Seed&Field

Technical Report

Efficacy of a range of pre- emergent herbicide products in a commercial onion planting in Rakaia, New Zealand.

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Summary

A field trial was conducted during spring 2024 to assess the effect of various pre-emergent herbicides on weed control and crop safety on an onion crop (cv. Perez) in Rakaia, New Zealand. The results indicate that Stomp Xtra, Goltix, and Frontier-P are effective at controlling the weed species present, with Goltix shown to be particularly effective for the control of Shepherds Purse (*Capsella bursa-pastoris*). No crop damage was noted for any of the treatments included in this study. Goltix does not currently have a label recommendation for onions. Frontier-P currently has a label recommendation as a post crop emergence application.

Method

Experimental site and application details

An experimental area was established within a commercial onion planting of the cv. Perez in Rakaia, New Zealand. The crop was seeded on the 13th of August, 2024, and no pre-emergent herbicide was applied to the experimental area. The experiment was laid out in a randomised complete block design (RCBD) with four treatment replicates. A total of 11 treatments were included in the experiment (including an untreated control) (Table 1). Plots were one bed (1.72m) wide and 7m in length. Pre-emergent herbicide applications were made on the 21st of August 2024 and were applied using a CO2 powered plot sprayer using 11002 AITTJ60 teejet nozzles spaced at 30cm. The sprayer was calibrated to apply a water volume equivalent to 400L/Ha. No contact herbicides were made to the experimental area, all other growing practices were conducted as per the commercial crop.

Herbicide efficacy was assessed on the 6th of November, 77 days after treatment applications were made. Weed species present were identified and counted from within a one bed metre sampling area within each plot. Weed control efficiency was calculated based on the number of weeds present and was calculated using the formula below:

$$WCE(\%) = \ (WDc - WDt)/WDc \ \times 100$$

WCE = Weed control efficiency

WDc = Weed population of the untreated control

WDt = Weed population of the treated plot

Statistical analysis

Data were analysed using a 95% confidence interval. Analyses of variance (ANOVA) were computed using the statistical software ARM. Treatment means were separated using Duncans new multiple range test. As the LSD is computed using transformed data, comparisons of means should rely on the letters of separation, rather than the LSD value.

Table 1: Pre-emergent herbicide treatment details.

Trt	Product name	Active Ingredient	Rate/ Ha
1	Untreated	-	-
2	Stomp Xtra	Pendimethalin	1L
3	Stomp Xtra	Pendimethalin	2L
4	Ramrod	Propachlor	10L
5	Ethomate	Ethofumesate	2L
6	Ethomate	Ethofumesate	4L
7	Chloronion	Chloridazon	2L
8	Goltix	Metimitron	3L
9	Frontier-P	Dimethenamid + Polymeric amine phosphate	300ml
10	Stomp Xtra + Ethomate + Chloronion	Pendimethalin + Ethofumesate + Chloridazon	1L + 1.5L + 1.5L
11	Stomp Xtra + Ethomate + Chloronion + Backrow Max	Pendimethalin + Ethofumesate + Chloridazon + Paraffinic petroleum oil	1L + 1.5L + 1.5L + 400ml

Results

Crop Safety

No crop injury was observed at any time before the assessment (85 days after application). This will continue to be monitored as the season progresses.

Herbicide efficacy

The predominant weed species identified within the block was Shepherds Purse (*Capsella bursa-pastoris*), with large populations of mature plants present in the untreated control plots. Nettle (*Urtica urens*) and Fathen (*Chenopodium album*) were also common throughout the trial area. Twin cress (*Lepidium didymium*), Cleavers (*Galium aparine*), and Groundsel (*Senecio vulgaris*) were also present in low numbers.

Treatments 4 (Ramrod 10L/ha), 5 (Ethomate 2L/ha), 6 (Ethomate 4L/ha), and 7 (Chloronion 2L/ha) did not differ significantly from the untreated control for total weed population, or for any of the individual weed species identified in the trial area.

Treatments containing Stomp Xtra (Treatments 2, 3, 10, 11) had total weed populations that were significantly lower than the untreated control. With treatment 3 (Stomp Xtra 2L/ha) also showing a significantly lower population of both Shepherds Purse and Nettle when compared to the untreated control. There was a non-significant trend indicating that increase rates of Stomp Xtra resulted in improved weed control. At this site, Backrow Max did not appear to increase weed control efficacy.

Treatment 8 (Goltix 3L/ha) and treatment 9 (Frontier-P 300ml/ha) both had a significantly lower total weed population, as well as a significantly lower Shepherds Purse population compared to the untreated control. The Nettle population was not significantly different from the untreated control for either of these two treatments.

Table 2: Effect of various pre-emergent herbicide treatments on the predominant weed populations in a commercial onion planting in Rakaia, New Zealand (presented as weed population per bed metre).

