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Disclaimer

Always read the label for full instructions.

The information and recommendations set out in this brochure are based on tests and data believed to be reliable at the time of publication. Results may vary, as the use and application of the products is beyond our control and may be subject to climatic, geographical or biological variables, and/or developed resistance. Any product referred to in this brochure must be used strictly as directed, and in accordance with all instructions appearing on the label for that product and in other applicable reference material. So far as it is lawfully able to do so, Bayer CropScience Pty Ltd accepts no liability or responsibility for loss or damage arising from failure to follow such directions and instructions.

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BCB0168

TECHNICAL GUIDE

VELOCITY®

photo-X TRIPLE ACTION TECHNOLOGY

For the post-emergent control of a wide range of broadleaf weeds in wheat, barley, triticale and cereal rye.

Bayer CropScience

VELOCITY® HERBICIDE, UTILISING photo-X TRIPLE ACTION TECHNOLOGY TECHNOLOGY

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INTRODUCTION

Following the successful launch of Precept® in 2008, the introduction of Velocity® extends the use of photo-X® technology to cover a wider range of broadleaf weeds – and control them with exceptional speed.

Velocity is a combination of pyrasulfotole, the active ingredient with the unique photo-X three-way mode of action, and bromoxynil.

This powerful new combination gives cereal growers the opportunity to control broadleaf weed competition when the crop is at its most vulnerable stage. An added advantage is that Velocity is just as effective on a number of weeds that are particularly prevalent in specific growing areas – weeds such as doublegee, bindweed, capeweed and wireweed – as it is on wild radish.

Photo-X herbicide technology: innovation – performance – reliability - speed

Photo-X herbicide technology is centred around pyrasulfotole, an active ingredient with a very distinctive and effective three-way mode of action against a wide range of broad-leaved weeds. Pyrasulfotole is classified as a member of the Group H mode of action group. It stems from the HPPD inhibitor family of active ingredients, commonly known as the 'bleachers'. However, photo-X herbicide technology doesn't simply bleach weeds: it simultaneously interrupts three crucial life processes within the plant.

INNOVATION: photo-X offers a unique mode of action that shuts down photosynthesis.

PERFORMANCE: photo-X kills a wide range of broadleaf weeds.

RELIABILITY: photo-X cuts off three life processes in broadleaf weeds – an effective triple action system.

What makes pyrasulfotole so unique is the way it works within the target weed. This one active ingredient simultaneously works in three different ways to control broadleaf weeds.

The performance of pyrasulfotole can be maximised by combining it with other active ingredients with different modes of action. Velocity is the second in the series of cereal herbicides featuring photo-X herbicide technology Bayer CropScience is developing.

ACTION 1	Cuts off the energy process	Pyrasulfotole stops the weed from generating an adequate supply of energy by preventing the production of an essential component of the photosynthetic apparatus.
ACTION 2	Cuts off the vitamin process	Pyrasulfotole restricts the weed's ability to produce vitamin E, which protects biological membranes against oxidative stresses.
ACTION 3	Cuts off the protective process	Pyrasulfotole prevents carotenoid production. This means the weed loses the shield that protects chlorophyll molecules from dangerous ultraviolet rays and excess light. As there is nothing to stop sunlight from penetrating deep into the leaves, the chlorophyll is destroyed, and the weed turns white and dies.

NOTES

BIOLOGICAL PROPERTIES

Velocity has a very rapid visible and powerful effect on a wide range of young broadleaf weeds.

- Innovative and robust mode of action based on simultaneously cutting three crucial life processes in weeds.
- Reliable performance, when used as directed – with exceptional efficacy against some difficult-to-control weeds and those resistant to other herbicide modes of action.
- High level of crop selectivity achieved by the optimum combination of photo-X technology and the latest Bayer CropScience crop safener.

Pyrasulfotole mode of action

ACTION ONE Disrupts energy supply to the target weed

Plastoquinone biosynthesis inhibition

By disrupting the production of plastoquinones, Velocity prevents the plant from generating an adequate supply of energy. The energy produced by photosynthesis is no longer transported and, with the energy supply cut off: **the weed dies.**

ACTION TWO Disrupts vitamin production

Tocopherol biosynthesis inhibition

Velocity restricts the weed's ability to produce vitamin E, which protects biological membranes against oxidative stresses and the photosynthetic apparatus against photo-inactivation. This means the weed lacks one of its most important antioxidants. As a result, so-called free radicals destroy the weed from the inside: **the weed dies.**

ACTION THREE Destroys the protective layer

Carotenoid biosynthesis inhibition

Velocity prevents carotenoid production, which leaves the plant's chlorophyll molecules unprotected against dangerous UV rays and excess light. Sunlight therefore destroys the chlorophyll, the weed turns white, and finally: **the weed dies.**

Triple-action synergy

Uptake: Velocity is rapidly taken up via the plant leaves following post-emergent applications of the product.

Translocation: Velocity is translocated both by the phloem and xylem. The phloem carries Velocity to the plant's growing points, where it inhibits new shoot growth.

Selectivity: Rapid metabolic degradation in the cereal crops is intensified by the Bayer CropScience safener mefenpyr-diethyl. Crop safety is paramount.

Bromoxynil mode of action

Activity: The bromoxynil in Velocity adds to pyrasulfotole's disruption of the photosynthetic process by inhibiting the second light reaction of photosynthesis. Bromoxynil also uncouples oxidative phosphorylation of respiration and therefore acts on electron transport inhibitors and uncoupling agents.

Uptake: Bromoxynil acts primarily as a contact foliar herbicide, with virtually no soil residual activity.

Symptoms in the target weed

When used as directed, Velocity is exceptionally fast-acting. Symptoms of its activity usually appear in 2–7 days. The plant will usually develop blisters or necrotic areas on older leaves, and bleaching and burning on new leaves and at the growing point. Later, extensive destruction of the entire leaf tissue occurs, leading to plant death. This can sometimes occur within 3 days, given ideal conditions and adequate application rates.

Final death will normally occur 20–25 days after application depending on temperature and weed.

Key features

- Innovative and distinctive mode of action, shared only with Precept, and classified as a Group H cereal herbicide
- The inhibition of 3 life processes in the target weed produces unprecedented robustness
- Incorporation of bromoxynil provides very fast control of an unusually broad spectrum of young weeds
- Exceptional selectivity provides outstanding crop safety
- Rapid uptake reinforces reliable performance
- Effective against wild radish resistant to Group B, Group F and Group I herbicides

RESISTANCE MANAGEMENT

Resistant weeds warning

Cereal growers have experienced increasing weed management problems resulting from the development of herbicide resistance in weeds over the past 15 years. As a result, cereal growers are looking for new solutions to deal with these problems.

Effective on resistant weeds

Pyrasulfotole is an effective tool in the management of broadleaf weed populations that are resistant to various modes of action including the Group B ALS inhibitors (e.g. sulfonylureas, like triasulfuron, chlorsulfuron & metsulfuron-methyl), Group F PDS inhibitors (e.g. diflufenican & picolinafen) and Group I synthetic auxins (e.g. MCPA, 2,4-D). In conjunction with Integrated Weed Management (IWM) practices, pyrasulfotole will continue to help control herbicide-resistant broadleaf weeds.

Potential for development of weeds resistant to pyrasulfotole

Presently there are no known populations in the world (including Australia, Canada or the USA) where there is weed resistance to the 4-HPPD inhibitor group of herbicide products i.e. Velocity. To minimise the development of resistant weed biotypes, general Integrated Weed Management (IWM) principles such as crop and herbicide rotation are recommended.

GROUP **H|C** HERBICIDE

Resistant Weeds Warning

Velocity contains members of the pyrazolone (pyrasulfotole) and nitrile (bromoxynil) groups of herbicides. Velocity is a herbicide which inhibits 4-hydroxyphenylpyruvate deoxygenase (4-HPPD) and also acts by disruption of plant cell growth. For weed resistance management, Velocity is a Group H and Group C herbicide. Some naturally-occurring weed biotypes resistant to Velocity, and other Group H and Group C herbicides, may exist through normal genetic variability in any weed population. The resistant individuals can eventually dominate the weed population if these herbicides are used repeatedly. These resistant weeds may not be controlled by Velocity or other Group H and Group C herbicides.

Since occurrence of resistant weeds is difficult to detect prior to use, Bayer CropScience Pty Ltd accepts no liability for any losses that may result from the failure of Velocity to control resistant weeds.

