# Metribuzin tolerance of barley varieties

***Kate Burke*** *(BCG Consultant)*

## Take home messages

- *No barley varietal differences in tolerance to metribuzin applied either pre-sowing or post-emergent have been detected in 3 years of trials on sandy loam soils at Walpeup and Woomelang.*
- *Crop damage from metribuzin has been known to occur in some commercial situations so label advice should be adhered to*

## Background

Metribuzin is a useful herbicide for managing brome grass in barley. Lexone Xtruded (active ingredient 750g/kg metribuzin) is registered for application pre-planting incorporated by sowing (IBS) (Vic, SA, WA) and for post-emergent use (Vic, SA, WA, Tas) with warnings regarding severe crop damage when used on alkaline sandy soils. There is also the potential for crop damage if heavy rain follows application. The risk of crop damage increases where press wheels are used.

A 3-year investigation of variety specific management for barley in changing farming systems in the south-eastern Australian Mallee region began in 2007. As part of this investigation, a range of barley varieties were tested for tolerance to metribuzin, particularly on alkaline sandy soils. This article describes the final year of evaluation in detail and briefly summarises the previous 2 years' findings.

## Aim

To evaluate the tolerance of recently released and commonly grown barley varieties to metribuzin.

## Method

| | | |
|---|---|---|
| Location: | Woomelang | |
| Replicates: | 3 (strip plots for herbicides, nil herbicide treatment in fixed location, varieties randomised) | |
| Sowing date: | 27 May 2009 | |
| Seeding density: | 130 plants/m² | |
| Crop type: | Barley | |
| Varieties (sowing rate): | Buloke (65kg/ha), Fleet (80kg/ha), Hindmarsh (60kg/ha), Gairdner (74kg/ha), Maritime (65kg/ha), Commander (70kg/ha) | |
| Seeding equipment: | Knife point, press wheels, 30cm row spacing | |
| Fertiliser: | 55kg/ha MAP at sowing; 26kg/ha N applied as UAN at GS32 | |
| Herbicide treatments: | 27 May | Lexone Xtruded 140g/ha & 280g/ha (IBS) |
| | 14 July | Lexone Xtruded 140g/ha & 280g/ha (GS14.5) |

Varietal tolerance to metribuzin was assessed on a Mallee sandy loam soil near Woomelang for both pre- and post-emergent application. Sowing occurred into a moist seed bed. A knockdown of 2L/ha Roundup Power Max was applied prior to sowing. Broadleaf weeds were controlled with an in-crop application of broad spectrum herbicide mix.

Lexone Xtruded was applied at 2 rates, the recommended rate (140g/ha) and twice the recommended rate (280g/ha) for sandy soils. The herbicide treatments were applied pre- and post-emergent. Both herbicide timings occurred on moist soil and received rain following application (24mm in 10 days after the pre-emergent application and 7mm in 10 days after the post-emergent application).

Plant establishment, weed presence, anthesis (GS65) biomass, grain yield and quality were recorded.

## Results

Weed densities were low with early season brome populations estimated to be less than 1 plant/$m^2$ in the highest density areas. There was a significant herbicide effect with the 280g/ha pre-emergent rate reducing brome density (Table 1). This trend continued through to seed set although differences measured in the late season head count data were not statistically significant.

The 280g/ha rate exceeds the label rate for pre-planting application and should not be used commercially as this would be illegal use of the product. This trial was conducted under permit and the data is provided for information only and does not constitute advice.

**Table 1.** Brome grass populations.

| Herbicide rate and timing | Early brome population score [1,2] | Brome seed set prior to harvest (heads/$m^2$) |
|---|---|---|
| Nil | Not recorded | 41 |
| Pre-sowing 1 x | 3 | 29 |
| Pre-sowing 2 x | 2 | 17 |
| Post-sowing 1 $x^2$ | 3 | 40 |
| Post-sowing 2 $x^2$ | 3 | 26 |
| **P value**<br>**LSD (5%)** | **P <0.05**<br>**0.7** | **NS** |

*[1] 1 = < 5 plants per plot (3x12 $m^2$); 2 = 5 – 10; 3 = 10 – 15; 4 = 15 – 20; 5 = > 20*

*[2] Scores taken before post-emergent treatment applied*

Excellent plant emergence was achieved. All varieties exceeded 130 plants/$m^2$. There were no significant effects of pre-emergent metribuzin application on plant emergence. There was no relationship between seeding rate and emergence. However significant varietal differences were evident. Gairdner had the lowest plant density and Buloke the highest (Table 2). Seed quality may have been a factor in emergence differences as it was not possible to obtain all seed from the same source. There was no obvious visual effect from either pre- or post-emergent application of metribuzin.

