

L4 Herbicide Tolerance, MRZ Wimmera (Pimpinio), Victoria

Aim

To understand the genetic control in lentils relating to tolerance to the range of sulfonyl urea herbicides.

Treatments

- Varieties: PBA HurrricaneXT and CIPAL1208 (Tolerant to imazethapyr, but with potential differential responses to the sulfonylurea 'su' herbicides), PBA Flash (Control, Intolerant).
- Herbicides: Twenty two herbicide treatments were applied and compared with an untreated 'control'. Three sulfonylurea herbicides (chlorsulfuron, metsulfuron-methyl, triasulfuron) and one Group I (clopyralid) were applied at four rates, and the imazadolinones (imazethapyr and imazapyr) at a high rate post-sowing pre-emergent (PSPE). Chlorsulfuron was also applied 6 weeks pre-sowing as a residual application at the four rates to mimic potential residual concentrations in soil (Table 1). *Note: All herbicide treatments used in this trial are not registered for use*

Other Details

- Sowing date: 13 May
- Row Spacing: 30cm
- Stubble: Standing (approx. 30cm tall), sown inter-row
- Fertiliser: MAP + Zn @ 80 kg/ha at sowing
- Plant Density: 120 plants/m²
- Soil Type: Alkaline Black cracking clay (Table 1 in Trial L2 above)

Results and Interpretation

- Key Message: PBA HurrricaneXT has improved tolerance to the sulfonylurea herbicides relative indicating significant benefits where residues may be an issue in cropping systems.
- Herbicide Damage – Trends in herbicide damage symptoms were similar to Curyo. Moderate to severe symptoms, resulting in crop death for many treatments were observed for all herbicide treatments applied to the intolerant genotype PBA Flash (Table 1).
- CIPAL1208 showed a significant damage with application imazapyr, but not imazethapyr and all SU's and clopyralid caused significant damage at most application rates. Symptoms generally increased with increasing application rate and within the SU's chlorsulfuron caused the greatest damage. In comparison, PBA HurrricaneXT only had significant damage scores in the imazapyr treatment and the 2 higher rates of clopyralid. Unlike Curyo the highest application rate of chlorsulfuron applied PSPE caused no significant crop damage. When plants were not killed by the initial herbicide application, in many cases, a level of recovery was observed throughout the season. (Table 1).
- Grain Yield – All results need to be treated with caution due to the extreme climatic conditions during spring (low rainfall and frost, see above). Yields in the 'Nil' treatment were only 0.6 t/ha for PBA HurrricaneXT, 0.67 t/ha for PBA Flash and 0.33 t/ha for CIPAL1208. Unlike Curyo, even the low rates of SU's (except x0.25 rate of metsulfuron-methyl) caused significant yield loss (Table 2). A similar response was observed for CIPAL 1208, except that it had no significant yield loss with imazethapyr. Conversely PBA HurrricaneXT displayed no significant yield loss in any herbicide treatment except clopyralid at the highest rate.
- Grain Weight – Within the tolerant lines there were no major impacts of the various herbicide treatments on grain weight.

Table 1. The effect of various Group B herbicide treatments and one Group I on visual damage score (0 – no damage, 100 – complete plant death) recorded July 14 of the imidazolinone tolerant lentil variety PBA HurricaneXT and genotypes, CIPAL1208, in comparison with an intolerant genotype, PBA Flash at Pimpinio, 2014. Significant damage scores have been shaded.

Herbicide	App Rate	CIPAL1208	PBA Flash	PBA HurricaneXT
Nil	x0	0	0	0
Imazethapyr	x4	10	80	0
Imazapyr	x4	35	90	30
Chlorsulfuron_res	x0.125	45	50	0
	x0.25	55	70	0
	x0.5	70	75	0
	x1	80	85	0
Chlorsulfuron_pspe	x0.125	60	70	0
	x0.25	70	80	0
	x0.5	80	80	0
	x1	90	90	5
Metsulfuron-methyl	x0.125	25	50	0
	x0.25	15	45	0
	x0.5	65	65	0
	x1	55	65	5
Triasulfuron	x0.125	15	50	0
	x0.25	50	65	0
	x0.5	50	50	0
	x1	85	80	15
Clopyralid	x0.125	35	45	0
	x0.25	5	30	0
	x0.5	60	55	55
	x1	100	100	100

Table 2. The effect of various Group B herbicide treatments and one Group I on grain yield (t/ha) of the imidazolinone tolerant lentil variety PBA HurricaneXT and genotypes, CIPAL1208, in comparison with an intolerant genotype, PBA Flash at Pimpinio, 2014.

Herbicide	App Rate	CIPAL1208	PBA Flash	PBA HurricaneXT
Nil	x0	0.33	0.67	0.60
Imazethapyr	x4	0.35	0.00	0.69
Imazapyr	x4	0.26	0.00	0.57
Chlorsulfuron_res	x0.125	0.30	0.00	0.63
	x0.25	0.30	0.00	0.55
	x0.5	0.39	0.00	0.63
	x1	0.33	0.00	0.67
Chlorsulfuron_pspe	x0.125	0.36	0.19	0.85
	x0.25	0.39	0.17	0.73
	x0.5	0.41	0.00	0.52
	x1	0.20	0.00	0.59
Metsulfuron-methyl	x0.125	0.29	0.31	0.59
	x0.25	0.33	0.50	0.71
	x0.5	0.33	0.22	0.56
	x1	0.40	0.33	0.76
Triasulfuron	x0.125	0.37	0.32	0.70
	x0.25	0.44	0.35	0.73
	x0.5	0.26	0.36	0.80
	x1	0.23	0.00	0.65
Clopyralid	x0.125	0.27	0.14	0.69
	x0.25	0.35	0.54	0.72
	x0.5	0.35	0.49	0.65
	x1	0.00	0.00	0.00

Key Findings and Comments

- Similar to previous seasons the data highlights responses to herbicide treatments can vary between sites. At Curyo we observed significant yield loss in the chlorsulfuron x1 treatment, but no response at Pimpinio. Similar to Curyo, It is important to look at these results with caution as the dry spring conditions limited grain yields and also may have prevented continued uptake of the SU's which could have resulted in larger yield losses, reflective of the crop damage symptoms, similar to that observed in previous seasons in South Australia.