Lentil, Herbicide Tolerance (Group C), MRZ Wimmera (Horsham), Victoria

Aim

To investigate the tolerance of a new genotype 'LGPC' with improved tolerance to Group C herbicide to post emergence application of various Group C herbicides and Group C & F mixes in comparison with PBA Jumbo2.

Treatments

Genotypes: PBA Jumbo2 and 'LGPC'
Treatments: See Table 1

Other Site Details

Sowing date	21 May
Plant density (plants/m^2)	120
Stubble height (cm)	Standing (20)
Row Spacing (cm)	36
Fertiliser (kg/ha)[1]	80

1. MAP (9.2, 20.2, 0, 2.7) + Zn (2.5)

Results and Interpretation

- **Key Messages**: PBA Jumbo 2 showed significant herbicide damage and a 38-73% yield loss from application of higher rates of 'HTGpC-E', 'HTGpC-B' and both low and higher rates of 'HTGpC-A', 'HTGpC-C' and 'HTGpC-G'. In contrast, the genotype 'LGPC' showed improved tolerance to post emergence application of various Group C herbicides and Group C & F mixes, and produced biomass and grain yields equivalent to the nil treatment.

- **Establishment and Growth:** Due to a dry start to the season, establishment was very slow and variable. Plant growth throughout the season was impacted by dry seasonal conditions and several frost events during vegetative and reproductive growth stages.

- **Herbicide Damage:** Visual herbicide damage 4 weeks after spraying showed significant interaction between herbicide treatment and variety. Crop damage symptoms from in-crop application of various Group C herbicides and Group C & F mixes included stunting of growth, chlorosis, necrosis and complete plant death. The herbicide damage symptoms were generally more severe in PBA Jumbo2 compared with 'LGPC' (Table 1). PBA Jumbo2 had significant damage from all the herbicide treatments except up to 'r2' of 'HTGpC-D' and 'r2' of 'HTGpC-F' (Table 1). In addition to tolerance to 'HTGpC-D' and 'HTGpC-F', 'LGPC' showed tolerance to application of 'r1' of 'HTGpC-G', up to 'r2' of 'HTGpC-E' and 'r2' of 'HTGpC-H' (Table 1). All other treatments showed significant crop damage, but symptoms were significantly less than PBA Jumbo2.

Table 1. Visual herbicide damage score (0= no damage, 100= plant death) from application of various Group C herbicides and Group C & F mixes to lentil genotypes at the 4 node growth stage at Horsham, Victoria in 2018.

		Herbicide Damage (0-100)		
Herbicide	**Application Rate (gai/ha)**	**PBA Jumbo2**	**'LGPC'**	*Average*
Nil		0	0	*0*
'HTGpC-A'	'r1'	71	13	*42*
'HTGpC-A'	'r2'	94	24	*59*
'HTGpC-A' + Diflufenican	'r1' + 60	95	33	*64*
'HTGpC-B'	'r1'	70	16	*43*
'HTGpC-B'	'r2'	93	18	*55*
'HTGpC-B' + Diflufenican	'r1' + 60	81	19	*50*
'HTGpC-C'	'r1'	93	18	*55*
'HTGpC-C'	'r2'	99	39	*69*
'HTGpC-C' + Diflufenican	'r1' + 60	98	29	*63*
'HTGpC-D'	'r1'	0	1	*1*
'HTGpC-D'	'r2'	0	0	*0*
'HTGpC-D' + Diflufenican	'r1' + 60	28	13	*20*
'HTGpC-E'	'r1'	28	4	*16*
'HTGpC-E'	'r2'	58	6	*32*
'HTGpC-E' + Diflufenican	'r1' + 60	63	19	*41*
'HTGpC-F'	'r1'	3	0	*1*
'HTGpC-F'	'r2'	4	0	*2*
'HTGpC-F' + Diflufenican	'r1' + 60	28	10	*19*
'HTGpC-G'	'r1'	43	8	*25*
'HTGpC-G'	'r2'	84	13	*48*
'HTGpC-G' + Diflufenican	'r1' + 60	86	30	*58*
'HTGpC-H'	'r1'	29	3	*16*
'HTGpC-H'	'r2'	50	8	*29*
'HTGpC-H' + Diflufenican	'r1' + 60	53	19	*36*
Average		*54*	*13*	*34*

Lsd (P<0.05) herbicide x variety = 12; herbicide = 9; variety = 2; CV (%) = 23

- **Biomass at Maturity**: In the nil treatment 'LGPC' produced 15% more biomass than PBA Jumbo2. Only PBA Jumbo2 showed any significant reduction in biomass from the application of Group C herbicides. Both 'HTGpC-A' and 'HTGpC-C'at all application rates and with diflufenican caused significant biomass reduction (Table 2). The high rates of 'HTGpC-E', 'HTGpC-B' and 'HTGpC-G' also caused significant biomass reduction. Despite significant injury from some of the herbicide treatments earlier in the season, 'LGPC' had no significant biomass reduction from any of the herbicide treatments (Table 2). This result demonstrated an ability to recover from herbicide damage.

Table 2. Effect of in-crop application of various Group C herbicides, and Group C & F mixes on biomass at maturity (t/ha) of lentil genotypes at Horsham, Victoria in 2018.