**Table 2.** Plant density, grain yield and grain quality for all varieties (mean of all herbicide treatments).

| Variety | Plant density (plants/m$^2$) | Grain yield (t/ha) | Plump grain retention > 2.5mm (%) | Protein (%) |
|---|---|---|---|---|
| Buloke | 167 | 3.17 | 85.0 | 10.91 |
| Commander | 149 | 3.23 | 86.8 | 10.52 |
| Fleet | 142 | 3.46 | 88.5 | 10.92 |
| Gairdner | 124 | 2.67 | 73.8 | 11.93 |
| Hindmarsh | 156 | 3.42 | 83.4 | 11.43 |
| Maritime | 141 | 2.86 | 94.0 | 12.79 |
| **P value** | **<0.01** | **<0.05** | **<0.001** | **0.055** |
| **LSD (5%)15** | **0.45** | **6.3** | **1.50** | |

While there were significant varietal effects on grain yield (Table 2), herbicide treatments had no significant effect (Table 4). Nor were there any significant variety by herbicide interactions. The feed varieties, Hindmarsh and Fleet, and the malt varieties, Commander and Buloke, yielded well.

Dry matter production measured at anthesis (GS65) was depressed by the post-emergent 2 x rate of metribuzin (P = 0.08) and the trend was consistent across most varieties (Table 3).

Grain plumpness measured as retention above a 2.5mm screen showed varietal differences (Table 2) but there were no herbicide treatment effects (data not shown). There were however, significant differences in grain protein among herbicide treatments (Table 5) and among varieties (Table 2).

**Table 3.** GS65 dry matter (t/ha) for barley varieties treated with metribuzin.

| Herbicide rate & timing | Mean of varieties | Buloke | Commander | Fleet | Gairdner | Hindmarsh | Maritime |
|---|---|---|---|---|---|---|---|
| Nil | 4.92 | 5.00 | 5.53 | 5.17 | 3.67 | 4.81 | 5.32 |
| Pre-sowing 1x | 5.20 | 5.39 | 5.09 | 6.06 | 3.93 | 5.56 | 5.19 |
| Pre-sowing 2x | 4.99 | 5.21 | 6.38 | 4.55 | 3.77 | 4.93 | 5.12 |
| Post-sowing 1x | 5.16 | 5.22 | 4.88 | 5.88 | 4.54 | 5.40 | 5.01 |
| Post-sowing 2x | 4.49 | 4.14 | 4.61 | 4.78 | 4.10 | 4.27 | 5.06 |
| **P value** | **0.08** | | | | | | |

*No significant differences for variety or for herbicide x variety interaction*

**Table 4.** Grain yield (t/ha) of barley varieties treated with metribuzin.

| Herbicide rate & timing | Mean of varieties | Buloke | Commander | Fleet | Gairdner | Hindmarsh | Maritime |
|---|---|---|---|---|---|---|---|
| Nil | 3.14 | 3.13 | 3.47 | 3.53 | 2.69 | 3.44 | 2.59 |
| Pre-sowing 1x | 3.21 | 3.21 | 3.38 | 3.45 | 2.69 | 3.55 | 2.97 |
| Pre-sowing 2x | 3.18 | 3.40 | 3.24 | 3.47 | 2.63 | 3.31 | 3.02 |
| Post-sowing 1x | 3.04 | 2.95 | 2.94 | 3.34 | 2.64 | 3.43 | 2.92 |
| Post-sowing 2x | 3.11 | 3.19 | 3.10 | 3.53 | 2.69 | 3.35 | 2.82 |
| **P value** | **NS** | | | | | | |

*No significant differences for herbicide or for herbicide x variety interaction*

**Table 5.** Protein content (% dry basis) of barley varieties treated with metribuzin

| Herbicide rate & timing | Mean of varieties | Buloke | Commander | Fleet | Gairdner | Hindmarsh | Maritime |
|---|---|---|---|---|---|---|---|
| Nil | 10.79 | 10.34 | 9.83 | 9.65 | 11.63 | 11.09 | 12.20 |
| Pre-sowing 1x | 11.79 | 10.99 | 10.78 | 11.75 | 11.85 | 11.87 | 13.49 |
| Pre-sowing 2x | 11.46 | 11.23 | 11.23 | 10.97 | 11.87 | 11.00 | 12.43 |
| Post-sowing 1x | 11.44 | 10.87 | 9.92 | 11.78 | 11.62 | 11.26 | 13.18 |
| Post-sowing 2x | 11.61 | 11.11 | 10.84 | 10.47 | 12.66 | 11.93 | 12.63 |
| **P value**<br>**LSD (5%)** | **<0.05**<br>**0.67** | | | | | | |

*Variety x herbicide effects P = 0.075*

## Interpretation

Plant populations of brome were not considered yield-limiting. Therefore, the experiment was a good test of varietal tolerance without the confounding effects of weed population on growth and yield.

In 3 years of evaluation there have been no significant differences in varietal tolerance to metribuzin. Therefore, it would be expected that the current suite of varieties would respond similarly to the application of metribuzin.

Crop damage from the use of metribuzin can occur in some situations. Late timing, heavy rainfall events after application and light textured soils are all factors that increase the chance of crop damage. Crop damage can also be exacerbated where post-emergent application occurs in paddocks containing press wheel furrows. Rain after application can wash the chemical into the furrow, concentrating the metribuzin near the plant root system. Observing the herbicide label instructions and ensuring the rate used is within the range specific to the soil type should minimise the risk of crop damage.

## Acknowledgments

This project was funded by South Australian Grains Industry Trust (SAGIT).