Imidazolinone tolerant barley – a new tool for integrated weed management

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Take home messages

- *VBHT805 is an imidazolinone tolerant barley variety in the final stages of evaluation and commercialisation.*
- *VBHT805 could be a useful tool for managing Group B soil residual herbicide carryover and for improved grass weed control in intensive cereal rotations.*

Background

Imidazolinone (imi) tolerant barley has been developed through conventional plant breeding techniques by DPI Victoria and is currently in the final stages of field evaluation and commercialisation by AWB Seeds.

There is currently no herbicide registered for use on imi-tolerant barley. It is envisaged that a registration application will be submitted to Australian Pesticides and Veterinary Medicines Authority (APVMA) in early 2010 for post-emergent use of an imi-group herbicide. This technology is expected to be available to growers in 2011.

Imi-tolerant barley has the potential to be used for improved grass weed control in barley (brome grass, wild oats, annual ryegrass and volunteer wheat). It could also be used as a crop rotation option when soil residual carryover from Group B herbicides, particularly imi-residues, is likely to cause damage to conventional barley.

This trial forms part of a 3-year South Australian Grains Industry Trust (SAGIT) project which aims to improve the control of brome and other grass weeds in barley on sandy mallee soils across the southern region of Australia.

Aim

To raise industry awareness of imi-tolerant barley as a potential tool for integrated weed management in the Victorian and South Australian Mallee.

Method

Location:	15km south of Woomelang
Replicates:	3 (split plot factorial)
Sowing date:	14 May 2009
Seeding rate:	50kg/ha
Crop type:	VBHT0805 barley
Seeding equipment:	BCG knife point, press wheels, 30cm row spacing
Fertiliser:	55kg/ha MAP at sowing; 26 kg/ha N applied as UAN at GS32

The trial was sown to the imi-tolerant barley cultivar VBHT0805 after a knockdown herbicide was applied.

A split plot design was used for herbicide treatments (Table 1). Each treatment plot was further split into 2 trifluralin treatments (nil and 1.5L/ha trifluralin 480) as subplots. Treatments were monitored for plant emergence, herbicide effect on crop and weeds, final weed densities and grain yield. To reduce confounding of results, broadleaf weeds were controlled with an in-crop application of a broad spectrum herbicide mix.

Table 1. Main plot herbicide treatment description.

Herbicide*	Rate (g) active ingredient/ha	Timing	Date of application
Nil	-	-	-
Metribuzin750 140g/ha	105	IBS	14 May
Metribuzin750 180g/ha	135	GS14	18 June
Imidazolinone rate 1	14.4	GS14	18 June
Imidazolinone rate 2	16.8	GS14	18 June
Imidazolinone rate 3	19.2	GS14	18 June
Imidazolinone rate 4	28.8	GS14	18 June
Imidazolinone rate 5	36	GS14	18 June

** Each main plot was further split into trifluralin and no trifluralin*

Results

Crop emergence

The crop was sown at 50kg/ha due to limited seed supply and subsequently plant density was lower. Plant populations ranged from 85 to 130 plants/m2 with a mean density of 110 plants/m2. Minor sporadic plant stunting was evident across the trial, characteristic of early barley growth in a sandy loam soil of moderate fertility.

Crop tolerance to herbicide

There were some visual effects of trifluralin 6 weeks after sowing but this was not consistent across all plots and not detectable later in the season. No significant effects were observed for either metribuzin pre- or post-emergent, or for any rate of the imi-herbicide (data not shown).

There were no significant differences in grain yield for any treatment (Table 2) indicating that VBHT0805 has excellent tolerance of imi-chemistry as well as the commonly used herbicides trifluralin and metribuzin.

Grain quality of VBHT805 was good with mean retention above a 2.5mm screen of 89%, mean screenings 3.4% and protein 10.6%. There were no herbicide effects on retention or protein but there were significant differences in screenings with nil herbicide and pre-emergent metribuzin having significantly higher screenings than all the treatments that were applied at GS14 (data not shown).

Table 2. Grain yield for VBHT0805 treated with various herbicide combinations (no significant differences detected).

Herbicide description	Timing of application	Rate (g) active ingredient/ha	Grain yield (t/ha)	
			No trifluralin	Trifluralin (1.5L/ha T480)
Nil	-	-	3.38	3.41
Metribuzin750 140g/ha	IBS	105	3.42	3.40
Metribuzin750 180g/ha	GS14	135	3.29	3.48
Imidazolinone rate 1	GS14	14.4	3.44	3.65
Imidazolinone rate 2	GS14	16.8	3.13	3.31
Imidazolinone rate 3	GS14	19.2	3.42	3.44
Imidazolinone rate 4	GS14	28.8	3.47	3.70
Imidazolinone rate 5	GS14	36	3.35	3.40

Weed Control

There was a very low population of brome grass on the trial area and no brome detected prior to harvest.

Volunteer wheat was the most prevalent grass weed in the trial. Suppression of volunteer wheat was observed 6 weeks after post-emergent application of the imi-herbicide treatments.

Herbicide treatments significantly affected volunteer wheat contamination in grain samples from harvest (Table 3). The nil herbicide, pre-emergent metribuzin and post emergent metribuzin treatments all had wheat levels exceeding the receival standard for malting barley of 85 wheat grains per half litre. All the imi-herbicide treatments were free of wheat indicating complete control. Post-emergent metribuzin provided a significant reduction in wheat contamination compared to nil herbicide or pre-emergent metribuzin but was still insufficient to reduce wheat numbers enough to meet receival numbers.

Table 3. Number of wheat grains in a 400g (half litre) grain sample of VBHT0805*.

Herbicide description	Timing of application	Rate ga.i/ha	Number of wheat grains per 400g (half litre) of barley[1]
Nil	-	-	667
Metribuzin750 140g/ha	IBS	105	464
Metribuzin750 180g/ha	GS14	135	169
Imidazolinone rate 1	GS14	14.4	0
Imidazolinone rate 2	GS14	16.8	0
Imidazolinone rate 3	GS14	19.2	0
Imidazolinone rate 4	GS14	28.8	0
Imidazolinone rate 5	GS14	36	0
P Value			**<0.001**
LSD (5%)			**115**

[1] *Maximum number of wheat grains for barley quality grades: Malt :85, F1: 500, F2: 1500*

Interpretation

VBHT0805 achieved excellent yield and quality and was highly tolerant of the imi-group herbicide applied at a range of rates. VBHT0805 is currently under seed increase and should be available for commercial production in 2011. The variety is likely to be evaluated for commercial scale malt quality in the near future but is unlikely to have malting status in the first few years of release.

VBHT805 and other imi-tolerant barley varieties have the potential to play a very useful role in integrated weed management throughout Victoria, and particularly in the Mallee region where choices for break crops are limited and intensive cereal rotations are common place. Note that VBHT0805 does not have cereal cyst nematode (CCN) resistance. Therefore CCN would need to be managed in other phases of the crop rotation.

VBHT805 has the ability to tolerate the residues of Group B soil residual herbicides, particularly imi-residues and would be a useful alternative to Clearfield wheat or Clearfield canola when imi-soil residue management is required.

The pending registration of an imi-herbicide for post-emergent application on imi-tolerant barley will improve brome control options in barley and provide a useful option for controlling volunteer wheat. This in turn will allow for more timely sowing and more flexible crop rotations.

Acknowledgments

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