		Biomass @ Maturity (t/ha)		
Herbicide	**Application Rate (gai/ha)**	**PBA Jumbo 2**	**'LGPC'**	*Average*
Nil		1.63	1.85	*1.74*
'HTGpC-A'	'r1'	0.94	1.56	*1.25*
'HTGpC-A'	'r2'	0.92	1.51	*1.22*
'HTGpC-A' + Diflufenican	'r1' + 60	0.55	1.76	*1.16*
'HTGpC-B'	'r1'	1.40	1.74	*1.57*
'HTGpC-B'	'r2'	0.73	1.62	*1.18*
'HTGpC-B' + Diflufenican	'r1' + 60	1.22	1.71	*1.47*
'HTGpC-C'	'r1'	1.03	1.90	*1.47*
'HTGpC-C'	'r2'	0.47	1.93	*1.20*
'HTGpC-C' + Diflufenican	'r1' + 60	0.78	1.82	*1.30*
'HTGpC-D'	'r1'	1.65	1.71	*1.68*
'HTGpC-D'	'r2'	1.83	1.56	*1.70*
'HTGpC-D' + Diflufenican	'r1' + 60	1.77	1.87	*1.82*
'HTGpC-E'	'r1'	1.60	1.78	*1.69*
'HTGpC-E'	'r2'	1.11	1.46	*1.29*
'HTGpC-E' + Diflufenican	'r1' + 60	1.42	1.68	*1.55*
'HTGpC-F'	'r1'	1.87	2.19	*2.03*
'HTGpC-F'	'r2'	1.98	1.77	*1.88*
'HTGpC-F' + Diflufenican	'r1' + 60	1.59	1.67	*1.63*
'HTGpC-G'	'r1'	1.79	2.11	*1.95*
'HTGpC-G'	'r2'	1.11	1.57	*1.34*
'HTGpC-G' + Diflufenican	'r1' + 60	1.19	1.76	*1.48*
'HTGpC-H'	'r1'	2.06	2.06	*2.06*
'HTGpC-H'	'r2'	1.71	1.84	*1.78*
'HTGpC-H' + Diflufenican	'r1' + 60	1.89	2.18	*2.04*
Average		*1.37*	*1.78*	*1.58*

Lsd (P<0.05) herbicide x variety = 0.48; herbicide =0.39; variety = 0.08; CV (%) = 18

- **Grain Yield:** Grain yields of the genotypes were very closely associated with biomass yield at maturity, where treatments with low biomass yield incurred significant yield loss. PBA Jumbo2 incurred 38-73% yield loss from application of higher rates of 'HTGpC-E', 'HTGpC-B' and both low and higher rates of 'HTGpC-A', 'HTGpC-C' and 'HTGpC-G' (Table 3). Likewise, application of low rates of the Group C herbicides except 'HTGpC-H' with 60 gai/ha of diflufenican caused significant yield loss (Table 3). In contrast, 'LGPC' had no significant yield loss from application of all the herbicide treatments (Table 3). However, it is worth noting that there was significant yield loss in 'LGPC' due to seed shattering.

Table 3. Grain yield (t/ha) response of lentil genotypes to in-crop application of various Group C herbicides, and Group C & F mixes at Horsham, Victoria in 2018.

		Grain Yield (t/ha)		
Herbicide	**Application Rate (gai/ha)**	**PBA Jumbo2**	**'LGPC'**	*Average*
Nil		0.37	0.16	*0.27*
'HTGpC-A'	'r1'	0.19	0.14	*0.17*
'HTGpC-A'	'r2'	0.16	0.14	*0.15*
'HTGpC-A' + Diflufenican	'r1' + 60	0.13	0.15	*0.14*
'HTGpC-B'	'r1'	0.29	0.18	*0.24*
'HTGpC-B'	'r2'	0.17	0.12	*0.15*
'HTGpC-B' + Diflufenican	'r1' + 60	0.18	0.16	*0.17*
'HTGpC-C'	'r1'	0.23	0.20	*0.22*
'HTGpC-C'	'r2'	0.10	0.18	*0.14*
'HTGpC-C' + Diflufenican	'r1' + 60	0.15	0.21	*0.18*
'HTGpC-D'	'r1'	0.40	0.17	*0.29*
'HTGpC-D'	'r2'	0.39	0.15	*0.27*
'HTGpC-D' + Diflufenican	'r1' + 60	0.31	0.15	*0.23*
'HTGpC-E'	'r1'	0.30	0.16	*0.23*
'HTGpC-E'	'r2'	0.23	0.13	*0.18*
'HTGpC-E' + Diflufenican	'r1' + 60	0.22	0.18	*0.20*
'HTGpC-F'	'r1'	0.46	0.20	*0.33*
'HTGpC-F'	'r2'	0.40	0.15	*0.28*
'HTGpC-F' + Diflufenican	'r1' + 60	0.29	0.15	*0.22*
'HTGpC-G'	'r1'	0.23	0.19	*0.21*
'HTGpC-G'	'r2'	0.22	0.14	*0.18*
'HTGpC-G' + Diflufenican	'r1' + 60	0.31	0.14	*0.23*
'HTGpC-H'	'r1'	0.47	0.18	*0.33*
'HTGpC-H'	'r2'	0.37	0.18	*0.28*
'HTGpC-H' + Diflufenican	'r1' + 60	0.44	0.20	*0.32*
Average		*0.28*	*0.16*	*0.22*

Lsd (P<0.05) herbicide x variety = 0.10; herbicide =0.08; variety = 0.02; CV (%) = 26