column 9)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	50775.000000				
R	3	100.000000	33.333333	1.257	0.3050	
A	1	49408.333333	49408.333333	1863.400	0.0001	3.0
B	5	362.500000	72.500000	2.734	0.0357	5.2
AB	5	29.166667	5.833333	0.220	0.9514	7.4
ERROR	33	875.000000	26.515152			

FACTORIAL/POOLED ERROR AOV For 18-Jun-2024 PLOT P CONTRO % 1 PLOT 1 35 31 59 34 DA-A (Data Column 11)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)	LSD (.05)
Total	47	47824.479167				
R	3	51.562500	17.187500	0.764	0.5223	
A	1	45325.520833	45325.520833	2015.316	0.0001	2.8
B	5	1408.854167	281.770833	12.528	0.0001	4.8
AB	5	296.354167	59.270833	2.635	0.0412	6.8
ERROR	33	742.187500	22.490530			

DISCUSSION

A small plot trial was established near Ghoolendaadi, New South Wales in 2024 compare the effectiveness of Envirowet Multi-Phase Surfactant with industry standard wetting agents when used with Glyphosate and Paraquat herbicides to control weeds in fallow.

Treatments were applied as a single broadcast foliar spray to annual ryegrass (*Lolium rigidum*) at the six-tiller growth stage (BBCH 26) and sowthistle (*Sonchus oleraceus*) at the 7-leaf growth stage (BBCH 17) using a hand-held boom fitted with Albuz AVI 110° flat fan air induction nozzles delivering 100 L/ha and generating very coarse (> 386µm to <484µm) spray droplets.

Seasonal conditions were characterised by above-average autumn rainfall prior to treatment application with an uncharacteristically high amount of rain also falling within the trial period. However, this did not affect the reliability of the results of the trial.

Weed counts were conducted by species across the UTC plots prior to treatment application and across all plots at 34 days after application (DA-A). Weed control was visually assessed by species at 3, 10, 15 and 34 DA-A.

Annual ryegrass control (Tables 1-4)

Factorial analysis showed that the plots treated with Paraquat provided significantly greater mean visual control of annual ryegrass at each assessment timing than the plots treated with Glyphosate. Mean visual control of annual ryegrass was 18.8% at 34 DA-A across the plots treated with Glyphosate whereas mean visual control at 34 DA-A was 86.5% across the plots treated with Paraquat.

Factorial analysis showed that visual control of annual ryegrass was higher across the plots treated with an adjuvant when compared with nil adjuvant, however this was not significant across the plots treated with Envirowet at 25 mL/100 L at 3, 10, or 15 DA-A or Envirowet at 50mL/100 L at 3 DA-A. Differences in annual ryegrass control between Envirowet at 25-100 mL/100 L and Axiwetta at 100mL/ha were not statistically significant between 10 and 34 DA-A. Visual control of annual ryegrass was significantly higher between 10 and 34 DA-A across the plots treated with LI700 at 350 mL/ha when compared with the plots treated with Envirowet at 25 mL/100 L. However, differences between Envirowet at 50 or 100 mL/100 L and LI700 were not significant. Results of annual ryegrass count data collected at 34 DA-A reflected visual control data.

Sowthistle control (Tables 5-8)

Factorial analysis showed that the plots treated with Paraquat provided significantly greater mean visual sowthistle control at each assessment timing than the plots treated with Glyphosate. Mean visual control of sowthistle was 26.0% at 34 DA-A across the plots treated with Glyphosate compared to 87.5% across the plots treated with Paraquat.

Factorial analysis showed that visual control of sowthistle was higher across the plots treated with an adjuvant when compared with nil adjuvant, however this was not significant across the plots treated with Envirowet at 25 mL/100 L at 10 or 15 DA-A, and differences in sowthistle densities at 34 DA-A were not significant between the plots treated with nil adjuvant and the plots treated with Envirowet at 25 mL/100 L. Differences in visual sowthistle control between Envirowet at 25-100 mL/100 L and Axiwetta at 100mL/ha or LI700 at 250mL/ha were not significant at any assessment timing.

CONCLUSIONS

Visual control of annual ryegrass was higher across the plots treated with an adjuvant when compared with nil adjuvant, however this was not significant across the plots treated with Envirowet at 25 mL/100 L at 3, 10, or 15 DA-A or Envirowet at 50mL/100 L at 3 DA-A.

Annual ryegrass control was statistically equivalent between 10 and 34 DA-A across the plots treated with Envirowet at 25-100 mL/100 L or Axiwetta at 100mL/ha.

Visual control of annual ryegrass was significantly higher between 10 and 34 DA-A across the plots treated with LI700 at 350 mL/ha when compared with the plots treated with Envirowet at 25 mL/100 L.

