

Combination of Arylex (halauxifen-methyl) + fluroxypyr for broadleaf weed control in winter cereals and fallow

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Summary Pixxaro™ Herbicide[#] with Arylex™ active is a new combination herbicide for the control of broadleaf weeds in wheat, barley and triticale as well as knockdown control of broadleaf weeds, when mixed with glyphosate, in fallow situations.

Pixxaro™ (16.25 g a.e. L⁻¹ halauxifen + 250 g a.e. L⁻¹ fluroxypyr + 16.25 g a.i. L⁻¹ cloquintocet-mexyl) at 200 mL ha⁻¹ gives 100% control of seedling Mexican poppy (*Argemone mexicana* L.) and deadnettle (*Lamium amplexicaule* L.) up to the four leaf stage. Pixxaro™ at 300 mL ha⁻¹ controls seedling flax-leaf fleabane (*Conyza bonariensis* (L.) Cronquist), dense-flowered fumitory (*Fumaria densiflora* DC.), common poppy (*Papaver somniferum* L.) and small-flowered mallow (*Malva parviflora* L.) up to the six leaf stage. Pixxaro™ at 400 mL ha⁻¹ controls seedling common sowthistle (*Sonchus oleraceus* L.) and black bindweed (*Fallopia convolvulus* (L.) A.Love) up to the four leaf stage.

In fallow situations, Pixxaro™ at 300 to 400 mL ha⁻¹, when tank mixed with glyphosate at 450 to 720 g a.i. ha⁻¹, controls common sowthistle and red pigweed (*Portulaca oleracea* L.) to 15 cm diameter.

Keywords Arylex, fluroxypyr, wheat, barley, fallow.

INTRODUCTION

Wide window of application of broadleaf herbicides in winter cereals and short plant-back flexibility of broadleaf herbicides tank mixed with glyphosate in fallow are key customer attributes in the Northern Grain Region (NGR). Many broadleaf weeds have multiple germinations during the season and growers want to apply herbicides when weeds appear in their winter cereal crops or fallow. All picloram and aminopyralid based herbicides have a restricted time of application in the crop up to Z31 plus a longer restriction for safe replant of sensitive crops compared to fluroxypyr. Therefore, if the weeds germinate after the Z31 spray window or weather prevents application occurring prior to this crop growth stage window, then the benefits of using picloram and aminopyralid are lost for that season.

The key broadleaf weeds in cereals and fallow in the NGR are flax-leaf fleabane, common sowthistle and black bindweed as they can persist in the crop and into the fallow after harvest. There are currently limited herbicides available that provides flexibility of application, control of these three main broadleaf weeds in winter cereals plus allow for the short plant-back flexibility to following crops when tank mixed with glyphosate in fallow.

Pixxaro™ is currently registered in Canada (Dow AgroSciences 2015) and combines two Group I herbicides, Arylex™ (subclass arylpicolinate) and fluroxypyr (subclass pyridine), that allows a wide application window in cereals from three leaf (Z13) to full flag leaf emergence (Z39) under Australian conditions.

MATERIALS AND METHODS

For the winter cereal trials, seven small plot trials with a randomized complete block design (three or four replicates) were undertaken on the Darling Downs, Queensland and Breeza, Northern New South Wales in 2015. For the fallow trials, eight small plot trials with a randomized complete block design (three or four replicates) were undertaken in Queensland, New South Wales, South Australia and Western Australia in 2015/16.

Treatments were applied with a small plot (LPG powered) precision sprayer operating at 200–230 kPa applying 100 L ha⁻¹ water volume in a single pass at 6 km h⁻¹ through flat fan air induction nozzles (coarse spray quality) fitted to a 2 or 3 m hand-held spray boom. Uptake™ Spraying Oil at 500 mL 100 L⁻¹ was added to each treatment in the winter cereal trials except Tordon™ 242 Cereal Herbicide (26 g a.i. picloram potassium salt + 420 g a.i. MCPA potassium salt L⁻¹). For the fallow trials, a non-ionic surfactant was added to all treatments whilst ammonium sulphate was also added to treatments containing glyphosate.

Final assessment as percent visual control of broadleaf weeds was taken between 55 and 65 days after application (DAA) for the cereal trials and 27 and 57 DAA for the fallow trials. Commercially acceptable control was set at greater than 90 percent,

which indicates death of the majority of plants with the remaining plants stunted with no ability to produce viable seed.

Results from individual trials have been analysed using Tukey’s means test with a 95% confidence interval.

Tolerance Crop selectivity was also assessed as percent visual injury for each crop at each site. There was no significant crop injury observed with any treatment during the trials (data not presented).

RESULTS AND DISCUSSION

Pixxaro™ at 200 mL ha⁻¹ gave 100 percent control of deadnettle and Mexican poppy which was equivalent to Paradigm™ Herbicide with Arylex™ active (200 g a.i. florasulam + 200 g a.i. halauxifen kg⁻¹) at 25 g ha⁻¹ + LVE 600 MCPA at 500 mL ha⁻¹, but was significantly better than the other standard herbicides in the trials (Table 1).

