Strategies to improve control of herbicide-resistant broadleaf weeds in lentils

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Introduction

The cultivation of imidazolinone (Imi)-tolerant lentils has allowed for the control of a number of difficult broadleaf weeds in lentil production. However, the over-reliance on Intervix and other Imi herbicides for weed control has resulted in the evolution of weed resistance. In lentil growing regions Imi resistance is now common in common sowthistle, prickly lettuce and Indian hedge mustard. Resistance has also recently been reported in wild vetch and snail medic. Several of these weed species can germinate in early spring and cause problems at harvest. There are limited effective alternative herbicides for broadleaf weed control in lentils. Most of these herbicides are residual and can cause damage to lentils.

This trial was established to compare strategies that might be used to provide the extended control of broadleaf weeds required. One strategy is to sow lentils on time and increase the number of residual herbicides used. This strategy has the risk of increased crop damage. A second strategy is to sow lentils late, where fewer herbicides are needed to control spring germinating broadleaf weeds. This strategy will compromise lentil yield. The third strategy is to sow GIA Metro lentils, where metribuzin can be used safely. However, GIA Metro lentils have a yield penalty compared to cultivars like GIA Thunder.

Methodology

The trial was sown at Hart with GIA Thunder and GIA Metro sown on June 20, 2025. Seed of common sowthistle and Indian hedge mustard was spread on the plots prior to sowing. The late GIA Thunder sowing was on July 3, 2025. The six weed control strategies used are in Table 1. WeedErase is a mechanical weed control tool that uses blue light and heat to control weeds. The trial was harvested on November 18, 2025. Crop establishment was assessed on July 30, 2025, and weed counts conducted on October 23, 2025 to capture spring germinating weeds. The WeedErase treatment was applied to surviving broadleaf weeds on September 3, 2025.

Table 1. Weed control strategies used in the lentil trial at Hart in 2025.

Weed control strategy	Herbicides and other tactics applied
1	Nil
2	Reflex at 0.75 L/ha IBS
3	Terbyne Xtreme at 0.86 kg/ha IBS
4	Reflex at 0.75 L/ha IBS, Metribuzin at 280 g/ha PSPE
5	Terbyne Xtreme at 0.86 kg/ha IBS, Metribuzin at 280 g/ha PSPE
6	Terbyne Xtreme at 0.86 kg/ha IBS, Metribuzin at 280 g/ha PSPE, WeedErase post emergent

Results and discussion

While Indian hedge mustard and sowthistle seed were spread across the site prior to sowing, weed numbers in the trial were low (Table 2). For sowthistle, all the herbicide strategies worked well. For Indian hedge mustard, herbicide strategies containing metribuzin were the most effective.

Table 2. Crop establishment, crop yield and weed numbers in lentils at Hart in 2025.

Crop	Strategy	Crop establishment (plants/m^2)	Crop yield (t/ha)	Indian hedge mustard (plants/m^2)	Sowthistle (plants/m^2)
GIA Thunder	1	134^{ab}	1.21^{ab}	5^{ab}	7^{a}
	2	132^{ab}	1.35^{a}	2^{b}	2^{bc}
	3	136^{ab}	1.40^{a}	10^{a}	0^{c}
	4	117^{b}	1.08^{ab}	0^{b}	1^{bc}
	5	113^{b}	0.96^{ab}	0^{b}	0^{c}
	6	114^{b}	0.85^{ab}	0^{b}	0^{c}
GIA Metro	1	147^{ab}	0.91^{ab}	13^{a}	3^{abc}
	2	142^{ab}	0.77^{b}	1^{b}	1^{bc}
	3	135^{ab}	0.86^{ab}	1^{b}	0^{c}
	4	153^{a}	0.98^{ab}	0^{b}	0^{c}
	5	161^{a}	1.10^{ab}	0^{b}	0^{c}
	6	159^{a}	0.87^{ab}	0^{b}	0^{c}
GIA Thunder sown late	1	122^{ab}	1.24^{ab}	6^{ab}	5^{ab}
	2	135^{ab}	1.22^{ab}	10^{a}	0^{c}
	3	133^{ab}	1.47^{a}	6^{ab}	0^{c}
	4	120^{ab}	1.20^{ab}	0^{b}	0^{c}
	5	130^{ab}	0.82^{ab}	0^{b}	0^{c}
	6	126^{ab}	0.65^{b}	0^{b}	0^{c}
P-value		**<0.0001**	**0.03**	**0.003**	**<0.0001**

Crop establishment was affected by herbicide strategy with metribuzin treatments reducing stand number for GIA Thunder. This did not occur when GIA Thunder was sown late, indicating the role that rainfall after herbicide application has on the safety of metribuzin. GIA Metro was not affected by metribuzin treatments.

The late start to the season and low spring rainfall resulted in low lentil yields. This meant there were only a few differences in yield. GIA Thunder with single residual herbicide applications had the highest yields.

Where multiple residual herbicides are to be used, it would be preferable to have the crop safety to metribuzin that is available in GIA Metro rather than risk increased crop damage. Where this is not the case, the yield penalty of GIA Metro makes it a less preferred cultivar.

This trial demonstrates that trying to control Imi-resistant broadleaf weeds in lentils will require choices to be made. Using multiple residual herbicides will increase the risk of herbicide damage to lentils. As crop damage is driven by rainfall patterns, which are unpredictable, this should not be the preferred strategy. One alternative to grow GIA Metro if broadleaf weed numbers are expected to be high, as metribuzin can be used safely in this cultivar. The other alternative is to have more cereal crops in the rotation where broadleaf weeds can be more easily controlled across the rotation.

Acknowledgements

This research was funded by the Grains Research and Development Corporation through the Weed Management Initiative, project UOA2501-004RTX.