Differences in annual ryegrass control between Envirowet at 50 or 100 mL/100 L and LI700 were not significant.

Visual control of sowthistle was higher across the plots treated with an adjuvant when compared with nil adjuvant, however this was not significant across the plots treated with Envirowet at 25 mL/100 L at 10 or 15 DA-A.

Visual sowthistle control was statistically equivalent between 3 and 34 DA-A across the plots treated with Envirowet at 25-100 mL/100 L and Axiwetta at 100mL/ha or LI700 at 250mL/ha.

APPENDICES

Appendix i - Trial details

Trial Site Information

Location	Ghoolendaadi, NSW
GPS Co-ordinates	-30.932674, 149.932857
Treated Plot Width	2 m
Treated Plot Length	12 m
Treated Plot Area	24 m^2
Replications	4
Treatments	13
Site Type	Field
Experimental Unit	1 Plot
Study Design	Factorial (RCB)

Cooperator

Name	James McGowan
Address	Quia Downs, 2720 Goolhi Rd, Ghoolendaadi, NSW 2380
Mobile	0477 147 192
E-Mail	admin@qdrural.com

Crop Description

Common Name	Fallow
Previous Crop 2023	Wheat

Pest Description

Scientific Name	*Lolium rigidum*	*Sonchus oleraceus*
Common Name	Annual ryegrass	Sowthistle
ARM Code	LOLRI	SONOL

Application Description

Code	A
Date	15-May-2024
Start Time	11:00 AM
Stop Time	1:32 PM
Method	SPRAY
Timing	ATGRST
Placement	FOLIAR
Air Temperature	22 C
% Relative Humidity	49
Wind Velocity+Dir.	7 KPH, ESE
Wet Leaves (Y/N)	N, no
% Cloud Cover	0

Application Equipment

Code	A
Equipment Name	HBM094
Equipment Type	SPRBAC
Operation Pressure	300 kPa
Nozzle Model	ALBUZ AVI 010s
Boom Height	50.0 cm
Ground Speed	5.1 KPH
Application Amount	100 L/ha
Mix Size	2.0 L

Pest Stage at Each Application

Code	A	A
ARM Code	LOLRI	SONOL
Majority, %	26, 50	17
Minimum, %	13, 10	11
Maximum, %	30, 30	31

Notes

Date	15-May-2024
By	Liam D
Description	Calibration 0.425L/Min. 5.1km/h. 8.5 seconds per plot VC

Trial plan

Rep	Blk													
4	4	401 12 A2 B5	402 2 A1 B1	403 5 A1 B4	404 8 A2 B1	405 1	406 9 A2 B2	407 7 A1 B6	408 11 A2 B4	409 3 A1 B2	410 4 A1 B3	411 6 A1 B5	412 10 A2 B3	413 13 A2 B6
3	3	301 3 A1 B2	302 7 A1 B6	303 10 A2 B3	304 13 A2 B6	305 4 A1 B3	306 6 A1 B5	307 8 A2 B1	308 1	309 12 A2 B5	310 5 A1 B4	311 2 A1 B1	312 9 A2 B2	313 11 A2 B4
2	2	201 9 A2 B2	202 4 A1 B3	203 11 A2 B4	204 12 A2 B5	205 3 A1 B2	206 10 A2 B3	207 5 A1 B4	208 2 A1 B1	209 6 A1 B5	210 1	211 13 A2 B6	212 7 A1 B6	213 8 A2 B1
1	1	101 5 A1 B4	102 1	103 7 A1 B6	104 6 A1 B5	105 2 A1 B1	106 8 A2 B1	107 13 A2 B6	108 9 A2 B2	109 11 A2 B4	110 3 A1 B2	111 10 A2 B3	112 12 A2 B5	113 4 A1 B3

Factor	Description
A	Herbicide
B	Adjuvant

Assessment Techniques

Assessment type	Scale	Method
Weed Count	Number	Prior to application (0 DA-A), the number of sowthistle plants per whole plot (2m x 12m) and the number of annual ryegrass plants in 4 x 0.25m2 quadrats per plot was counted. At 34 DA-A, the number of weeds per 0.25m^2 quadrat in each plot as counted by species. All weed counts were converted to the number of weeds per m^2.
Weed Control	%UNCK	Percent weed control was visually assessed in each plot relative to the untreated in the same replicate whereby: 0 = No control, weed healthy 10 = Some slight discolouration of leaves 20 = Some slight discolouration of leaves; 10% biomass reduction 30 = Some discolouration of leaves; 20% biomass reduction 40 = Some distinct yellowing of leaves; 30% biomass reduction 50 = Most plants yellowing; some plant distortion (if present); some necrosis; 40 % biomass reduction 60 = Most plants yellowing; some plant distortion (if present); some necrosis; 50% biomass reduction 70 = Most plants yellowing; some plant distortion (if present); some necrosis; 60% biomass reduction 80 = Most plants dying; significant plant distortion (if present); 70% biomass reduction 90 = Most plants dead or dying; significant plant distortion (if present); 80% biomass reduction 100 = All plants dead

Statistical interpretation

All data from this trial was analysed using a confidence limit of 95%, unless otherwise specified. All mention of significant differences contained within this report refer to statistically significant differences. Levene's test was used to test for homogeneity.