Use Velocity as part of an IWM program involving herbicides with other modes of action and non-chemical methods of control. CropLife Australia resistance management strategies are available from your local agricultural chemical supplier or the CropLife Australia website (www.croplife.com.au). Refer to these strategies for details of how to manage the build-up of resistant weeds on your farm.

APPLICATION

Velocity has a registered use pattern for wheat, barley, cereal rye and triticale. For effective use of Velocity, ensure that complete and even spray coverage of all targeted weeds is achieved. Velocity is predominantly a foliar herbicide, with limited activity via the soil. Velocity will not reliably control weeds that emerge after spraying. Results are best when applied under good growing conditions and with thorough coverage of weeds. Application to weeds or crops under stress should be avoided.

Adjuvant selection

A recommended crop oil must be used in conjunction with Velocity or Velocity tank-mixtures with other products.

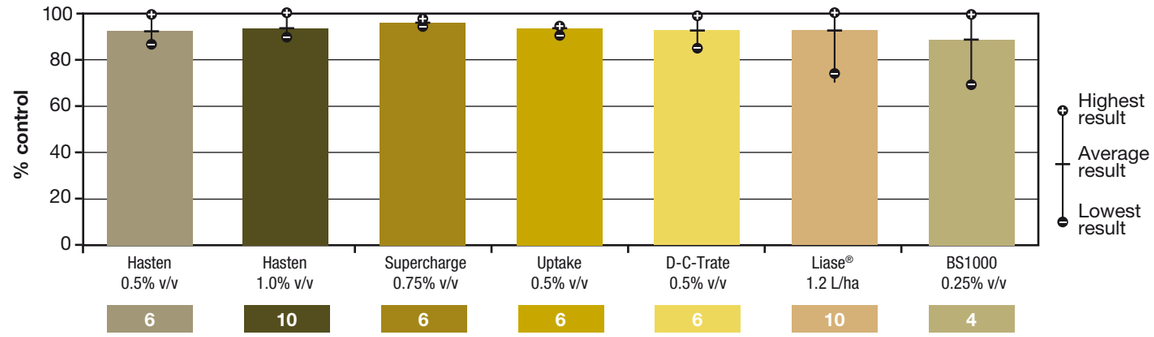
When using Velocity in tank-mixes refer to Tables 3 and 4 (page 24) for the appropriate wetting agent/adjuvant recommendation with compatible products.

Bayer CropScience has conducted a number of trials to determine the impact of using alternative adjuvants. Final control was satisfactory with non-ionic surfactants (BS1000 at 0.25% v/v), mineral oil (D-C-Trate® Advance at 0.5% v/v), paraffin oil plus surfactant (Uptake® at 0.5% v/v) and the paraffin oil, Supercharge® (0.75% v/v).

The trial summaries below demonstrate that although satisfactory control may be obtained with alternative adjuvant systems, speed of kill and selectivity may be affected. For this reason Hasten 1% (v/v) is currently the only adjuvant recommended for use with Velocity.

Further trial work is ongoing to investigate alternative adjuvant systems to recommend with Velocity herbicide.

Graph 1: Broadleaf weed control using different adjuvants when Velocity applied at rate of 500 mL/ha.

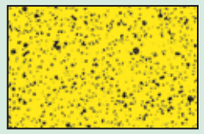


Trial ID: 05NW19, 05VA19, 05WA01, 05WB16, 08NW04, 08VB09, 08VE05, 08WA06, 08WA17, 08WB09.

Examples of spray coverage using water sensitive paper

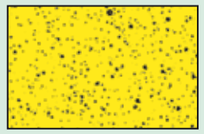
Excellent coverage

Use MEDIUM/FINE droplet size



Adequate coverage

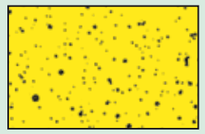
Use MEDIUM* droplet size



Coverage in these ranges will produce optimal weed control, provided weeds are not stressed. For the most effective control, aim for **adequate coverage** as a minimum.

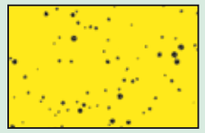
Fair coverage

MEDIUM/COARSE droplet size



Poor coverage

COARSE droplet size



Coverage in these ranges will produce marginal results. If there are negative conditions such as stress on target weeds or adverse weather, weed control will be unsatisfactory.

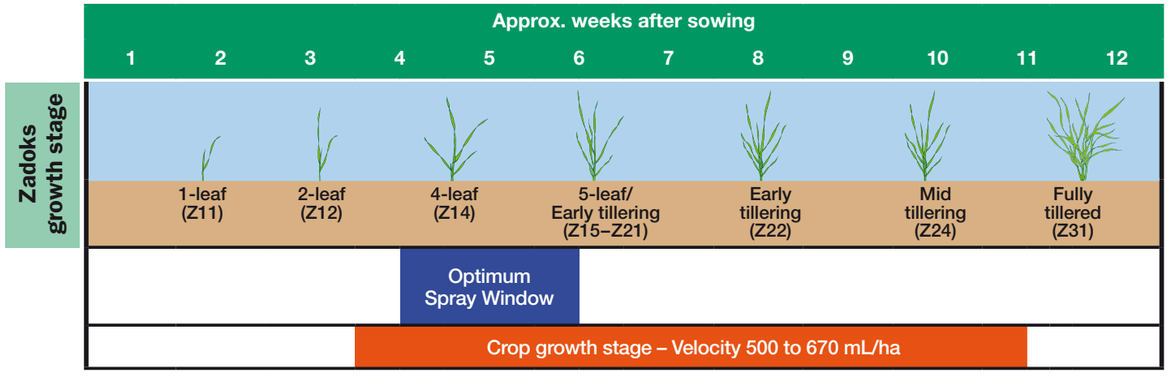
* MEDIUM droplets only permitted for use with Velocity.

Recommended growth stage

Velocity contains bromoxynil-octanoate and bromoxynil-heptanoate. Wheat, barley, triticale and cereal rye should be at a minimum 2-leaf stage (Z12 growth stage) before application of Velocity.

Optimum results are achieved when sprayed 4–6 weeks after sowing, onto maximum 4-leaf weeds when cereals have usually 2 to 5 leaves (Z12–Z21).

DO NOT apply later than Z30 (late tillering).



Mixing

Half-fill the spray tank with water and then, with agitators in motion, add the correct amount of Velocity directly into the spray tank. Add other relevant compatible herbicides, then adjuvant or crop oil as recommended. Complete filling the tank with agitators in motion. Agitation must continue before and during spraying.

Sprayer equipment

Velocity should be applied using correctly calibrated spray equipment. Achieving even and thorough coverage of the target weeds (leaf area and growing point) is essential to optimise the control of targeted broadleaf weeds with Velocity. An even droplet density as shown to the right under **adequate coverage** is the MINIMUM coverage required for effective weed control.

Ground-rig application

Ground sprayers – It is recommended that the product is applied in 70 to 150 L water/ha. USE ONLY medium spray droplet size as classified according to ASAE S572 definition for standard nozzles. In the case of advanced weeds (greater than 4-leaf at application), heavy weed density (causing shading of weeds) or heavy crop canopy (causing shading of weeds), it is recommended that a spray volume at the upper end of the 70–150 L water/ha range is used as adequate coverage is critical to ensure control.

The use of nozzles that will deliver a medium spray quality is recommended. Nozzles creating coarse or very coarse spray qualities have not been thoroughly investigated at this time and cannot be recommended. Contact your Bayer CropScience representative for advice before applying this product through such nozzles.

Aerial application

Application of Velocity by aircraft is not permitted.

Spray clean-up

The sprayer must be thoroughly cleaned before being subsequently used to spray crops other than winter cereals. Ensure that the following operation is carried out in an area that is clear of waterways, desirable vegetation and tree roots, and preferably in an area where drainings can be contained.

Fill the boom tank with water, rinse and repeat this procedure (i.e. fill and rinse the tank twice), then remove and clean all filters (in-line and nozzle) separately. This should be done immediately after spraying is finished to prevent dried residues adhering to the tank/lines/filters. A boom-cleaning agent may be used.

When a tank-mixture of Velocity with a compatible product has been used, more rigorous cleaning of the sprayer may be required than when using Velocity alone. In this event, refer to the compatible product label for appropriate instructions.

Time of day

Optimum performance of Velocity occurs when it is applied in high light intensity situations. To maximise the efficacy of Velocity apply during the day and at least 1 hour before sunset, particularly if followed by low overnight temperatures.

Restraints

DO NOT use if rainfall or irrigation is to occur within 2 hours of application.

