Post-Emergent Herbicide Options for Wild Cabbage Control In Lentils

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The aim of this trial was to investigate post-emergent herbicide options for the control of Wild Cabbage (Hare's ear mustard, *Coringia orientalis*) in lentils

Summary
Broadstrike® Herbicide with or without wetter and Broadstrike + Brodal® all provided commercially acceptable control of wild cabbage in lentils without causing crop damage. Warm, sunny conditions at spraying resulted in good Broadstrike activity. The late finish to the growing season also suited Broadstrike mixes, as the delay in crop maturity resulting from Broadstrike application did not reduce yield**.** These results need to be verified in other environments

Background
Wild Cabbage is a brassica weed that can cause yield losses of up to 50% in lentils. Control of Wild Cabbage with post-sowing-pre-emergent applications of simazine + metribuzin has been unsatisfactory in some paddocks. This trial aimed to evaluate a number of post-emergent (PE) herbicides for crop tolerance and effect on wild cabbage.

Methods
This experiment was conducted at Ashens on Wimmera Grey Clay soil with Growing Season Rainfall (April-November) of 295 mm. The paddock was sown to Digger lentils at 50 kg/ha on June 24 on 17.5 cm row spacings. Double Super (60 kg/ha) was applied at sowing. Pre sowing weed management consisted of 0.6 L/ha trifluralin 480 and 1 L/ha Roundup®. Simazine 1L/ha + Lexone® 128 g/ha was applied post-sowing-pre-emergent on July 1. On September 20, 0.06 L/ha Verdict® 520 grass herbicide and 0.5L L/ha Boomer® fungicide were sprayed. Elect® fungicide 0.7L/ha was applied on November 1 with 0.3 L/ha Decis® insecticide. On November 16, 2 kg/ha Mancozeb fungicide and 250ml/ha Alpha-max® insecticide were applied.

Ten treatments of PE herbicides were applied to the lentil crop on September 14, 2001 on a warm sunny day. The temperature was 18^{o}C, cloud cover was 50 %, there was a slight WNW breeze and the soil was moist. The trial was designed as a randomised complete block with three replications. Plot dimensions were 2 x 20 m. The lentils were at the 10 node stage and Wild Cabbage was mainly 4 leaf and up to 10 cm in diameter. The wild cabbage was concentrated in harvester trails with populations of 20-50 plants/m^2 in 2 m wide strips, every 4 metres. Treatment 1 in Reps 1 and 2, and Treatments 4, 5 and 6 may have received less than the desired application rate due to problems with the spraying equipment.

Plots were assessed for crop tolerance and weed control using the EWRC scoring system of 1-9. Low scores indicate effective weed control and acceptable crop damage. High scores indicate poor weed control and unacceptable crop damage. Plots were harvested with a Hege plot harvester

Results
The effectiveness ratings of the different herbicide mixes for Wild Cabbage control is shown in Table 1. Table 2 shows the data for lentil crop tolerance, lentil yields and estimated profit resulting from each treatment.

Broadstrike mixes

The warm, sunny conditions at spraying were ideal for achieving maximum efficacy with Broadstrike. Broadstrike + wetter, Broadstrike alone, and Broadstrike + Brodal all provided very effective Wild Cabbage control in this trial. There were no significant differences in EWRC weed control scores among these treatments however Broadstrike + wetter caused more rapid death of Wild Cabbage plants than Broadstrike alone. Broadstrike + Brodal provided acceptable control but some Wild Cabbage plants survived and went on to flower and set seed. However, this mix also controlled whip thistle and suppressed milk thistle.

Broadstrike + wetter and Broadstrike alone caused slight yellowing of the crop and delayed maturity by approximately 7 days. Broadstrike + Brodal caused leaf blotching typical of Brodal. The crop damage for these three treatments was commercially acceptable. Lentil yields were all significantly greater than the yield of the Nil treatment due to a reduction in weed competition. The estimated profit generated from these three treatments was over $150.00/ha (Table 2).

Brodal treatments

The efficacy of Brodal alone, Brodal + simazine and Brodal 0.05 L/ha + 24 D Ester 0.05 L/ha may have been reduced by problems at spraying so these results should be treated with caution. As discussed, Broadstrike + Brodal provided economic control of Wild Cabbage. Buttress + Brodal provided excellent control of Wild Cabbage, whip thistle and milk thistle. Brodal 0.05 L/ha + 24 D Ester 0.05 L/ha provided control of Wild Cabbage which was almost commercially acceptable. All other Brodal treatments suppressed Wild Cabbage but did not provide commercially acceptable control.