If homogeneity was not met, then the data was transformed using the appropriate transformation. The ANOVA table provides the original means with the transformed letters of separation. The calculation of F values is developed from transformed data units and as the LSD is calculated from these values it will also apply to the transformed data. This means that comparison of treatment means needs to rely on the letters of significance and not the LSD.

Abbreviation guide

Trial Details

YBRAC, NOSC, Fallow, Fallow = IE
LOLRI, Lolium rigidum, Annual ryegrass = IE
SONOL, Sonchus oleraceus, Annual sowthistle = IE
FACTOR, Factorial (RCB) = Factorial (RCB)
ATGRST = at growing stage
SPRBAC = sprayer - backpack, knapsack, hand-held

Data Tables

Part Assessed
PLANT = plant
PLOT = plot
P = Pest is Part Rated

Assessment Type
COUNT = count
CONTRO = control / burndown or knockdown

Assessment Unit
NUMBER = number
%UNCK = percent of untreated check
m2 = square meter
PLOT = total plot

ARM Action Codes
AA = Automatic arcsine square root % transformation
AS = Automatic square root transformation of X+0.5

Appendix ii - Plot data

Table 1 - Annual ryegrass (Lolium rigidum) count at 0 and 34 DA-A

Assessment Date						15-May-2024	18-Jun-2024
Part Assessed						PLANT, P	PLANT, P
Assessment Type						COUNT	COUNT
Assessment Unit						NUMBER	NUMBER
Reporting Basis						0.25 m2	0.25 m2
Number of Subsamples						4	1
Pest Stage Majority/Min/Max						26, 13, 30	31, 30, 34
Trt-Eval Interval						0 DA-A	34 DA-A
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	Plot	1	12
1	Untreated Control				102	26.5	52.0
					210	34.5	49.0
					308	20.5	49.0
					405	24.5	45.0
					Mean =	26.5	48.8
2	Glyphosate 450	1.5	L/ha	A	105		47.0
	Nil			A	208		46.0
					311		48.0
					402		40.0
					Mean =	.	45.3
3	Glyphosate 450	1.5	L/ha	A	110		41.0
	Envirowet	25	mL/100 L	A	205		38.0
					301		45.0
					409		29.0
					Mean =	.	38.3
4	Glyphosate 450	1.5	L/ha	A	113		46.0
	Envirowet	50	mL/100 L	A	202		34.0
					305		26.0
					410		17.0
					Mean =	.	30.8
5	Glyphosate 450	1.5	L/ha	A	101		37.0
	Envirowet	100	mL/100 L	A	207		37.0
					310		34.0
					403		34.0
					Mean =	.	35.5
6	Glyphosate 450	1.5	L/ha	A	104		42.0
	Axiwetta	100	mL/ha	A	209		37.0
					306		21.0
					411		22.0
					Mean =	.	30.5
7	Glyphosate 450	1.5	L/ha	A	103		44.0
	LI700	250	mL/ha	A	212		36.0
					302		36.0
					407		29.0
					Mean =	.	36.3
8	Paraquat 250	1.2	L/ha	A	106		22.0
	Nil			A	213		26.0
					307		16.0
					404		12.0
					Mean =	.	19.0
9	Paraquat 250	1.2	L/ha	A	108		15.0
	Envirowet	25	mL/100 L	A	201		13.0
					312		15.0
					406		11.0
					Mean =	.	13.5
10	Paraquat 250	1.2	L/ha	A	111		11.0
	Envirowet	50	mL/100 L	A	206		8.0
					303		6.0
					412		3.0
					Mean =	.	7.0
11	Paraquat 250	1.2	L/ha	A	109		9.0
	Envirowet	100	mL/100 L	A	203		11.0

				313		17.0
				408		2.0
				Mean =	.	9.8
12	Paraquat 250	1.2L/ha	A	112		17.0
	Axiwetta	100mL/ha	A	204		13.0
				309		16.0
				401		8.0
				Mean =	.	13.5
13	Paraquat 250	1.2L/ha	A	107		7.0
	LI700	250mL/ha	A	211		5.0
				304		4.0
				413		2.0
				Mean =	.	4.5