DO NOT apply to frost-affected weeds or if frosts are imminent.

DO NOT apply without adjuvant/crop oil. See '**Use of Adjuvant/Crop Oil/Wetting Agent**' under 'General Instructions'.

DO NOT apply to broadleaf crops, e.g. canola, chickpea, clover, faba bean, lupin, lucerne, medic or vetch.

DO NOT apply to any crop other than wheat, barley, cereal rye or triticale.

DO NOT apply using aircraft.

DO NOT apply through a mister.

DO NOT apply when windspeed is less than 3 or more than 20 km per hour at application site.

DO NOT apply during surface temperature inversion conditions at application site.

DO NOT apply with smaller than **MEDIUM** spray droplets according to ASAE S572 definition for standard nozzles.

DO NOT apply using a boom height of more than 50–55 cm above the ground.

DO NOT apply if there are livestock, pasture or any land that is producing feed for livestock within **180 metres** downwind from the applicaton area.

DO NOT apply if there are aquatic and wetland areas, including aquacultural ponds or surface streams and rivers, within **5 metres** downwind from the application area.

DO NOT apply if there are sensitive crops, gardens and landscaping vegetation or protected non-target vegetation within **40 metres** downwind from the application area.

Withholding periods

Harvest

NOT REQUIRED WHEN USED AS DIRECTED

Grazing/Stockfood

DO NOT GRAZE OR CUT FOR STOCKFOOD FOR 5 WEEKS AFTER APPLICATION

Key success factors

- Weed and crop densities need to be low enough to ensure shading of weeds does not occur.
- Weed size needs to be considered in conjunction with weed density – the rate of Velocity may need to be increased as per label instructions.
- Droplet size is critical for coverage of the target weed: a MEDIUM droplet size should be used.
- As weed and crop densities increase, water volume, and the rate of Velocity, may need to be increased as per label instructions.
- Reducing application rates may lead to the onset of resistance problems; follow the Velocity label for required rates.
- To maximise efficacy of Velocity, apply in high light intensity during the day and at least 1 hour before sunset.
- Chemical rotations and IWM practices should be incorporated in all farm spray programs to ensure herbicide resistance does not become an issue; follow CropLife Australia resistance management strategies.

WEED CONTROL – EFFICACY

The efficacy of Velocity is related to growing conditions. Weed control under poor growth situations (e.g. low or excess moisture, temperatures not favourable to weed growth, or poor nutrition) may be inferior to those achieved under good conditions.

Temperature

DO NOT apply to frost-affected weeds or if frosts are imminent.

Weed density

Velocity is most effective when applied, with good coverage, to actively growing weeds. For reliable control, good contact must be made with each weed plant. Higher weed density may cause shading of plants lower in the weed canopy and effective control may not occur. The shading of weeds lower in the plant canopy may require a follow-up application of a suitable herbicide to control plants remaining after an application of Velocity.

DO NOT use the 500 mL/ha rate for the control of dense wild radish populations (>75 /m^2) or on populations where wild radish leaf shading occurs. For dense wild radish populations, increasing the rate to 670 mL/ha will improve control in most situations. If coverage is considered an issue on densities less than 75 /m^2, then the Velocity rate should be increased to 670 mL/ha. Even then full control may not be obtained.

Where crop or weed density is high, water volume should also be increased to the higher rate range of 70–150 L/ha.

Weed emergence after application

Velocity will not reliably control subsequent germinations of weeds. A follow-up application of a suitable herbicide may be required to control remaining plants or plants that emerge after application.

Weed stage

Weed age and weed size normally go hand-in-hand. Small weeds, however, are not always young weeds. To arrive at a sound spraying decision, don't just check the above-ground parts of the plant for size, but also the roots for the age of the weed. If the roots are larger than could be normally be expected at a determined leaf stage of the weed, consult your agronomist or Bayer CropScience Territory Sales Manager.

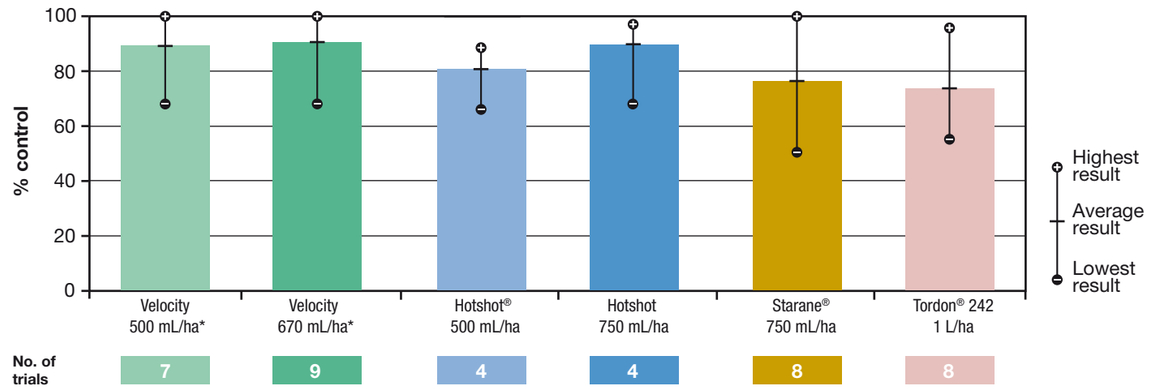
THE RESULTS

Trial results in the following section demonstrate the range of results obtained from field trials for each treatment in the graphs. They are not necessarily the same trials or even the same number of trials within the graph. As a result, some graphs provide an indication of the reliability of different treatments rather than a direct comparison between them.

The upper weed stage in the directions for use section for each weed refers to the maximum weed stage not the average weed stage. Thus a 2 up to 6-leaf weed means 6-leaf is the maximum.

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
BINDWEED (***Fallopia convolvulus***)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 4-leaf	500	Following germinations of bindweed may occur after application. Refer to General Instructions – "Weed density" and "Weed emergence after application".
			2 up to 6-leaf	670	

Graph 2: Bindweed *(Fallopia convolvulus)*

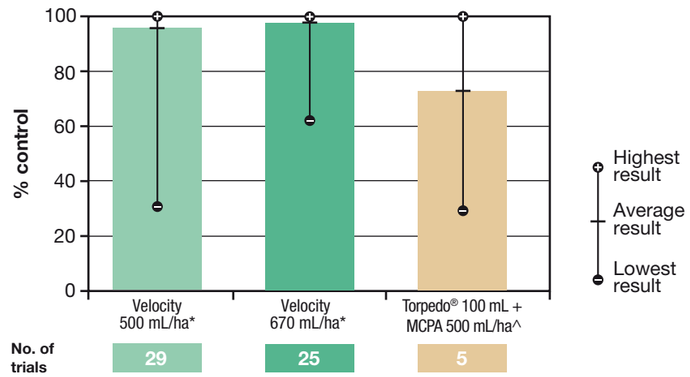


Trial ID: 04ND29, 05ND18, 05ND27, 05ND28, 05ND29, 05ND30, 06NC03, 06NC04, 06QC02, 06QC03.

*Hasten 1% v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
CAPEWEED (***Arctotheca calendula***)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500 – 670	Use the higher rate on higher density populations.

Graph 3: Capeweed *(Arctotheca calendula)*

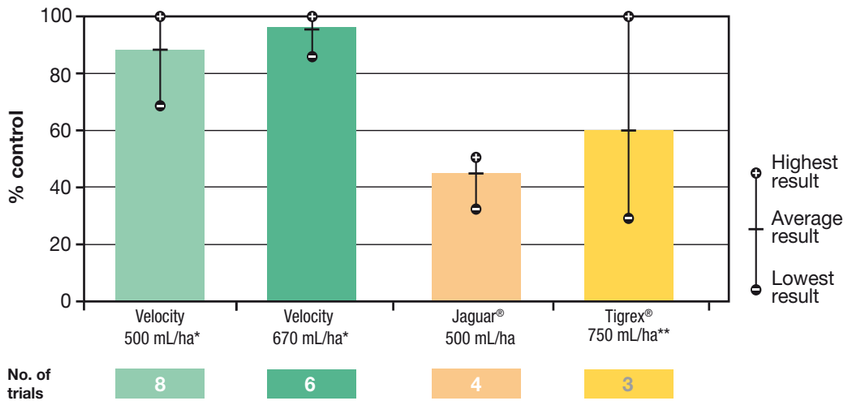


Trial ID: 03WA14, 03WA15, 04VB08, 04WA05, 04WA06, 04WA07, 04WA08, 04WA09, 05ND03, 05NW06, 05NW19, 05SA03, 05VB04, 05VB11, 05WA01, 05WA02, 05WA03, 05WA05, 05WA06, 05WA07, 05WA11, 06NB05, 06NW06, 06VA12, 06VD09, 06VD14, 06VD15, 06WA02, 07ND12, 07NW17, 07NW29, NSW07_43, 07SB07, 07VB06, 07WA03, 07WA05, 07WA06, 07WB09, 07WB11, 07WC09, 07WC18.

