Seed&Field

Technical Report

Efficacy of a range of pre- emergent herbicide products in a commercial onion planting in Matamata, 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. The results indicate that Dacthal was the most effective product at controlling the predominant weed species in the field (*Polygonum aviculare* - wireweed). Treatments containing Stomp Xtra were also effective at controlling the weed species present. Ethomate and Ramrod appeared to offer no control of wireweed in this experiment. Chloronion treatments showed a trend toward offering some level of wireweed control although this was not statistically significant. No crop damage was noted for any of the treatments included in this study.

Method

Experimental site and application details

An experimental area was established within a commercial onion planting of the cv. Rubillion in a known high pressure wireweed block in Matamata. The crop was seeded on the 5th of September 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 10 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 12th of September 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 24th October, 42 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	500ml
3	Stomp Xtra + Backrow Max	Pendimethalin + Paraffinic petroleum oil	500ml + 400ml
4	Stomp Xtra	Pendimethalin	1L
5	Ethomate	Ethofumesate	1.5L
6	Ethomate	Ethofumesate	6L
7	Dacthal	Chlorthal-Dimethyl	12kg
8	Ramrod	Propachlor	10L
9	Chloronion	Chloridazon	1.5L
10	Ethomate + Chloronion	Ethofumesate + Chloridazon	1.5L + 1.5L

Results

Crop Safety

No crop injury was observed at the time of assessment (42 days after application). This will continue to be monitored as the season progresses.

Herbicide efficacy

The predominant weed species identified within the block was wireweed, with large populations present in the untreated control plots (average of 164.4 plants per bed metre). Twin cress (*Lepidium didymium*) was also present throughout the trial area, with other weeds (*Anthemis cotula* -stinking mayweed, *Sonchus asper* -prickly sow thistle, *Solanum nigrum* -black nightshade) present in insignificant numbers.

Treatments 5 (Ethomate 1500ml/ha), 6 (Ethomate 6000ml/ha), 8 (Ramrod 10000ml/ha), 9 (Chloronion 1500ml) and 10 (Ethomate 1500ml/ha + Chloronion 1500ml/ha) did not differ significantly from the untreated control for either wireweed or total weed population (Table 2).

Treatments containing Stomp Xtra (treatments 2,3,4) all had significantly lower wireweed and total weed populations than the untreated control, and treatments 5, 6, 8, 9, and 10. There was a non-significant trend toward increased rates of Stomp Xtra showing improved weed control efficiency. The addition of Backrow Max to Stomp Xtra appeared to result in increased weed control efficiency compared to Stomp Xtra alone.

Dacthal (treatment 7) was the most effective herbicide treatment at controlling wireweed, having significantly lower wireweed and total weed populations than all other treatments.

Comparisons between treatment 5 (Ethomate 1500ml), treatment 9 (Chloronion 1500ml), and treatment 10 (Ethomate 1500ml + Chloronion 1500ml) appeared to indicate that Chloronion was having some efficacy, and was controlling wireweed to some extent, with treatment 9 showing a significantly lower wireweed, and total weed population compared to treatment 5.

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

Trt	Wireweed	Twincress	Total weed	WCE (Wireweed) (%)	WCE (Total) (%)
1	164.4 ab	7.0 -	177.0 ab	0	0
2	71.5 c	6.4 -	80.6 c	56.51	54.46
3	60.7 c	2.1 -	66.8 c	63.08	62.26
4	54.5 c	2.2 -	59.6 c	66.85	66.33
5	227.9 a	2.1 -	232.1 ab	0	0
6	233.8 a	0.8 -	235.9 a	0	0
7	19.8 d	0.6 -	21.4 d	87.96	87.91
8	229.5 a	0.6 -	230.6 ab	0	0
9	157.1 b	3.5 -	164.9 b	4.44	6.84
10	163.9 ab	2.3 -	169.1 ab	0.30	4.46
LSD (p=0.05)	25.77-64.64	-	25.59-63.12	-	-
SD	1.56t	10.71t	1.51t	-	-
CV	13.92t	120.73t	13.19t	-	-
Shapiro-Wilk^	0.9342	0.9722	0.958	-	-
P(Shapiro-Wilk)^	0.0515	0.5422	0.2418	-	-
Replicate F	0.628	0.515	0.779	-	-
Replicate Prob(F)	0.6059	0.6764	0.5200	-	-
Treatment F	34.025	0.795	31.614	-	-
Treatment Prob(F)	0.0001	0.6246	0.0001	-	-

*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

The crop will continue to be monitored for any crop safety issues throughout the remainder of the season. Given the recent EPA ruling around the use of chlorthal-dimethyl, future trial work should focus on the use of alternative products. Crop safety and weed control efficiency of increased pendimethalin application rates should be a focus, as well as further validating the use of Backrow Max as part of the tank mix. The efficacy of Chloronion also needs to be further validated both as a stand-alone product, and in tank mixes with Stomp Xtra. There are also several products not currently registered for use in onions that could be assessed in future work.

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Appendix

Appendix i- Weather data

Date	September			October		
	Max (°C)	Min (°C)	Rainfall (mm)	Max (°C)	Min (°C)	Rainfall (mm)
1	-	-	-	18.4	10.2	0
2	-	-	-	17.6	14.2	23.4
3	-	-	-	18.2	3.8	0.4
4	-	-	-	18.3	5.6	0
5	-	-	-	19	11.8	3
6	-	-	-	18.4	13.6	41
7	-	-	-	19.1	9.3	2.6
8	-	-	-	18.8	13.4	5
9	-	-	-	16.5	4.3	0.8
10	-	-	-	15.9	9.1	0.4
11	-	-	-	17	4.1	0.4
12	13.6	4.1	0	17.7	7.6	0
13	15.7	10.3	0	17.5	10.4	6.8
14	17.9	11.2	24.2	16.4	3.4	1.8
15	16.4	8.2	0	18.8	6.3	0
16	13.9	5.3	0.4	18.9	4.8	0
17	11.6	-0.4	7.8	19.9	9.1	0
18	13.5	3.4	0.4	18.5	7.2	0
19	16	9.2	11.4	17	7.8	0
20	13	8.4	3.4	18.9	10	0
21	17.1	3.5	0	20.7	5.9	0
22	19.6	8.3	0	20.9	12.3	0
23	17.3	8.2	0	20.9	13.1	0
24	16.8	6.6	0.2	20.3	13.3	0
25	17.7	4.1	0	-	-	-
26	15.9	8.4	4.2	-	-	-
27	14.6	1.2	0.4	-	-	-
28	16.4	5.8	0	-	-	-
29	16.8	3.7	0	-	-	-
30	18.8	5.6	0	-	-	-
31	-	-	-	-	-	-

Appendix ii- Photograph 1- Trial site overview

Appendix iii- Photograph 2- Untreated plot

Appendix iv- Photograph 3- Dacthal treated (treatment 7) plot

Appendix v- Photograph 4- Stomp Xtra (500ml/ha) treated (treatment 2) plot

Appendix vi- Photograph 5- Stomp Xtra (1L/ha) treated (treatment 4) plot