Table 2 - Annual ryegrass (Lolium rigidum) control at 3, 10, 15 and 34 DA-A

Assessment Date						18-May-2024	25-May-2024	30-May-2024	18-Jun-2024
Part Assessed						PLOT, P	PLOT, P	PLOT, P	PLOT, P
Assessment Type						CONTRO	CONTRO	CONTRO	CONTRO
Assessment Unit						%UNCK	%UNCK	%UNCK	%UNCK
Reporting Basis						1 PLOT	1 PLOT	1 PLOT	1 PLOT
Number of Subsamples						1	1	1	1
Pest Stage Majority/Min/Max						26, 13, 30	29, 25, 32	29, 25, 32	31, 30, 34
Trt-Eval Interval						3 DA-A	10 DA-A	15 DA-A	34 DA-A
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	Plot	4	6	8	10
1	Untreated Control				102	0.0	0.0	0.0	0.0
					210	0.0	0.0	0.0	0.0
					308	0.0	0.0	0.0	0.0
					405	0.0	0.0	0.0	0.0
					Mean =	0.0	0.0	0.0	0.0
2	Glyphosate 450	1.5	L/ha	A	105	0.0	10.0	10.0	10.0
	Nil			A	208	0.0	15.0	10.0	10.0
					311	0.0	15.0	15.0	15.0
					402	0.0	10.0	10.0	5.0
					Mean =	0.0	12.5	11.3	10.0
3	Glyphosate 450	1.5	L/ha	A	110	0.0	15.0	10.0	10.0
	Envirowet	25	mL/100 L	A	205	0.0	15.0	15.0	15.0
					301	0.0	10.0	10.0	10.0
					409	0.0	20.0	20.0	15.0
					Mean =	0.0	15.0	13.8	12.5
4	Glyphosate 450	1.5	L/ha	A	113	0.0	15.0	10.0	10.0
	Envirowet	50	mL/100 L	A	202	0.0	15.0	15.0	20.0
					305	0.0	20.0	20.0	30.0
					410	10.0	25.0	30.0	30.0
					Mean =	2.5	18.8	18.8	22.5
5	Glyphosate 450	1.5	L/ha	A	101	0.0	20.0	15.0	20.0
	Envirowet	100	mL/100 L	A	207	10.0	25.0	20.0	20.0
					310	10.0	25.0	20.0	30.0
					403	0.0	20.0	15.0	30.0
					Mean =	5.0	22.5	17.5	25.0
6	Glyphosate 450	1.5	L/ha	A	104	0.0	15.0	15.0	15.0
	Axiwetta	100	mL/ha	A	209	10.0	15.0	15.0	20.0
					306	10.0	20.0	20.0	25.0
					411	10.0	25.0	25.0	35.0
					Mean =	7.5	18.8	18.8	23.8
7	Glyphosate 450	1.5	L/ha	A	103	0.0	15.0	15.0	15.0
	LI700	250	mL/ha	A	212	10.0	25.0	20.0	30.0
					302	0.0	15.0	15.0	15.0
					407	0.0	25.0	25.0	15.0
					Mean =	2.5	20.0	18.8	18.8
8	Paraquat 250	1.2	L/ha	A	106	40.0	70.0	70.0	65.0
	Nil			A	213	30.0	70.0	70.0	65.0
					307	45.0	85.0	85.0	80.0
					404	30.0	80.0	80.0	80.0
					Mean =	36.3	76.3	76.3	72.5
9	Paraquat 250	1.2	L/ha	A	108	40.0	70.0	70.0	80.0
	Envirowet	25	mL/100 L	A	201	50.0	85.0	85.0	95.0
					312	40.0	75.0	80.0	85.0
					406	45.0	80.0	85.0	85.0
					Mean =	43.8	77.5	80.0	86.3
10	Paraquat 250	1.2	L/ha	A	111	50.0	85.0	85.0	90.0
	Envirowet	50	mL/100 L	A	206	40.0	80.0	85.0	85.0
					303	50.0	90.0	90.0	95.0
					412	40.0	90.0	90.0	95.0
					Mean =	45.0	86.3	87.5	91.3
11	Paraquat 250	1.2	L/ha	A	109	50.0	85.0	80.0	90.0
	Envirowet	100	mL/100 L	A	203	60.0	85.0	85.0	95.0
					313	40.0	70.0	70.0	85.0
					408	55.0	85.0	90.0	95.0