Brodal + MCPA, Brodal + Buttress and both Brodal + 24 D Ester treatments caused stunting and curling of the growing point in lentil plants, typical of Phenoxy herbicide symptoms. Brodal + Buttress delayed crop development by 14 days. Brodal + MCPA and Brodal + Buttress significantly reduced yield compared to other herbicide treatments. All other Brodal treatments except Brodal 0.2L/ha yielded significantly higher than the Nil treatment due to weed control. All Brodal mixes except Brodal + Buttress were profitable compared to the Nil treatment.

Table 1. Effectiveness of various herbicides in controlling Wild Cabbage in lentils.

Treatment	Wild Cabbage EWRC Weed Control Scores			Control (C) or Suppression (S) of other weeds	
	25/9	19/10	8/11		
	11 DAT	35 DAT	55 DAT	Whip thistle	Milk thistle
Broadstrike 25 g/ha	5	3.0	2	-	-
Broadstrike 25 g/ha + 0.1%wetter	3.4	1.0	1	-	-
Broadstrike 20 g/ha + Brodal 0.1 L/ha	3.7	3.3	1.3	C	-
Brodal 0.12 L/ha + Simazine 1 L/ha	6.7	8	6.7	S	-
Brodal 0.2 L/ha	5.7	6.8	8	S	-
Brodal 0.05 L/ha + Ester 0.05 L/ha	4.8	5.2	4.3	S	-
Brodal 0.025 L/ha + Ester 0.025 L/ha	6.5	7.7	6.3	C	-
Brodal 0.1 L/ha+ MCPA 0.12 L/ha	4.7	6.2	5.7	C	S
Brodal 0.05 L/ha+ Buttress 1 L/ha	4.2	2.3	2	C	C
Nil	9	9	9	-	-
LSD (P<0.05)	1.8	1.2	1.7		

EWRC weed control score: 1 = complete kill, 4 = acceptable control, 9 = no effect. DAT = Days after treatment.
EWRC score statistics are for comparing between herbicide treatments but not for comparing herbicide with untreated.
Broadstrike 25g/ha is the only treatment registered for use in lentils.

Table 2. Tolerance of lentils to various herbicides for controlling Wild Cabbage.

Treatment	Lentil EWRC Crop tolerance Score			Lentil Yield	Approx. Cost of herbicide	Estimated profit from treatment, assuming lentils are worth $400/T.
	25/9	19/10	8/11			
	11 DAT	35 DAT	55 DAT	(T/ha)	($/ha)	($/ha)
Broadstrike 25 g/ha	2.3	1.7	1	2.45	14.95	+153
Broadstrike 25 g/ha + 0.1%wetter	2.8	1.3	1.3	2.67	15.35	+238
Broadstrike 20 g/ha + Brodal 0.1 L/ha	3.3	2.0	1.3	2.83	29.72	+293
Brodal 0.12 L/ha + Simazine 1 L/ha	2.7	2.0	1.3	2.34	23.26	+100
Brodal 0.2 L/ha	3.3	2.3	1	2.23	29.60	+50
Brodal 0.05 L/ha + Ester 0.05 L/ha	2.8	2.3	2.3	2.60	7.85	+220
Brodal 0.025 L/ha + Ester 0.025 L/ha	2.0	2.2	2	2.45	3.93	+164
Brodal 0.1 L/ha + MCPA 0.12 L/ha	5.3	4.5	4.3	2.13	15.47	+24
Brodal 0.05 L/ha + Buttress 1 L/ha	2.7	5.3	3.8	2.00	20.18	-31
Nil	1	1	1	2.03	0	0
LSD (P<0.05)	1.3	1	0.9	0.26		

EWRC crop tolerance score: 1 = no effect, 5 = unacceptable damage, 9 = complete kill. DAT= Days after treatment.
EWRC score statistics are for comparing between herbicide treatments but not for comparing herbicide with untreated.
Broadstrike 25g/ha is the only treatment registered for use in lentils.

Interpretation

It is difficult to make solid conclusions about the crop safety of the herbicides tested, based on one year of data. Frosts occurred on October 20 and November 11 which may have caused 5-20% yield loss. Herbicide treatments affected crop maturity. This may have resulted in different treatments being at varied stages of flowering and pod development when frost occurred thus causing different levels of yield damage. Late season rainfall (73 mm in October and November) and cool temperatures during this time would have aided crop recovery following herbicide application. Yield loss may have been worse in years with hot dry finishes.

Commercial Practice

Management options for Wild Cabbage in lentils include post-sowing-pre-emergent applications of simazine and post-emergent applications of Broadstrike with or without wetter, or Broadstrike + Brodal. Early applications would give better weed control while the Wild Cabbage is small, and give the crop a longer period of time to recover from herbicide damage. Broadstrike mixes should be sprayed on warm sunny days to achieve maximum efficacy. Broadstrike, on weeds such as Wild Radish, can be less effective if sprayed in cool overcast conditions. Of the herbicides tested in this trial, only Broadstrike 25g/ha is registered for use in lentils.

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