

L9 Herbicide Tolerance, LRZ Southern Mallee (Curvo), Victoria

Aim

To investigate the adaptability of a range of new herbicide tolerant lentil varieties to a range of Group B herbicides.

Treatments

- Varieties: PBA HeraldXT, CIPAL1101, CIPAL1102 (all tolerant), PBA Flash (Control, Intolerant).
- Herbicides: Thirteen herbicide treatments (Group B; ALS inhibitors) encompassing a range of imidazolinones, sulfonylureas and triazolopyrimidines were applied at various application rates and timings in comparison with an untreated control (Table L11.1).

Other Details

- Sowing date: 4 May.
- Row Spacings/Stubble: 30 cm row spacing, inter-row, standing stubble (ST30).
- Fertiliser: MAP + Zn @ 40 kg/ha at sowing.
- Plant Density: 120 plants/m².
- Soil Type: Alkaline Sandy Loam over a heavy clay at about 40-60cm (pH_{H2O} (0-10cm): 7.8; pH_{H2O} (40-60cm): 9.1)

Results and Interpretation

- Key Message: None of the Imi treatments resulted in a significant grain yield loss for the tolerant varieties, and few visual symptoms of crop damage were observed.
- Plant establishment – Imi applied PSPE had no significant impact on establishment of all varieties.

Table L9.1. The effect of various Group B herbicide treatments on visual damage score (1 – no damage, 9 – complete plant death) of the new imidazolinone tolerant lentil varieties, PBA HeraldXT, CIPAL1101 and CIPAL1102 in comparison with an intolerant variety, PBA Flash at Curvo in 2011. Significant damage scores have been shaded.

Herbicide Treatment¹	PBAHeraldXT	CIPAL1101	CIPAL1102	PBA Flash
Nil	1.0	1.0	1.0	1.0
<i>Imidazolinones</i>				
Imi (PSPE) L	1.0	1.0	1.0	5.3
Imi (PSPE) H	1.5	1.3	1.0	6.5
Imi (PEb) L	1.8	1.3	1.3	5.9
Imi (PEb) H	1.5	1.0	1.8	8.3
Imi mix (PEb) L	4.3	2.3	2.6	8.1
Imi mix (PEb) H	4.0	4.0	4.3	9.0
<i>Triazolopyrimidines</i>				
Flumetsulam (PEb) L	1.3	1.3	1.3	2.3
Flumetsulam (PEb) H	1.3	1.0	1.3	1.8
Tri (PEb) L	3.8	4.3	4.8	8.0
<i>Sulfonylureas</i>				
SU-1 (Res) L	1.3	1.3	1.3	5.0
SU-1 (PEb) H	5.0	4.5	5.3	9.0
SU-2 (Res) L	2.0	1.0	1.3	5.2
SU-3 (Res) L	2.0	1.5	2.3	6.5

lsd(P<0.05)HTxVar = 1.4.

1. Herbicide code or active ingredient if registered for use; application time in brackets: PSPE – Post sowing/pre-emergence; PEb – Applied at the 4 node stage of lentil crop growth targeting small broadleaf weeds; Res – Applied 4-6 weeks prior to sowing to mimic residual concentrations; H or L refers to relative application rate.

- Herbicide symptoms – All of the herbicides used caused some visual damage on the intolerant variety PBA Flash (Table L9.1). However, damage from flumetsulam applied at both rates caused only insignificant damage. In the herbicide tolerant varieties, PBAHeraldXT, CIPAL1101 and CIPAL1102, the only treatments to cause significant visual damage were the higher rate of ‘Imi mix’, ‘Tri’ and ‘SU-1’ applied PEb (Table L9.1). All ‘Imi’ and flumetsulam treatments generally caused limited or no symptoms except the low rate of ‘Imi mix’, which caused moderate visual damage in PBA HeraldXT and CIPAL1102.
- Grain Yield – Grain yields for the intolerant variety PBAFlash were generally well related to herbicide damage scores. Most herbicide treatments resulted in a significant grain yield loss, up to 100% for ‘SU-1’ applied PEb (Table L9.2). The tolerant varieties PBAHeraldXT, CIPAL1101 and CIPAL 1102 showed no significant grain yield loss.

Table L9.2. The effect of various Group B herbicide treatments on grain yield (t/ha) of the new imidazolinone tolerant lentil varieties, PBA HeraldXT, CIPAL1101 and CIPAL1102 in comparison with an intolerant variety, PBA Flash at Curyo in 2011. Significant damage scores have been shaded.

Herbicide Treatment ¹	PBAHeraldXT	CIPAL1101	CIPAL1102	PBA Flash
Nil	1.63	2.49	1.95	1.87
<i>Imidazolinones</i>				
Imi (PSPE) L	1.65	1.73	2.18	1.54
Imi (PSPE) H	1.79	2.31	1.96	0.60
Imi (PEb) L	2.11	2.00	1.89	1.65
Imi (PEb) H	1.91	2.26	1.58	0.42
Imi mix (PEb) L	1.50	1.77	1.77	0.50
Imi mix (PEb) H	1.64	2.10	1.60	0.18
<i>Triazolopyrimidines</i>				
Flumetsulam (PEb) L	1.59	2.21	2.34	1.63
Flumetsulam (PEb) H	1.72	1.90	1.67	1.78
Tri (PEb) L	1.70	2.25	2.16	0.64
<i>Sulfonylureas</i>				
SU-1 (Res) L	1.78	2.13	2.12	1.41
SU-1 (PEb) H	1.71	1.80	1.57	0.01
SU-2 (Res) L	0.94	2.17	2.33	0.75
SU-3 (Res) L	1.58	1.99	1.65	0.41

lsd(P<0.05)HTxVar = 0.81.

1. Herbicide code or active ingredient if registered for use; application time in brackets: PSPE – Post sowing/pre-emergence; PEb – Applied at the 4 node stage of lentil crop growth targeting small broadleaf weeds; Res – Applied 4-6 weeks prior to sowing to mimic residual concentrations; H or L refers to relative application rate.

Key Findings and Comments

This trial demonstrates the improvements in tolerance of the new varieties, PBAHeraldXT, CIPAL1101 and CIPAL1102 compared with intolerant commercial variety, PBAFlash. None of the Imi treatments resulted in a significant grain yield loss for the tolerant varieties, despite some minor to moderate visual symptoms of crop damage being observed (eg Imi mix at the higher application rate). In addition, the improved Imi tolerance results in improved tolerance to most sulfonylureas and triazolopyrimidines assessed in these trials. Other research has also found that Imi mix had no impact on nodulation and nitrogen fixation of PBAHeraldXT.

It is important to note that climatic conditions in 2011 were suitable for recovery from earlier damage. This is also supported by the insignificant grain yield loss observed in the intolerant variety in response to Imi applied PEb at a the L rate, despite showing significant crop damage symptoms. Due to the previous summer rainfall there was significant stored moisture that could be accessed and few high or low temperature stress events were experienced during the lentil growth phase. So it will be important to repeat trials in seasons with drier spring conditions to observe the full impact of those herbicides that caused significant visual damage on the tolerant variety, but didn't result in any yield loss.

The introduction of these herbicide tolerant lentils could result in significant farming systems benefits through improved weed control, increased control options in lentil crops and in the previous rotation phase, and decreased pressure on herbicides currently employed for broadleaf weed control in lentil. Earlier this year Pulse Australia was able to gain a 'permit for use' of imazethapyr at the low rate that was used in these trials which, when combined with the additional improved tolerance to flumetsulam and sulfonylureas enables growers to realise the full benefits of the tolerance trait.