DOUBLEGEE (*Emex australis*)

Crop	State	Weed stage	Rate (mL/ha)	Critical comments
Wheat, cereal rye, triticale, barley – ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 4-leaf	500 – 670	Use the lower rate for good weed growing conditions.

Graph 4: Doublegee *(Emex australis)*



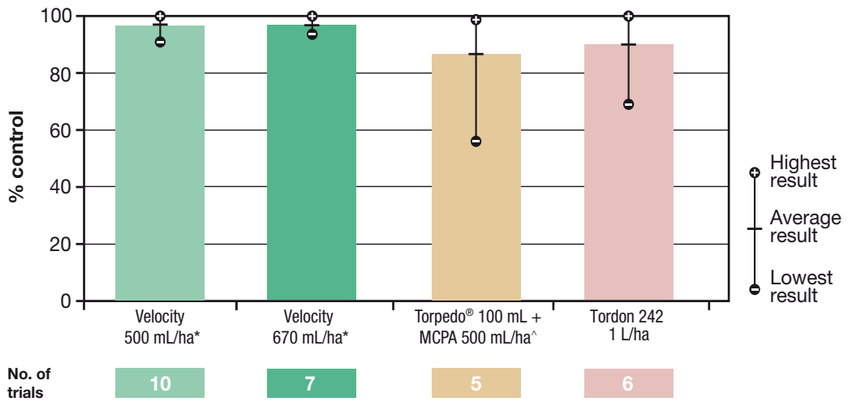
Trial ID: 04WA06, 04WA07, 04WB09, 05WA01, 05WA06, 05WA11, 07WA03, 07WA04, 07WB09, 07WC07, 07WD02.

* Hasten 1% v/v ** Not a registered label rate. Rate used for comparative purposes only.

SOWTHISTLE (*Sonchus oleraceus*)

Crop	State	Weed stage	Rate (mL/ha)	Critical comments
Wheat, cereal rye, triticale, barley – ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 8-leaf	500	–

Graph 5: Sowthistle *(Sonchus oleraceus)*



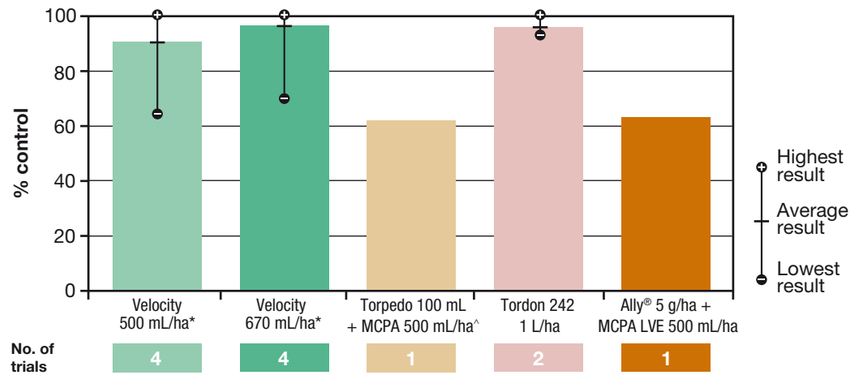
Trial ID: 05ND07, 05SA05, 05VA19, 06NC01, 06NC02, 06ND04, 06QC01, 06QC04, 07ND10, 07ND13, 07VB09, 07QA01, 07QA06.

* Hasten 1% v/v ^ Uptake 0.5% v/v

TURNIP WEED (*Rapistrum rugosum*)

Crop	State	Weed stage	Rate (mL/ha)	Critical comments
Wheat, cereal rye, triticale, barley – ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 8-leaf	500	–

Graph 6: Turnip weed *(Rapistrum rugosum)*



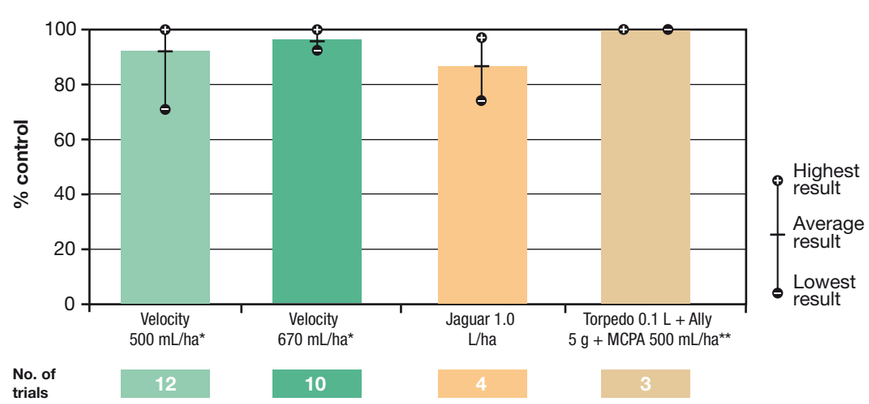
Trial ID: 05ND04, 05ND07, 06QC01, 07ND10, 07QA01, 07QA05, 08NE01, 08QA06.

* Hasten 1% v/v ^ Uptake 0.5% v/v

FUMITORY (*Fumaria densiflora*)

Crop	State	Weed stage	Rate (mL/ha)	Critical comments
Wheat, cereal rye, triticale, barley – ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500 – 670	Use the higher rate on higher density populations. Insufficient information exists on other fumitory species.

Graph 7: Fumitory *(Fumaria densiflora)*

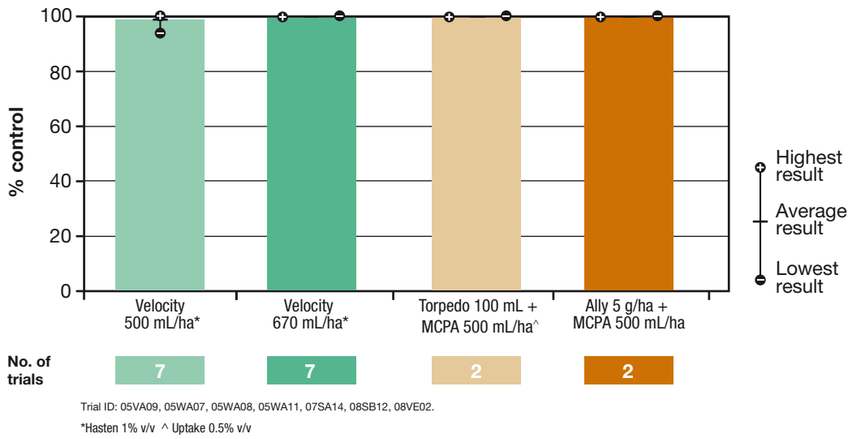


Trial ID: 05ND05, 06NB06, 06ND01, 06NW05, 06NW26, 06SA56, 07ND08, 07NW14, 07NW18, 07CQ02, 07VB04, 07VB07, 07VD94, 07VD95.

*Hasten 1% v/v, ** BS 1000 0.1 % v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
WILD TURNIP (*Brassica tournefortii*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 8-leaf	500	–

Graph 8: Wild turnip *(Brassica tournefortii)*

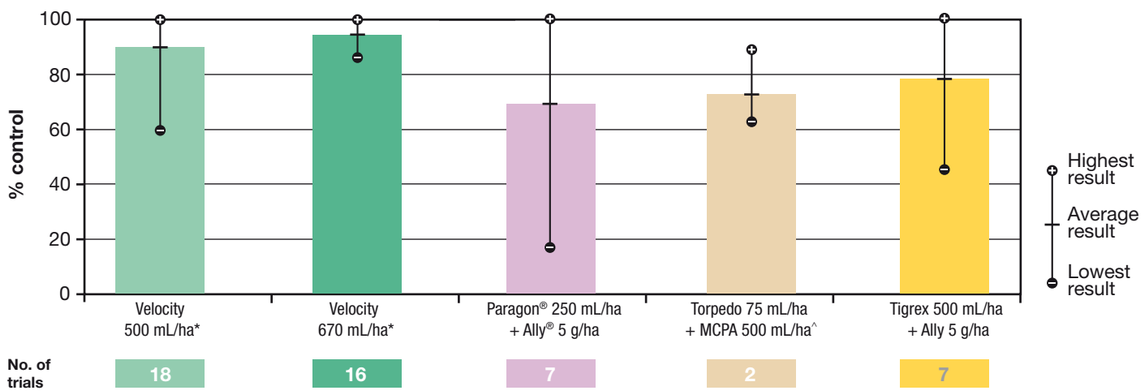


Trial ID: 05VA09, 05WA07, 05WA08, 05WA11, 07SA14, 08SB12, 08VE02.