				Mean =	51.3	81.3	81.3	91.3
12	Paraquat 250	1.2L/ha	A	112	40.0	80.0	80.0	80.0
	Axiwetta	100mL/ha	A	204	50.0	75.0	80.0	80.0
				309	55.0	90.0	90.0	90.0
				401	50.0	80.0	85.0	85.0
				Mean =	48.8	81.3	83.8	83.8
13	Paraquat 250	1.2L/ha	A	107	50.0	80.0	80.0	90.0
	LI700	250mL/ha	A	211	55.0	90.0	90.0	95.0
				304	60.0	90.0	90.0	95.0
				413	45.0	90.0	90.0	95.0
				Mean =	52.5	87.5	87.5	93.8

Table 3 - Sowthistle (Sonchus oleraceus) count at 0 and 34 DA-A

Assessment Date						15-May-2024	18-Jun-2024
Part Assessed						PLANT, P	PLANT, P
Assessment Type						COUNT	COUNT
Assessment Unit						NUMBER	NUMBER
Reporting Basis						24 m2	0.25 m2
Number of Subsamples						1	1
Pest Stage Majority/Min/Max						17, 11, 31	35, 31, 59
Trt-Eval Interval						0 DA-A	34 DA-A
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	Plot	3	14
1	Untreated Control				102	30.0	3.0
					210	20.0	3.0
					308	60.0	5.0
					405	199.0	6.0
					Mean =	77.3	4.3
2	Glyphosate 450	1.5	L/ha	A	105		2.0
	Nil			A	208		2.0
					311		2.0
					402		3.0
					Mean =	.	2.3
3	Glyphosate 450	1.5	L/ha	A	110		2.0
	Envirowet	25	mL/100 L	A	205		2.0
					301		2.0
					409		1.0
					Mean =	.	1.8
4	Glyphosate 450	1.5	L/ha	A	113		1.0
	Envirowet	50	mL/100 L	A	202		2.0
					305		1.0
					410		1.0
					Mean =	.	1.3
5	Glyphosate 450	1.5	L/ha	A	101		1.0
	Envirowet	100	mL/100 L	A	207		1.0
					310		1.0
					403		0.0
					Mean =	.	0.8
6	Glyphosate 450	1.5	L/ha	A	104		0.0
	Axiwetta	100	mL/ha	A	209		0.0
					306		1.0
					411		0.0
					Mean =	.	0.3
7	Glyphosate 450	1.5	L/ha	A	103		1.0
	LI700	250	mL/ha	A	212		1.0
					302		2.0
					407		2.0
					Mean =	.	1.5
8	Paraquat 250	1.2	L/ha	A	106		0.0
	Nil			A	213		0.0
					307		1.0
					404		1.0
					Mean =	.	0.5
9	Paraquat 250	1.2	L/ha	A	108		0.0
	Envirowet	25	mL/100 L	A	201		0.0
					312		0.0
					406		1.0
					Mean =	.	0.3
10	Paraquat 250	1.2	L/ha	A	111		0.0
	Envirowet	50	mL/100 L	A	206		1.0
					303		0.0
					412		0.0
					Mean =	.	0.3
11	Paraquat 250	1.2	L/ha	A	109		0.0
	Envirowet	100	mL/100 L	A	203		0.0
					313		1.0
					408		0.0

				Mean =	.	0.3
12	Paraquat 250	1.2L/ha	A	112		0.0
	Axiwetta	100mL/ha	A	204		1.0
				309		0.0
				401		0.0
				Mean =	.	0.3
13	Paraquat 250	1.2L/ha	A	107		0.0
	LI700	250mL/ha	A	211		0.0
				304		0.0
				413		0.0
				Mean =	.	0.0