Pixxaro™ at 300 mL ha⁻¹ gave excellent control of flax-leaf fleabane (Table 2). Control was equivalent to Paradigm™ at 25 g ha⁻¹ + LVE 600 MCPA at 500

Table 1. Average control of deadnettle and Mexican poppy with herbicides in 2015. Note that the data highlighted in orange indicates the proposed label rate for each weed.

		Trial number	152012HG	152017HG	154006AS
		Location	Breeza	Breeza	Greymare
		State	NSW	NSW	Qld
		Spray date	6-May-15	31-Jul-15	20-May-15
		Situation	Wheat	Fallow	Oats
		Weed	Deadnettle	Deadnettle	Mexican poppy
		Weed stage	2–9 leaf	4 leaf	1–6 leaf
		Density (m ⁻²)	10	10	15
		Soil moisture	Moist	Moist	Moist
		Assessment (DAA)	62	59	65
No.	Treatment	Rate (ha ⁻¹)	% Visual control		
1	Untreated	–	0	0	0
2	Pixxaro	200 mL	100 a	100 a	100 a
3	Pixxaro	200 mL	100 a	–	100 a
	LVE 600 MCPA	500 mL			
4	Pixxaro	300 mL	100 a	100 a	100 a
5	Pixxaro	300 mL	100 a	100 a	100 a
	LVE 600 MCPA	500 mL			
6	Pixxaro	400 mL	100 a	100 a	100 a
7	Pixxaro	400 mL	100 a	100 a	98 a
	LVE 600 MCPA	500 mL			
8	Paradigm	25 g	100 a	100 a	100 a
	LVE 600 MCPA	500 mL			
9	Starane Advanced	300 mL	53 b	26 b	85 b
	LVE 600 MCPA	500 mL			
10	Tordon 242	1 L	32 c	9 c	70 c
		LSD	6.1	5.6	5.8
		CV	3.96	5	4.19

mL ha⁻¹, but was significantly better than Starane™ Advanced (300 g a.e. fluroxypyr L⁻¹) at 300 mL ha⁻¹ plus LVE 600 MCPA at 500 mL ha⁻¹ and Tordon™ 242 at 1 L ha⁻¹.

Pixxaro™ at 400 mL ha⁻¹ gave excellent control of common sowthistle in three out of four trials which was equivalent to all standards (Table 3).

For trial 154009AS (Table 3 and 4), there was a frost on the morning of application and there was no significant rainfall for the two weeks before and four weeks after application, so the weeds were considered under stress. As a result, the control was less than ideal.

This situation can happen regularly and can only be reinforced in the restraints section of the label to avoid treating weeds that are under stress.

Pixxaro™ at 400 mL ha⁻¹ gave excellent control of black bindweed in two out of three trials which was equivalent to two of the three standards (Table 4).

Summer fallow Pixxaro™ at 300 mL ha⁻¹ plus glyphosate gave acceptable control of common sowthistle in fallow compared to glyphosate alone and fluroxypyr + glyphosate (Table 5).

Table 2. Average control of flax-leaf fleabane with herbicides in 2015. Note that the data highlighted in orange indicates the proposed label rate.

		Trial number	154007AS	152017HG	152029HG
		Location	Warra	Breeza	Breeza
		State	Qld	NSW	NSW
		Spray date	27-May-15	31-Jul-15	10-Sep-15
		Situation	Barley	Fallow	Wheat
		Weed	Fleabane	Fleabane	Fleabane
		Weed stage	cots – 3 leaf	8 leaf	8 leaf
		Density (m ⁻²)	20	4	0.5
		Soil moisture	Moist	Moist	Moist
		Assessment (DAA)	55	59	60
No.	Treatment	Rate (ha ⁻¹)	% Visual control		
1	Untreated	–	0	0	0
2	Pixxaro	200 mL	90 ab	100 a	100 a
3	Pixxaro	200 mL	91 ab	–	100 a
	LVE 600 MCPA	500 mL			
4	Pixxaro	300 mL	94 a	100 a	100 a
5	Pixxaro	300 mL	97 a	100 a	100 a
	LVE 600 MCPA	500 mL			
6	Pixxaro	400 mL	93 a	100 a	100 a
7	Pixxaro	400 mL	98 a	100 a	100 a
	LVE 600 MCPA	500 mL			
8	Paradigm	25 g	97 a	98 a	100 a
	LVE 600 MCPA	500 mL			
9	Starane Advanced	300 mL	77 bc	45 b	100 a
	LVE 600 MCPA	500 mL			
10	Tordon 242	1 L	72 c	49 b	95 b
		LSD	9.0t	10.8	2.0
		CV	8.44	8.84	1.36

Table 3. Average control of common sowthistle with herbicides in 2015. Note that the data highlighted in orange indicates the proposed label rate.