*Hasten 1% v/v ^ Uptake 0.5% v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
WIREWEED (*Polygonum aviculare*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500	**Suppression of wireweed** – will suppress the growth of wireweed but may not adequately reduce plant numbers.
				670	**Control of wireweed.**

Graph 9: Wireweed *(Polygonum aviculare)*

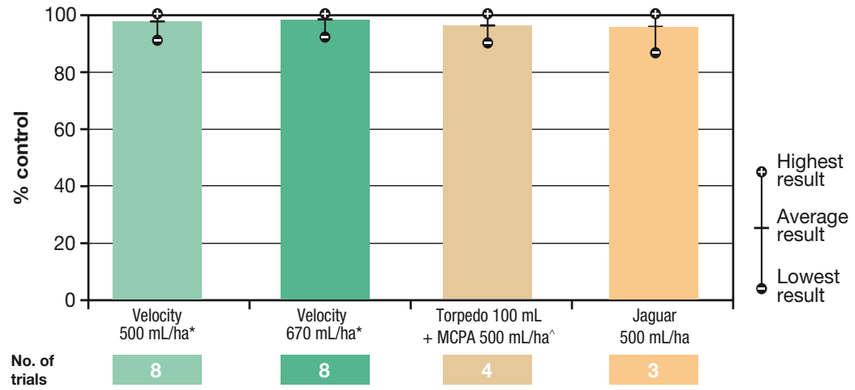


Trial ID: 04NW10, 04NW23, 04VB08, 04VB08, 05ND06, 05ND30, 05SA03, 05VB04, 06NB04, 06NB06, 06ND03, 06VA11, 06VB05, 07ND08, 07NW15, 07NW16, 07SA11, 07SB01, 07SB07, 07VA20, 07VA28, 07WC08.

* Hasten 1% v/v ^ Uptake 0.5% v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
2–4 leaf WILD RADISH (*Raphanus raphanistrum*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 4-leaf	500	Use the 670 mL/ha rate for the control of dense wild radish populations (>75/m^2) or where total weed density is high. In dense wild radish populations, increasing the rate to 670 mL/ha will give good control in most situations. Because high weed density may cause shading of weeds lower in the plant canopy a follow-up application of a suitable herbicide may be required to control plants remaining after an application of Velocity Selective Herbicide. Following germinations of wild radish may occur after application. Refer also to comments in the General Instructions under "Weed emergence after application".

Graph 10: 2–4 leaf Wild radish *(Raphanus raphanistrum)*

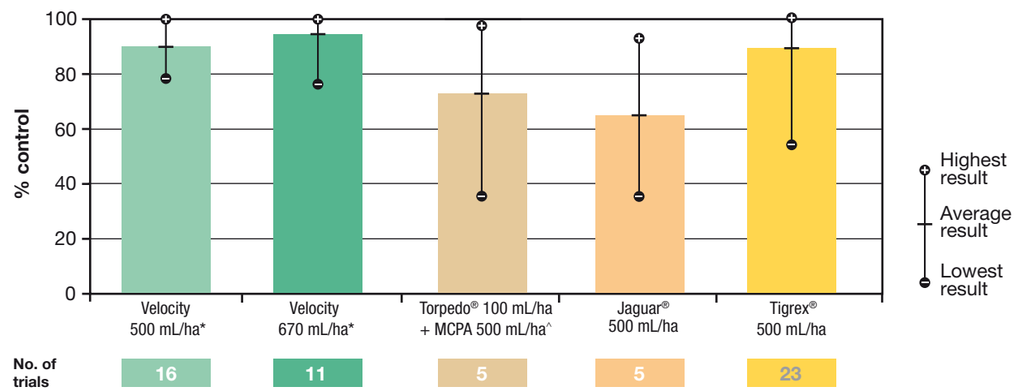


Trial ID: 03NW13, 03WA15, 04WA04, 04WA08, 04WB17, 05ND01, 05ND02, 05NW03, 05NW06, 05NW19, 05VA09, 05WA02, 05WA05, 05WA06, 06VA18, 06WA08, 06WA11, 07VA29, 07WA06, 07WC08, 07VD80, 08WA04, 08WA21, 08WA21.

* Hasten 1% v/v ^ Uptake 0.5% v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
4–6 leaf WILD RADISH (*Raphanus raphanistrum*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	Up to 6-leaf	670	Use the 670 mL/ha rate for the control of dense wild radish populations (>75/m^2) or where total weed density is high. In dense wild radish populations, increasing the rate to 670 mL/ha will give good control in most situations. Because high weed density may cause shading of weeds lower in the plant canopy a follow-up application of a suitable herbicide may be required to control plants remaining after an application of Velocity Selective Herbicide. Following germinations of wild radish may occur after application. Refer also to comments in the General Instructions under "Weed emergence after application".

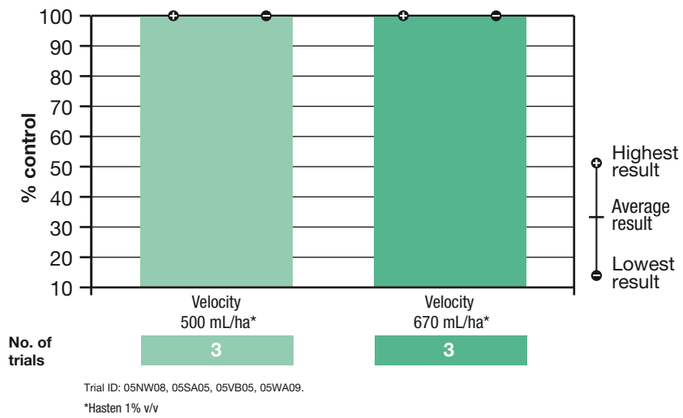
Graph 11: 4–6 leaf Wild radish *(Raphanus raphanistrum)*



Trial ID: 03ND10, 03VB06, 04NW09, 04VB07, 04VB08, 04WA05, 04WA09, 04WB10, 04WB17, 05VA08, 05VB01, 05VB02, 06NB04, 06NB05, 06NW02, 06NW03, 06NW12, 06SA03, 06VB04, 06VB07, 06WA09, 06WC08, 07JT02, 07NW53, 07SA10, 07VA23, 07VB05, 07VB21, 07WA57, 07WB08, 07WB12, 07WC02, 07WC03, 07WC05, 07VD84, 08SA12, 08WA06, 08WB09.

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
VOLUNTEER CANOLA (*Brassica napus*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 8-leaf	500	–

Graph 12: Canola *(Brassica napus)*



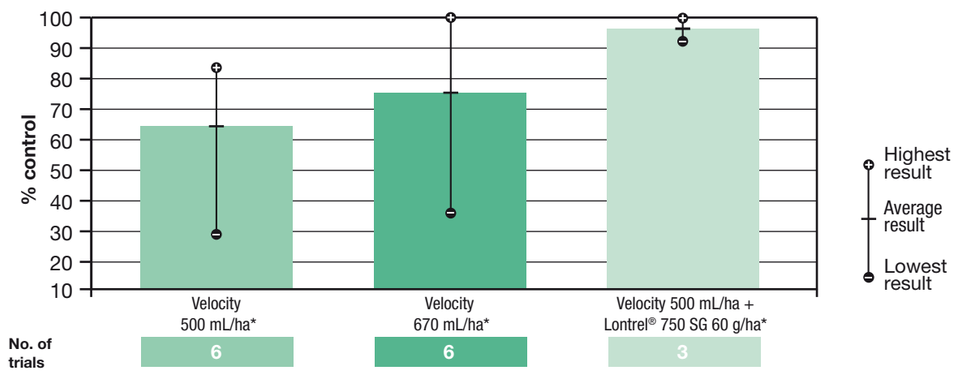
Trial ID: 05NW08, 05SA05, 05VB05, 05WA09.

