

Effect of varying lotril rates on onion population and crop safety in a commercial planting in Pukekohe, New Zealand

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Summary

A field trial was conducted during winter 2025 to assess the crop safety of a single application of lotril at various rates on a commercial onion crop at the flag leaf growth stage. The results indicate that lower lotril rates (200–600 ml/ha single, 200 ml/ha double) maintained onion populations and resulted in only minor to moderate crop damage. High-rate double applications (≥ 800 ml/ha) caused severe crop damage and reduced onion stand populations, highlighting a clear lack of crop safety at these levels.

Method

Experimental site and application details

An experimental area was established within a commercial onion planting of the cv. Seed & Field ELK in Pukekohe. The crop was seeded on the 29th of May, and no contact herbicides had been applied to the block prior to the trial commencing. 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. Herbicide applications were made on the 18th of June 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. Applications were made as either a single, or a double pass (eg: lotril 200ml as a double application is 200ml/ha equivalent applied in one direction, with the same rate then immediately applied in the reverse direction). No other herbicides were made to the experimental area; all other growing practices were conducted as per the commercial crop. Onion population and crop safety were assessed on the 14th of July, 26 days after application.

Statistical analysis

Data was analysed using a 95% confidence interval. Analyses of variance (ANOVA) were computed using the statistical software ARM. Treatment means were separated using Tukeys 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: Herbicide treatment details

Treatment	Treatment Name	Active Ingredient	Rate (ml/ha)
1	Untreated Check	-	
2	lotril	loxynil 240 g/L	200
3	lotril	loxynil 240 g/L	400
4	lotril	loxynil 240 g/L	600
5	lotril	loxynil 240 g/L	800
6	lotril	loxynil 240 g/L	1000
7	lotril (double)	loxynil 240 g/L	200
8	lotril (double)	loxynil 240 g/L	400
9	lotril (double)	loxynil 240 g/L	600
10	lotril (double)	loxynil 240 g/L	800
11	lotril (double)	loxynil 240 g/L	1000

Results

Onion plant populations were not significantly affected by most lotril treatments when compared with the untreated check. Populations remained statistically similar across treatments up to 600 ml/ha single and 200 ml/ha double applications. However, higher double applications (≥ 800 ml/ha) resulted in significantly reduced onion populations, with the lowest plant population recorded at 1000 ml/ha double (114 plants/2m bed). Crop damage increased with increasing lotril rate and was significantly greater in higher-rate treatments. The untreated control and the lowest rate (200 ml/ha) both showed negligible crop damage (0–5%). Crop damage became moderate at mid-range rates (400–600 ml/ha single and 200–400 ml/ha double, ranging 13.8–40%), and severe at the higher double rates (≥ 800 ml/ha, 68.8–77.5%).

While onion population remained relatively unaffected at lower rates, crop damage data clearly indicate that higher lotril rates (particularly in double applications) caused substantial crop damage. Treatments of 800–1000 ml/ha double were significantly different from all lower rates, showing the strongest negative impact on crop safety.

In summary, lower lotril rates (200–600 ml/ha single, 200 ml/ha double) maintained onion populations and resulted in only minor to moderate crop damage. High-rate double applications (≥ 800 ml/ha) caused severe crop damage and reduced onion stand populations, highlighting a clear lack of crop safety at these levels.

Table 2: Effect of varying rates of lotril on onion population and damage to the crop

Treatment	Onion Population	Crop Damage
Untreated Check	177.3 a	0.0 f
lotril (200 ml/ha)	170.8 a	5.0 ef
lotril (400 ml/ha)	169.0 a	13.8 def
lotril (600 ml/ha)	171.8 a	21.3 def
lotril (800 ml/ha)	153.3 ab	28.8 cde
lotril (1000 ml/ha)	164.0 ab	30.0 cde
lotril (200 ml/ha double)	164.8 ab	17.5 def
lotril (400 ml/ha double)	151.8 ab	40.0 cd
lotril (600 ml/ha double)	146.5 abc	48.8 bc
lotril (800 ml/ha double)	127.3 bc	68.8 ab
lotril (1000 ml/ha double)	114.0 c	77.5 a
Tukey's HSD P=.05	37.59	27.10
Standard Deviation	15.29	11.03
CV	9.84	34.53
Grand Mean	155.48	31.93
Levene's F [^]	1.611	2.557*
Levene's Prob(F)	0.147	0.021*

Means followed by same letter or symbol do not significantly differ (P=.05, Tukey's HSD).

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

- Adjusted means
- [^]Calculated from residual.

Appendix
Appendix i- Weather data

Date	June			July		
	Max (°C)	Min (°C)	Rainfall (mm)	Max (°C)	Min (°C)	Rainfall (mm)
1	17.9	8.4	0.3	15.6	5.2	0
2	19.3	8.8	0.7	17.2	8.2	6.8
3	18.7	9.4	1.2	17	14.5	30.5
4	18.2	14.3	45.4	21.1	13.4	26
5	17.9	9.2	10.8	18.7	8.2	8.7
6	13.8	5.2	18.4	15.6	3.9	0
7	14.1	3.6	0	14.3	5	0
8	15	6.8	17.9	14.7	8.2	0
9	19	6.4	0.3	14.6	10.1	2.2
10	16.5	9.1	44.5	15.1	12.9	4.8
11	19.7	12.4	19	14.7	9	54.6
12	16.5	10.7	16.5	16.5	8.4	6.6
13	16.2	8.9	21.7	14.1	5.3	2.3
14	18.2	8.4	0.4	17.6	6.8	1.2
15	12.6	5.6	0.3	15.5	9.5	12.3
16	15.1	5.5	0	16.6	7.9	6.4
17	15.7	3.2	0.2	14	8.2	15.4
18	17.3	3.9	0	14.4	3.5	0
19	17.7	9.9	17.4	16.6	5.5	0.7
20	18.1	7.2	4.5	13.8	1.8	0
21	16.8	3	0	-	-	-
22	15.5	8.7	0.6	-	-	-
23	18.1	6.7	0.1	-	-	-
24	17.4	3.6	0	-	-	-
25	16.9	8.9	0.3	-	-	-
26	17.9	15.3	9.6	-	-	-
27	15.9	12.5	24.6	-	-	-
28	15.3	11.6	18.9	-	-	-
29	16.3	8.6	2.4	-	-	-
30	16.6	6.5	0.1	-	-	-

Appendix ii- Photograph 1- Trial site overview.



Appendix iii- Photograph 2- Onion growth stage at time of herbicide application.