	Trial number	152012HG	154008AS	154009AS	152017HG	
	Location	Breeza	Tara	Millmerran	Breeza	
	State	NSW	Qld	Qld	NSW	
	Spray date	6-May-15	2-Jun-15	15-Jul-15	31-Jul-15	
	Situation	Wheat	Wheat	Barley	Fallow	
	Weed	Milk thistle	Milk thistle	Milk thistle	Milk thistle	
	Weed stage	4 leaf	2–4 leaf	4–6 leaf	8 leaf	
	Density (m ⁻²)	3	1	0.5	0.5	
	Soil moisture	Moist	Moist	Frost	Moist	
	Assessment (DAA)	62	58	68	59	
No.	Treatment	Rate (ha ⁻¹)	% Visual control			
1	Untreated	–	0	0	0	0
2	Pixxaro	200 mL	87 a	91 a	65 bc	100 a
3	Pixxaro	200 mL	85 a	99 a	63 bc	–
	LVE 600 MCPA	500 mL				
4	Pixxaro	300 mL	100 a	97 a	50 bc	100 a
5	Pixxaro	300 mL	100 a	97 a	50 bc	100 a
	LVE 600 MCPA	500 mL				
6	Pixxaro	400 mL	100 a	98 a	68 bc	100 a
7	Pixxaro	400 mL	100 a	97 a	65 bc	100 a
	LVE 600 MCPA	500 mL				
8	Paradigm	25 g	96 a	98 a	57 bc	94 a
	LVE 600 MCPA	500 mL				
9	Starane Advanced	300 mL	67 a	97 a	50 bc	100 a
	LVE 600 MCPA	500 mL				
10	Tordon 242	1 L	100 a	93 a	82 ab	100 a
	LSD		20.9	5.4	19.4	13.8
	CV		12.63	3.89	19.95	9.98

Pixxaro™ at 400 mL ha⁻¹ was unreliable for control of common sowthistle in fallow due to the size of the weeds treated and lack of crop competition. Further work is underway on this use pattern.

Conclusion Pixxaro™ combines the weed spectrum of Arylex™ and fluroxypyr to allow wide window of application in cereals with a short plant-back interval.

ACKNOWLEDGMENTS

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REFERENCES

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Table 4. Average control of black bindweed with herbicides in 2015. Note that the data highlighted in orange indicates the proposed label rate.

		Trial number	154009AS	152017HG	152029HG
		Location	Millmerran	Breeza	Breeza
		State	Qld	NSW	NSW
		Spray date	15-Jul-15	31-Jul-15	10-Sep-15
		Situation	Barley	Fallow	Wheat
		Weed	Bindweed	Bindweed	Bindweed
		Weed stage	2–4 leaf	4 leaf	4 leaf
		Density (m ⁻²)	10	2	10
		Soil moisture	Frost	Moist	Moist
		Assessment (DAA)	68	59	60
No.	Treatment	Rate (ha ⁻¹)	% Visual control		
1	Untreated	–	0	0	0
2	Pixxaro	200 mL	65 bcd	100 a	82 ab
3	Pixxaro	200 mL	71 abc	–	71 b
	LVE 600 MCPA	500 mL			
4	Pixxaro	300 mL	73 abc	100 a	88 ab
5	Pixxaro	300 mL	74 abc	100 a	95 a
	LVE 600 MCPA	500 mL			
6	Pixxaro	400 mL	79 ab	100 a	97 a
7	Pixxaro	400 mL	79 ab	100 a	94 a
	LVE 600 MCPA	500 mL			
8	Paradigm	25 g	58 cd	100 a	45 c
	LVE 600 MCPA	500 mL			
9	Starane Advanced	300 mL	70 abc	100 a	90 ab
	LVE 600 MCPA	500 mL			
10	Tordon 242	1 L	88 a	100 a	83 ab
		LSD	11.5	16.8	15.6
		CV	10.93	11.71	13.31

Table 5. Average control of common sowthistle with herbicides in summer fallow in 2015/16. Note that the data highlighted in orange indicates the proposed label rate.

	Trial number	164001AS	152017CP	166001MW	
	Location	Moola	Lockhart	Esperance	
	State	Qld	NSW	WA	
	Spray date	22-Dec-15	31-Dec-15	22-Dec-15	
	Situation	Fallow	Fallow	Fallow	
	Weed	Milk thistle	Milk thistle	Milk thistle	
	Weed stage	Elongated	15 cm	20 cm	
	Density (m ⁻²)	25	5	20	
	Soil moisture	Moist	Dry	Moist	
	Assessment (DAA)	29	28	34	
No.	Treatment	Rate (ha ⁻¹)	% Visual control		
1	Untreated	–	0	0	0
2	Pixxaro	300 mL	53 cde	83 ab	83 a
3	Pixxaro	400 mL	65 cd	90 a	84 a
4	Roundup® CT	1.4 L	88 ab	90 a	94 a
5	Pixxaro	300 mL	86 ab	92 a	93 a
	Roundup CT	1.4 L			
6	Starane Advanced	300 mL	93 a	92 a	95 a
	Roundup CT	1.4 L			
	LSD	22.6	12	30.6	
	CV	14.11	5.76	15.19	