*Hasten 1% v/v

VOLUNTEER LEGUMES

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
CHICKPEAS (*Cicer arietinum*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500	**Suppression of chickpeas** – will suppress the growth of chickpeas but may not adequately reduce plant numbers.

Graph 13: Chickpeas *(Cicer arietinum)*



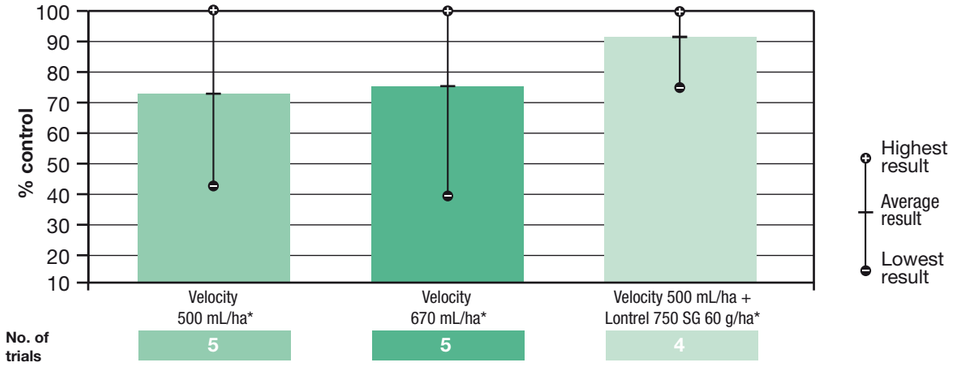
Trial ID: 05NW08, 05SA05, 05VB05, 05WA09, 06SA04, 06VA13, 06WA04, 07VA22, 07WA06.

*Hasten 1% v/v

VOLUNTEER LEGUMES

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
FABA BEANS (*Vicia faba*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500	–

Graph 14: Faba beans *(Vicia faba)*

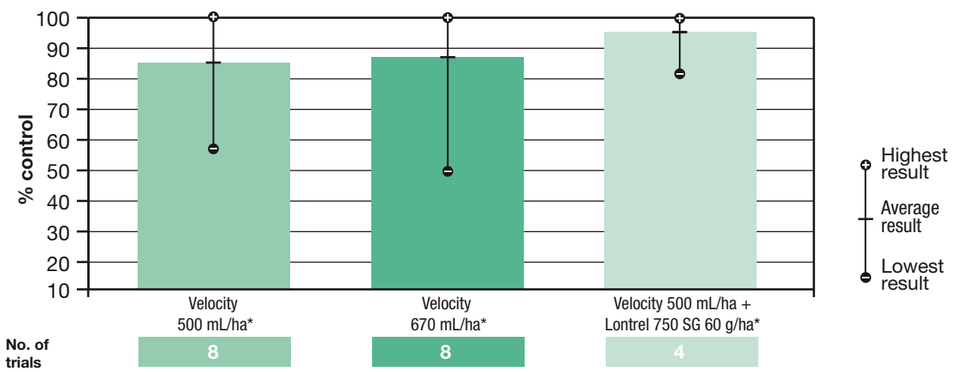


Trial ID: 05NW08, 05SA05, 06WA04, 07SA14, 07VA22, 07WA06.

*Hasten 1% v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
FIELD PEAS (*Pisum sativum*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 8-leaf	500	**Suppression of field peas** – will suppress the growth of field peas but may not adequately reduce plant numbers.
				670	**Control of field peas.**

Graph 15: Field peas *(Pisum sativum)*



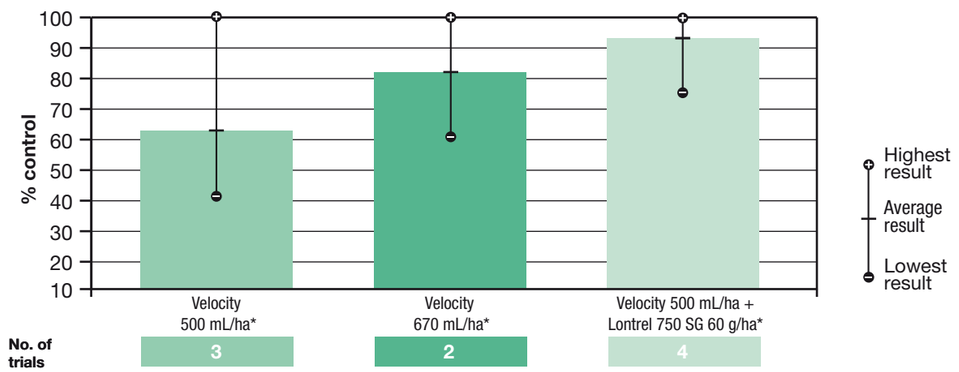
Trial ID: 05NW08, 05SA05, 05WA09, 06SA04, 06WA04, 07SA14, 07VA22, 07WA06.

*Hasten 1% v/v

VOLUNTEER LEGUMES

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
LENTILS (***Lens culinaris***)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500	**Suppression of lentils** – will suppress the growth of lentils but may not adequately reduce plant numbers.

Graph 16: Lentils *(Lens culinaris)*

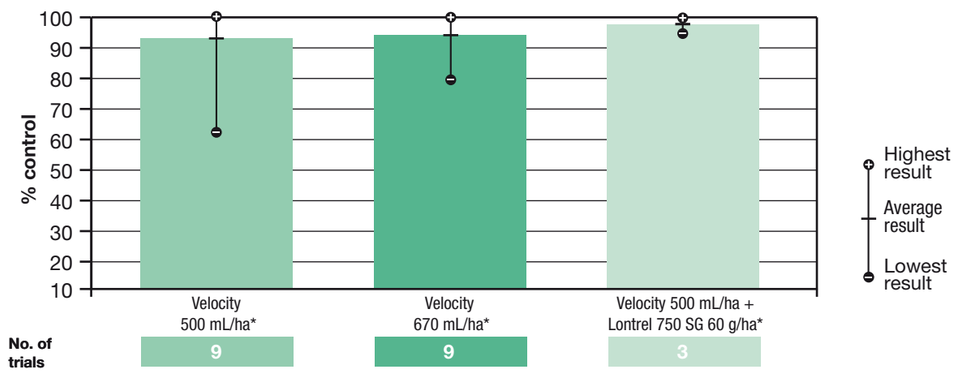


Trial ID: 06ND01, 06WA04, 07SA14, 07VA22, 07WA06.

*Hasten 1% v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
LUPINS (***Lupinus* spp.**)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 8-leaf	500 – 670	Use the higher rate on higher density populations.

Graph 17: Lupins *(Lupinus* spp.*)*



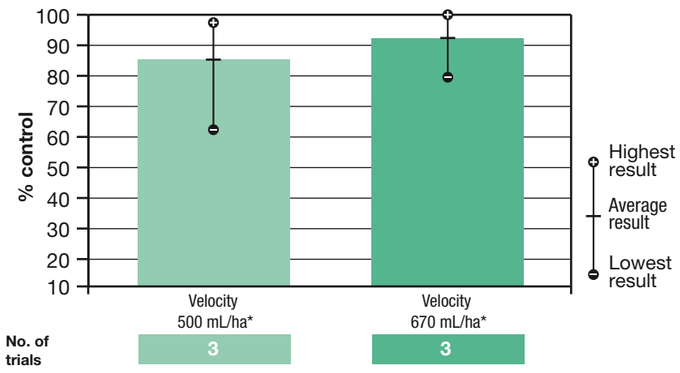
Trial ID: 04WB09, 05SA03, 05SA05, 05WA09, 05WB16, 06NB06, 06SA04, 07SA10, 07VA22, 07WA06, 07WA04.

*Hasten 1% v/v

VOLUNTEER LEGUMES

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
LUCERNE SEEDLING (***Medicago sativa***)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500	–

Graph 18: Lucerne seedling *(Medicago sativa)*

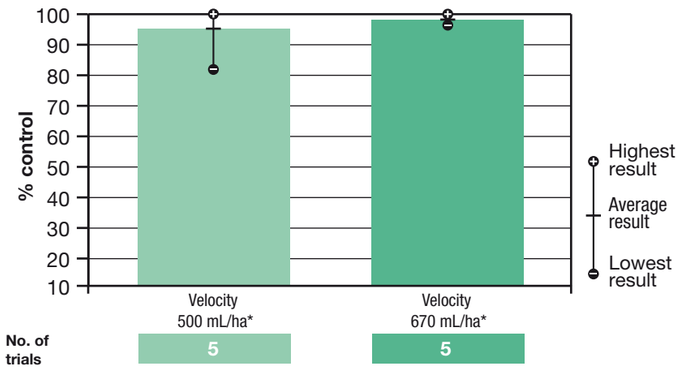


Trial ID: 06NC03, 06NC04, 07VA22.