Table 4 - Sowthistle (Sonchus oleraceus) control at 3, 10, 15 and 34 DA-A

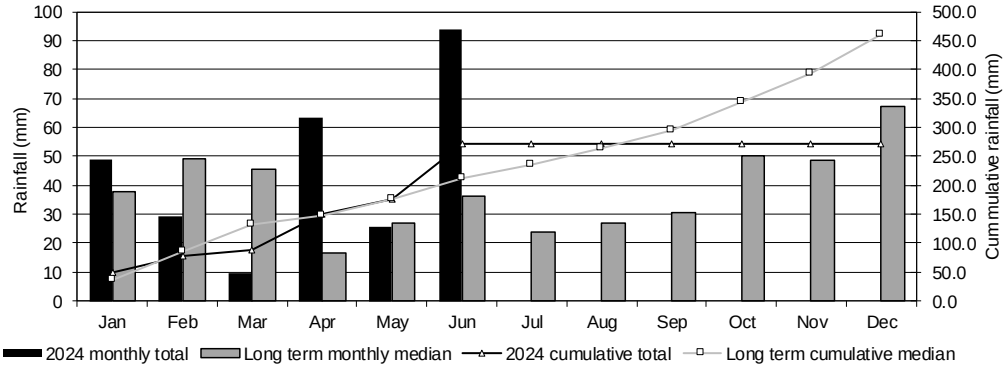
Assessment Date						18-May-2024	25-May-2024	30-May-2024	18-Jun-2024
Part Assessed						PLOT, P	PLOT, P	PLOT, P	PLOT, P
Assessment Type						CONTRO	CONTRO	CONTRO	CONTRO
Assessment Unit						%UNCK	%UNCK	%UNCK	%UNCK
Reporting Basis						1 PLOT	1 PLOT	1 PLOT	1 PLOT
Number of Subsamples						1	1	1	1
Pest Stage Majority/Min/Max						17, 13, 31	31, 14, 33	31, 14, 52	35, 31, 59
Trt-Eval Interval						3 DA-A	10 DA-A	15 DA-A	34 DA-A
Trt No.	Treatment Name	Other Rate	Other Rate Unit	Appl Code	Plot	5	7	9	11
1	Untreated Control				102	0.0	0.0	0.0	0.0
					210	0.0	0.0	0.0	0.0
					308	0.0	0.0	0.0	0.0
					405	0.0	0.0	0.0	0.0
					Mean =	0.0	0.0	0.0	0.0
2	Glyphosate 450	1.5	L/ha	A	105	5.0	15.0	10.0	15.0
	Nil			A	208	10.0	15.0	15.0	15.0
					311	0.0	25.0	25.0	15.0
					402	0.0	20.0	20.0	20.0
					Mean =	3.8	18.8	17.5	16.3
3	Glyphosate 450	1.5	L/ha	A	110	5.0	20.0	20.0	15.0
	Envirowet	25	mL/100 L	A	205	10.0	20.0	30.0	25.0
					301	10.0	20.0	15.0	20.0
					409	10.0	25.0	25.0	20.0
					Mean =	8.8	21.3	22.5	20.0
4	Glyphosate 450	1.5	L/ha	A	113	15.0	25.0	20.0	25.0
	Envirowet	50	mL/100 L	A	202	10.0	25.0	25.0	30.0
					305	10.0	25.0	25.0	35.0
					410	15.0	30.0	30.0	35.0
					Mean =	12.5	26.3	25.0	31.3
5	Glyphosate 450	1.5	L/ha	A	101	10.0	30.0	20.0	30.0
	Envirowet	100	mL/100 L	A	207	10.0	30.0	25.0	30.0
					310	15.0	40.0	40.0	35.0
					403	5.0	25.0	25.0	35.0
					Mean =	10.0	31.3	27.5	32.5
6	Glyphosate 450	1.5	L/ha	A	104	5.0	20.0	20.0	25.0
	Axiwetta	100	mL/ha	A	209	15.0	20.0	20.0	30.0
					306	15.0	30.0	35.0	30.0
					411	15.0	30.0	30.0	35.0
					Mean =	12.5	25.0	26.3	30.0
7	Glyphosate 450	1.5	L/ha	A	103	10.0	25.0	25.0	30.0
	LI700	250	mL/ha	A	212	20.0	30.0	30.0	25.0
					302	0.0	30.0	25.0	25.0
					407	10.0	25.0	25.0	25.0
					Mean =	10.0	27.5	26.3	26.3
8	Paraquat 250	1.2	L/ha	A	106	80.0	80.0	80.0	65.0
	Nil			A	213	70.0	80.0	80.0	75.0
					307	80.0	80.0	85.0	80.0
					404	80.0	90.0	90.0	80.0
					Mean =	77.5	82.5	83.8	75.0
9	Paraquat 250	1.2	L/ha	A	108	80.0	90.0	90.0	95.0
	Envirowet	25	mL/100 L	A	201	80.0	90.0	90.0	95.0
					312	80.0	90.0	90.0	85.0
					406	90.0	80.0	80.0	85.0
					Mean =	82.5	87.5	87.5	90.0
10	Paraquat 250	1.2	L/ha	A	111	90.0	90.0	90.0	95.0
	Envirowet	50	mL/100 L	A	206	85.0	95.0	95.0	85.0
					303	90.0	85.0	85.0	95.0
					412	90.0	90.0	90.0	90.0
					Mean =	88.8	90.0	90.0	91.3
11	Paraquat 250	1.2	L/ha	A	109	90.0	90.0	90.0	90.0
	Envirowet	100	mL/100 L	A	203	90.0	85.0	90.0	90.0
					313	80.0	85.0	85.0	85.0
					408	95.0	85.0	90.0	95.0

				Mean =	88.8	86.3	88.8	90.0
12	Paraquat 250	1.2L/ha	A	112	90.0	90.0	90.0	90.0
	Axiwetta	100mL/ha	A	204	80.0	90.0	90.0	75.0
				309	90.0	90.0	90.0	90.0
				401	85.0	85.0	90.0	90.0
				Mean =	86.3	88.8	90.0	86.3
13	Paraquat 250	1.2L/ha	A	107	85.0	90.0	90.0	95.0
	LI700	250mL/ha	A	211	90.0	95.0	95.0	95.0
				304	90.0	85.0	85.0	90.0
				413	90.0	90.0	90.0	90.0
				Mean =	88.8	90.0	90.0	92.5

Appendix iii - Weather data

2024 rainfall data - Gunnedah Airport AWS, NSW

Observations were drawn from Gunnedah Airport AWS {station 55202}.