Trt	Shepards Purse	Nettle	Total weed population	WCE (Shepards Purse) (%)	WCE (Total) (%)
1	30.5 ab	3.1 ab	44.9 a	0.00	0.00
2	18.8 bcd	0.6 bc	23.6 bcd	38.36	47.44
3	18.2 cd	0.0 c	21.9 cd	40.33	51.22
4	33.8 a	2.8 ab	40.9 ab	0.00	8.91
5	25.2 abc	1.7 abc	33.6 a-d	17.38	25.17
6	27.6 abc	3.0 ab	39.4 abc	9.51	12.25
7	33.0 a	8.1 a	49.3 a	0.00	0.00
8	4.3 e	1.5 bc	17.8 d	85.90	60.36
9	9.2 de	1.0 bc	18.3 d	69.84	59.24
10	18.5 bcd	0.0 c	23.0 bcd	39.34	48.78
11	19.9 bcd	1.9 abc	26.0 bcd	34.75	42.09
LSD (p=0.05)	10.65	2.10 –6.04	16.68	-	-
SD	7.24	5.61t	11.35	-	-
CV	3.33	77.78t	36.86	-	-
Shapiro-Wilk^	0.9756	0.9707	0.9872	-	-
P(Shapiro-Wilk)^	0.6138	0.4623	0.949	-	-
Replicate F	2.675	7.415	1.934	-	-
Replicate Prob(F)	0.0735	0.0014	0.1551	-	-
Treatment F	6.818	2.803	3.937	-	-
Treatment Prob(F)	0.0001	0.0224	0.0039	-	-

*means followed by the same letter do not differ significantly (p=0.05, Duncans New MRT)

t= mean descriptions are reported in transformed data units, and are not de-transformed

^ calculated from residual

Further Work

Stomp Xtra, Goltix, and Frontier-P showed good efficacy toward controlling the predominant weed species that were present at this site. Of these products, only Stomp Xtra has a label registration for use as a pre-emergence herbicide. Further work should look to elucidate the efficacy and crop safety of these products across a range of conditions, onion varieties, and weed species.

Appendix

Appendix i- Weather data

Date	August			September			October			November		
	Max (°C)	Min (°C)	Rainfall (mm)	Max (°C)	Min (°C)	Rainfall (mm)	Max (°C)	Min (°C)	Rainfall (mm)	Max (°C)	Min (°C)	Rainfall (mm)
1	-	-	-	20.6	5.2	0	14.7	6.8	0	21.2	4.5	0
2	-	-	-	22.4	13.3	0	19.1	7.4	10.8	18.9	-0.5	0.6
3	-	-	-	17.6	3.5	7.6	10.3	7.3	7.2	12.2	-0.5	0
4	-	-	-	12.5	3	0	14.4	8.5	1	23.9	6.6	0
5	-	-	-	17.5	3	0.2	16.6	4.3	0.2	16.1	9.2	0
6	-	-	-	20.8	9.6	0	13.8	4.3	0.2	20.3	9.8	0
7	-	-	-	24.6	1.9	0.2	17.4	5.6	0	-	-	-
8	-	-	-	14.9	3.1	0	22	4.7	0	-	-	-
9	-	-	-	17.6	6.6	0	16.9	0.5	0	-	-	-
10	-	-	-	16.9	0.7	3.2	12.9	0.5	0	-	-	-
11	-	-	-	16.2	2.9	0	21.8	3.9	0	-	-	-
12	-	-	-	20.7	6.3	1	22.4	4.1	4.2	-	-	-
13	11.3	-0.9	0.2	8.1	5.6	16.2	10.7	0.4	3	-	-	-
14	16.8	0.3	0	9.5	3.8	0.6	14	0.7	1.8	-	-	-
15	13.6	4	0	12.2	5	0.2	10.2	0.2	0.2	-	-	-
16	11.8	4.4	0	10.4	2.8	4.2	13.7	0.3	0	-	-	-
17	15.2	6.7	12.6	9.5	-0.5	0.2	15.6	7.3	0	-	-	-
18	7.2	-0.3	16.6	17.6	0.5	0	14.8	7.8	0.4	-	-	-
19	8.4	-3.3	0	19	0.7	0.2	17.6	8	0	-	-	-
20	13.4	-0.9	0.2	17.8	1.7	0	19.3	8	0	-	-	-
21	16.6	1.1	0	16.6	4.1	0	22.1	9.6	0	-	-	-
22	17.7	1.8	0	19.4	3.8	0	13.8	9.6	0	-	-	-
23	16.1	3.8	1.8	17.7	6.9	0	27.3	9.9	0	-	-	-
24	18.7	10.2	0	18.1	1.3	0	23	14	0.2	-	-	-
25	15.6	5.9	6.4	15.2	2.5	0	20.1	7.7	34.4	-	-	-
26	9.4	6.1	1	23.3	2.7	6	8.5	4.3	24.8	-	-	-
27	15.8	3.9	0.2	13.4	-1.3	0.2	14.1	6.4	0	-	-	-
28	17.9	4.8	0	15	0.4	0	17.3	3.9	0	-	-	-
29	19.3	5.4	0	17.7	3	0	15.7	5	1.8	-	-	-
30	17	6.2	0	17.6	3.6	0	19.4	5.8	0	-	-	-
31	19.7	5.3	4.2	-	-	-	19.3	4.7	0	-	-	-

Appendix ii- Photograph- trial site layout