*Hasten 1% v/v

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
MEDIC (***Medicago* spp.**)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500	**Suppression of medic** – will suppress the growth of medic but may not adequately reduce plant numbers.
				670	**Control of medic.**

Graph 19: Medic *(Medicago* spp.*)*



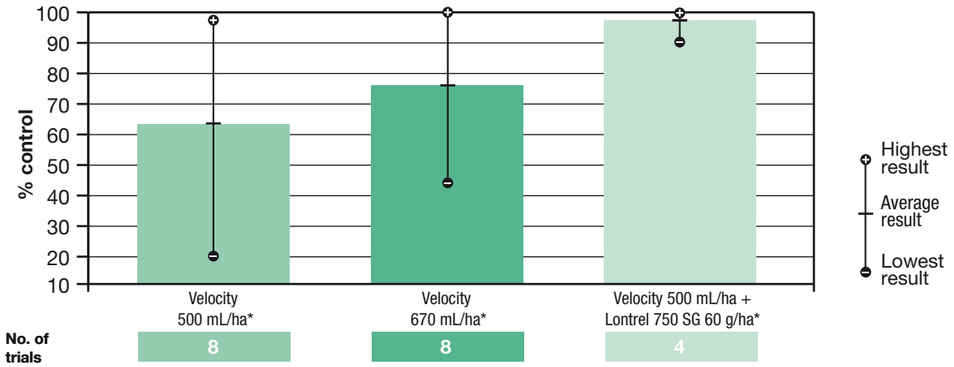
Trial ID: 06WA04, 07SA14, 06NW08, 06SA05, 05WA09.

*Hasten 1% v/v

VOLUNTEER LEGUMES

	Crop	State	Weed stage	Rate (mL/ha)	Critical comments
VETCH (*Vicia sativa*)	**Wheat, cereal rye, triticale, barley –** ≥ 2-leaf (Z12) to fully tillered (Z30)	All States	2 up to 6-leaf	500	**Suppression of vetch** – will suppress the growth of vetch but may not adequately reduce plant numbers.

Graph 20: Vetch *(Vicia sativa)*



Trial ID: 05SA04, 05VA19, 06WA04, 07SA12, 07SA14, 07SB01, 07VA22, 07WA06.

*Hasten 1% v/v

BROAD-SPECTRUM ACTIVITY

Since the beginning of the development program for Velocity, its activity on many broadleaf weeds has been researched. However, the number of replicated trials conducted for many weeds has not been sufficient to submit for registration. The following weed activity table has been included to provide further and better information for agronomists when giving advice on weed control of Velocity. Included in the table are those weeds registered and a list of weeds with insufficient data for registration.

This table is intended as a guide only. Bayer CropScience does not support the use of Velocity on weeds which are not registered on the product label or at rates which are not registered on the product label. These weeds may not be satisfactorily controlled or suppressed by Velocity.

The bracketed numbers indicate the number of trials on which the ratings are based.

>90	Excellent
80–90	Acceptable
<80	Inadequate
–	No Data

Table 1: Weed activity table

		Velocity rate		
		500 mL/ha	670 mL/ha	
Common name	**(Latin name)**	**Control rating (No. of trials)**		**Registration**
Bedstraw	*(Galium tricornutum)*	88% (4)	94% (8)	N
Bifora	*(Bifora testiculata)*	80% (2)	96% (2)	N
Bindweed	*(Fallopia convolvulus)*	90% (7)	94% (9)	Y
Canola	*(Brassica napus)*	100% (3)	100% (3)	Y
Capeweed	*(Arctotheca calendula)*	95% (29)	97% (25)	Y
Carrot weed	*(Cotula australis)*	99% (1)	80% (1)	N
Charlock	*(Sinapis arvensis)*	100% (1)	100% (1)	N
Chickpeas	*(Cicer arietinum)*	64% (6)	76% (6)	Y*
Chickweed	*(Cerastium glomeratum)*	66% (1)	67% (1)	N
Clover	*(Trifolium* spp.*)*	64% (7)	79% (6)	N
Corn gromwell; ironweed	*(Buglossoides arvensis)*	99% (2)	99% (4)	N
Crassula	*(Crassula sieberana)*	48% (3)	33% (3)	N
Cress	*(Lepidium* sp.*)*	63% (2)	86% (2)	N
Deadnettle	*(Lamium amplexicaule)*	95% (6)	96% (3)	Y
Doublegee	*(Emex australis)*	88% (8)	96% (6)	Y
Evening primrose	*(Oenothera affinis)*	93% (2)	93% (2)	N
Faba beans	*(Vicia faba)*	73% (5)	75% (5)	Y*
Field peas	*(Pisum sativum)*	85% (8)	87% (8)	Y*
Fleabane	*(Conyza* sp.*)*	92% (1)	–	N
Fumitory	*(Fumaria* spp.*)*	93% (12)	98% (10)	Y
Hoary cress	*(Cardaria draba)*	83% (1)	83% (1)	N
Indian hedge mustard	*(Sisymbrium orientale)*	98% (10)	98% (8)	Y
Ivy leaf speedwell	*(Veronica hederaefolia)*	23% (1)	30% (1)	N
Lentils	*(Lens culinaris)*	63% (3)	81% (2)	Y*
London rocket	*(Sisymbrium irio)*	87% (1)	100% (1)	N
Loosestrife	*(Lythrum hyssopifolia)*	70% (1)	70% (1)	N
Lucerne seedling	*(Medicago sativa)*	85% (3)	92% (3)	Y
Lupins	*(Lupinus* sp.*)*	93% (9)	94% (9)	Y
Maltese cockspur	*(Centaurea melitensis)*	89% (1)	92% (1)	N
Marshmallow	*(Malva parviflora)*	70% (4)	83% (8)	N
Matricaria	*(Oncosiphon piluliferum)*	–	70% (1)	N
Medic	*(Medicago* spp.*)*	95% (5)	99% (5)	Y

Common name	(Latin name)	500 mL/ha	670 mL/ha	Registration
Mexican poppy	*(Argemone mexicana)*	100% (1)	100% (1)	N
Muskweed	*(Myagrum perfoliatum)*	95% (2)	100% (1)	N
Paterson's curse	*(Echium plantagineum)*	100% (1)	100% (1)	N
Pimpernel	*(Anagallis arvensis)*	79% (1)	64% (1)	N
Poppy	*(Papaver* sp.*)*	100% (1)	100% (1)	N
Prickly lettuce	*(Lactuca serriola)*	96% (4)	95% (4)	N
Purple goosefoot	*(Scleroblitum atriplicinum)*	100% (1)	100% (1)	N
Saffron thistle	*(Carthamus lanatus)*	90% (3)	94% (4)	N
Serradella	*(Ornithopus sativus)*	95% (1)	100% (1)	N
Shepherd's purse	*(Capsella bursapastoris)*	100% (2)	100% (2)	Y
Sorrel	*(Rumex acetosella)*	33% (1)	–	N
Sowthistle	*(Sonchus oleraceus)*	98% (10)	98% (7)	Y
Spreading night phlox	*(Zaluzianskya divaricata)*	100% (1)	100% (1)	N
Stagger weed	*(Stachys arvensis)*	92% (1)	98% (1)	N
Storksbill	*(Erodium botrys)*	30% (1)	40% (1)	N
Turnip weed	*(Rapistrum rogosum)*	88% (4)	92% (4)	Y
Variegated thistle	*(Silybum marianum)*	100% (1)	100% (1)	N
Vetch	*(Vicia sativa)*	63% (8)	77% (8)	Y*
Wild radish (up to 4 leaf)	*(Raphanus raphanistrum)*	94% (8)	98% (7)	Y
Wild radish (4 to 6 leaf)	*(Raphanus raphanistrum)*	88% (16)	95% (11)	Y
Wild turnip	*(Brassica tournefortii)*	99% (7)	100% (7)	Y
Wireweed	*(Polygonum aviculare)*	91% (18)	96% (16)	Y
Yellow burrweed	*(Amsinckia lycopsoides)*	91% (1)	96% (1)	N

* Will suppress growth but may not adequately reduce plant numbers. Where control rather than suppression of chickpeas, faba beans, field peas, lentils and vetch is required the addition of Lontrel is recommended.