2024 daily rainfall data - Gunnedah Airport AWS, NSW.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.6		0.2			64.0	3.4					
2	0.2					7.0	0.6					
3			0.4	5.6		10.8						
4												
5	6.8			24.2	9.2							
6		0.2		14.6		0.6						
7		11.4		0.2		0.2						
8						2.0						
9	2.6											
10	0.2					0.2						
11	14.6				9.2							
12	0.2				6.8							
13					0.4							
14												
15		5.4			0.2	5.0						
16		4.0				1.8						
17		0.4		0.2								
18	18.8		4.6	12.2								
19	4.0	1.6	4.0	6.2		0.2						
20		0.2		0.2								
21			0.4									
22												
23		4.4										
24		1.8										
25						0.2						
26						0.2						
27												
28												
29												
30						1.6						
31	1.0											

Summary statistics												
2024 monthly total	49.0	29.4	9.6	63.4	25.8	93.8						
2024 cumulative total	49.0	78.4	88.0	151.4	177.2	271.0	271.0	271.0	271.0	271.0	271.0	271.0
Long term monthly median	37.6	49.2	45.4	16.6	27.2	36.4	23.8	26.9	30.6	50.4	48.8	67.0
Long term cumulative median	37.6	86.8	132.2	148.8	176.0	212.4	236.2	263.1	293.7	344.1	392.9	459.9

2024 maximum & minimum temperature data - Gunnedah Airport AWS, NSW

Observations were drawn from Gunnedah Airport AWS {station 55202}.

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec	
Date	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	16.3	34.9	21.3	37.4	20.8	40.3	19.0	31.5	14.2	22.1	14.0	14.9	8.1	16.8										
2	18.6	35.2	19.6	40.3	21.9	37.1	15.4	28.4	10.2	24.8	10.0	16.9	8.5											
3	18.6	35.9	21.2	40.8	19.0	34.6	9.2	28.9	9.0	24.8	5.1	15.5												
4	19.6	37.9	20.0	40.1	12.2	35.4	16.4	22.3	12.7	18.1	2.1	15.5												
5	19.9	33.3	23.4	37.4	17.1	33.8	15.6	18.5	9.6	21.2	3.9	13.2												
6	17.4	33.5	23.1	28.6	17.7	34.1	13.4	26.3	7.8	23.8	4.5	15.4												
7	19.3	32.8	18.5	26.6	18.9	36.0	10.8	27.2	10.5	24.1	4.4	12.0												
8	22.2	28.0	17.8	25.4	17.4	34.4	11.2	27.4	8.1	23.8	8.3	14.1												
9	19.8	35.1	18.4	32.2	16.5	34.6	9.0	26.0	10.2	25.3	5.5	17.7												
10	19.9	34.8	18.2	31.0	15.3	33.7	7.2	23.6	13.8	24.7	1.5	17.2												
11	20.9	36.6	17.1	34.5	16.4	35.2	5.0	25.9	13.1	17.1	0.5	17.2												
12	20.3	35.3	17.9	35.1	14.4	35.5	9.6	27.3	11.5	20.4	4.9	19.6												
13	19.2	36.5	18.5	34.8			8.8	27.9	8.2	19.0	-0.1	14.6												
14	21.2	35.6	17.8	36.4		36.4	9.3	28.4	7.6	23.0	3.0	14.9												
15	18.8	35.3	19.4	35.0	20.1	32.5	11.6	28.8	5.8	23.5	4.1	13.8												
16	18.6	32.6	19.2	35.0	16.7	30.2	14.6	29.5	7.9	24.1	4.8	15.8												
17	18.4	34.6	18.8	34.1	20.4	29.1	13.1	28.7	8.0	23.7	-0.3	16.1												
18	20.7	32.3	19.5	35.1	18.4	27.0	11.6	21.0	3.2	17.6	-0.2	14.8												
19	12.1	33.5	17.9	32.1	17.0	34.1	5.3	21.5	4.5	18.8	-1.6	15.0												
20	15.9	37.1	15.1	32.4	18.0	27.2	13.2	22.0	-1.4	19.2	3.6	12.6												
21	21.4	39.4	17.6	34.6	15.0	28.5	12.9	25.2	5.5	20.9	4.5	17.8												
22	19.2	41.5	21.2	36.8	11.3	29.9	9.7	26.0	5.2	21.3	-1.1	14.5												
23	18.3	35.2	19.0	38.0	16.4	26.2	10.5	26.4	1.8	20.8	0.7	17.5												
24	17.6	37.5	20.9	34.2	16.3	25.0	14.5	26.7	3.4	19.9	0.0	17.6												
25	20.2	40.0	17.2	34.8	10.5	31.3	8.5	22.4	6.1	22.1	2.1	19.3												
26	19.9	39.4	18.6	37.5	12.0	33.0	7.2	24.3	6.1	22.5	3.9	20.8												
27			20.7	35.7	12.9	33.2	10.1	25.1	3.6	22.2	0.6	18.0												
28			22.0	37.2	17.2	32.9	11.6	26.2	4.3	23.0	-1.1	18.1												
29			22.1	39.5	16.7	31.8	9.9	26.5	6.3	23.8	0.9	20.7												
30	22.2	36.9			16.1	32.3	11.4	24.7	4.7	23.9	8.4	17.6												
31	21.4	36.8			13.4	32.0			12.5	23.3														

Summary statistics

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Min/Max	12.1	41.5	15.1	40.8	10.5	40.3	5.0	31.5	-1.4	25.3	-1.6	20.8	8.1	16.8										
2024 monthly mean	19.2	35.6	19.4	34.9	16.4	32.6	11.2	25.8	7.5	22.0														
Longterm monthly mean	18.6	34.6	17.9	33.1	15.5	30.3	10.8	26.4	5.6	21.7	3.7	18.0	2.0	17.5	2.5	19.6	5.8	23.6	10.0	27.5	14.1	30.4	16.4	32.4

Appendix iv - Photographs

Photographs below depict the trial site at application and at the end of the trial.

Photograph 1

The trial site one day after application A, 16-May-2024 (1 DA-A).

Photograph 2

Weeds one day after application A, 16-May-2024 (1 DA-A).

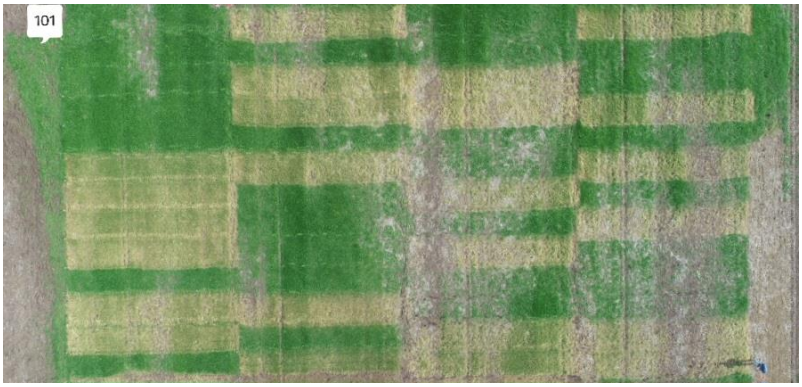
Photograph 3

Weeds one day after application A, 16-May-2024 (1 DA-A).

Photograph 4

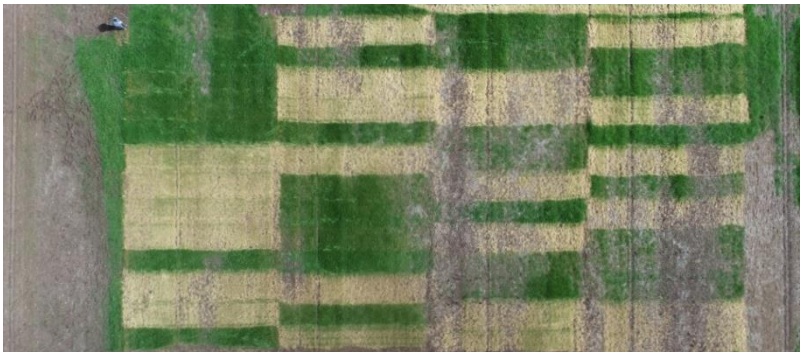
The trial site at trial completion, 18-Jun-2024, (34 DA-A).

Photographs below are drone images of the trial site.



Photograph 5

Drone image of the trial site (plot 101 in top left corner), 18-May-2024, (3 DA-A).



Photograph 6

Drone image of the trial site (plot 101 in top left corner), 25-May-2024, (10 DA-A).

Photograph 7

Drone image of the trial site (plot 101 in top left corner), 30-May-2024, (15 DA-A).

Photograph 8

Drone image of the trial site (plot 101 in top left corner), 18-Jun-2024, (34 DA-A).