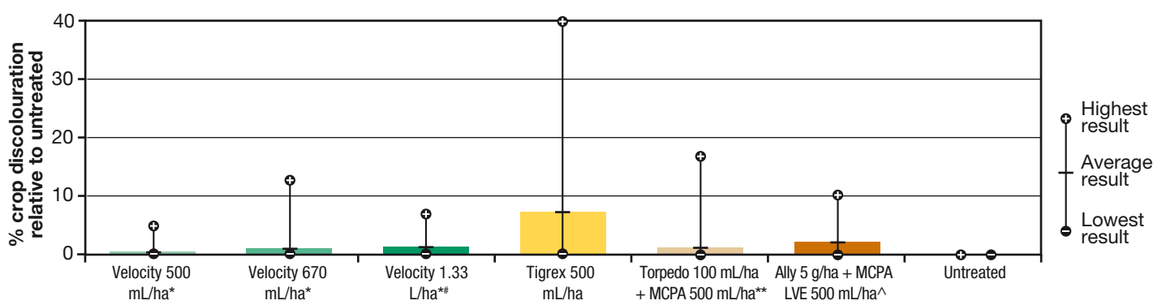
CROP SAFETY

Crop discolouration and biomass reductions

Velocity shows good crop safety, when used as directed. Some crop yellowing and growth retardation may occur within 2 to 5 weeks of application. Where up to 670 mL/ha of Velocity is applied in wheat and barley, any effects will be negligible and rapidly dissipate except in areas of boom overlap. In boom-overlap areas, growth retardation may occasionally remain until spring. Grain yield will not be compromised. Double spraying (boom overlap, corners, etc.) should be avoided wherever possible.

Velocity is not recommended for use in oats.

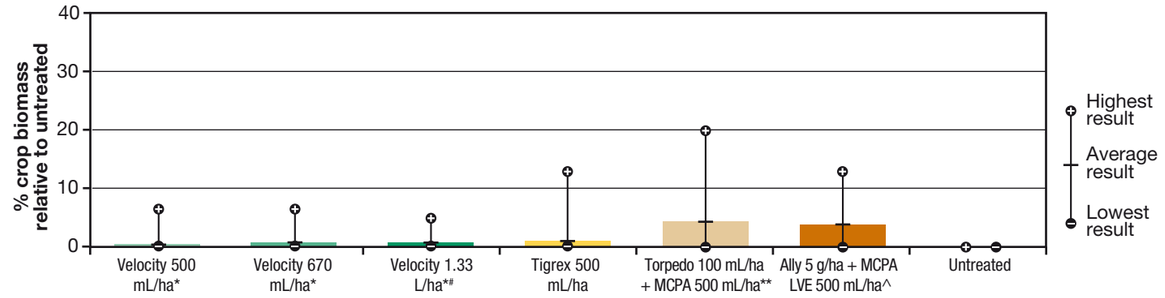
Graph 21: Crop discolouration in wheat trials



Trial ID: 05ND04, 05ND05, 05ND06, 05ND18, 05ND27, 05ND28, 05ND30, 05NW04, 05NW05, 05NW06, 05NW07, 05NW19, 05NW22, 05SA03, 05SA41, 05VA10, 05VB02, 05VB03, 05VB04, 05VB05, 05VB10, 05VB11, 05WA01, 05WA04, 05WA05, 05WA07, 05WA08, 05WA09, 05WA11, 03WB11, 05WB12, 05WB16, 05WB26, 06NB04, 06NB05, 06NB06, 06NC01, 06NC02, 06NC03, 06NC04, 06ND01, 06NW04, 06NW05, 06NW12, 06SA56, 06SA59, 06VA08, 06VA09, 06VA11, 06VA13, 06VB05, 06VB07, 06WB06, 06WB25, 06WC08, 06WC09, 06WC10, 07NW05, 07QA07, 07SA10, 07VB05 07WB08, 08NE01, 08NE02, 08NE03, 08NE05, 08SA16, 08SB08, 08VD19, 08WA05.

* Hasten 1% v/v ** Uptake 0.5% v/v ^ BS1000 0.1% v/v # Not a registered label rate. Data represents an overlap situation at the highest registered label rate.

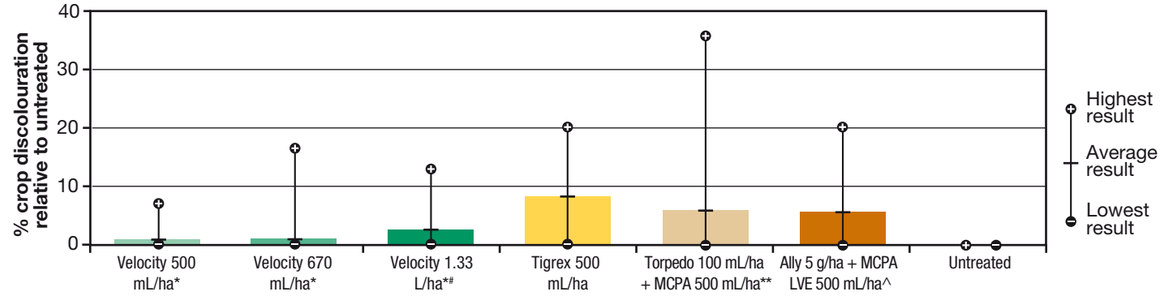
Graph 22: Crop biomass reduction in wheat trials



Trial ID: 05ND04, 05ND05, 05ND06, 05ND18, 05ND27, 05ND28, 05ND30, 05NW04, 05NW05, 05NW06, 05NW07, 05NW19, 05NW22, 05SA03, 05SA41, 05VA10, 05VB02, 05VB03, 05VB04, 05VB05, 05VB10, 05VB11, 05WA01, 05WA04, 05WA05, 05WA07, 05WA08, 05WA09, 05WA11, 03WB11, 05WB12, 05WB16, 05WB26, 06NB04, 06NB05, 06NB06, 06NC01, 06NC02, 06NC03, 06NC04, 06ND01, 06NW04, 06NW05, 06NW12, 06SA56, 06SA59, 06VA08, 06VA09, 06VA11, 06VA13, 06VB05, 06VB07, 06WB06, 06WB25, 06WC08, 06WC09, 06WC10, 07NW05, 07QA07, 07SA10, 07VB05 07WB08, 08NE01, 08NE02, 08NE03, 08NE05, 08SA16, 08SB08, 08VD19, 08WA05.

* Hasten 1% v/v ** Uptake 0.5% v/v ^ BS1000 0.1% v/v # Not a registered label rate. Data represents an overlap situation at the highest registered label rate.

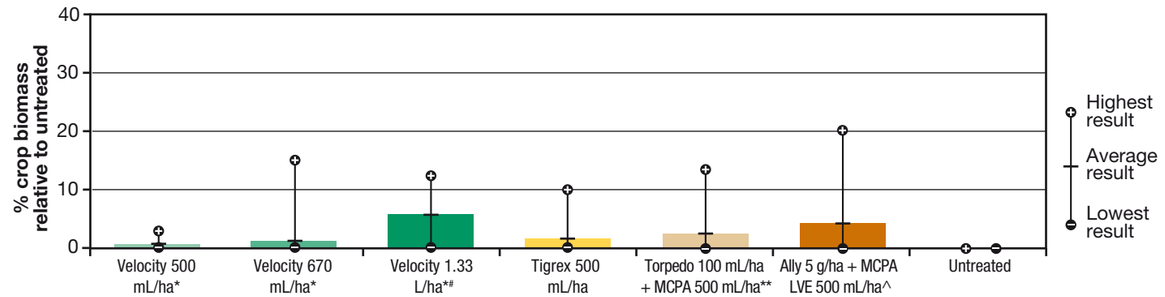
Graph 23: Crop discolouration in barley trials



Trial ID: 05ND03, 05SA05, 05VA09, 05VA11, 05NW22, 05SA41, 05VB10, 05WB26, 05SA59, 06WB25, 06VA19, 06NW06, 06QC01, 06QC02, 06QC03, 06QC04, 06SA04, 06SA59, 04VA18, 06WA11, 06WB25, 07ND11, 07QA01, 07QA06, 07SA13, 08NE04, 08SB11, 08SB12, 08VD08, 08VD181, 06VA13, 06VB05, 06VB07, 06WB06, 06WB25, 06WC08, 06WC09, 06WC10, 07NW05, 07QA07, 07SA10, 07VB05 07WB08, 08NE01, 08NE02, 08NE03, 08NE05, 08SA16, 08SB08, 08VD19, 08WA05.

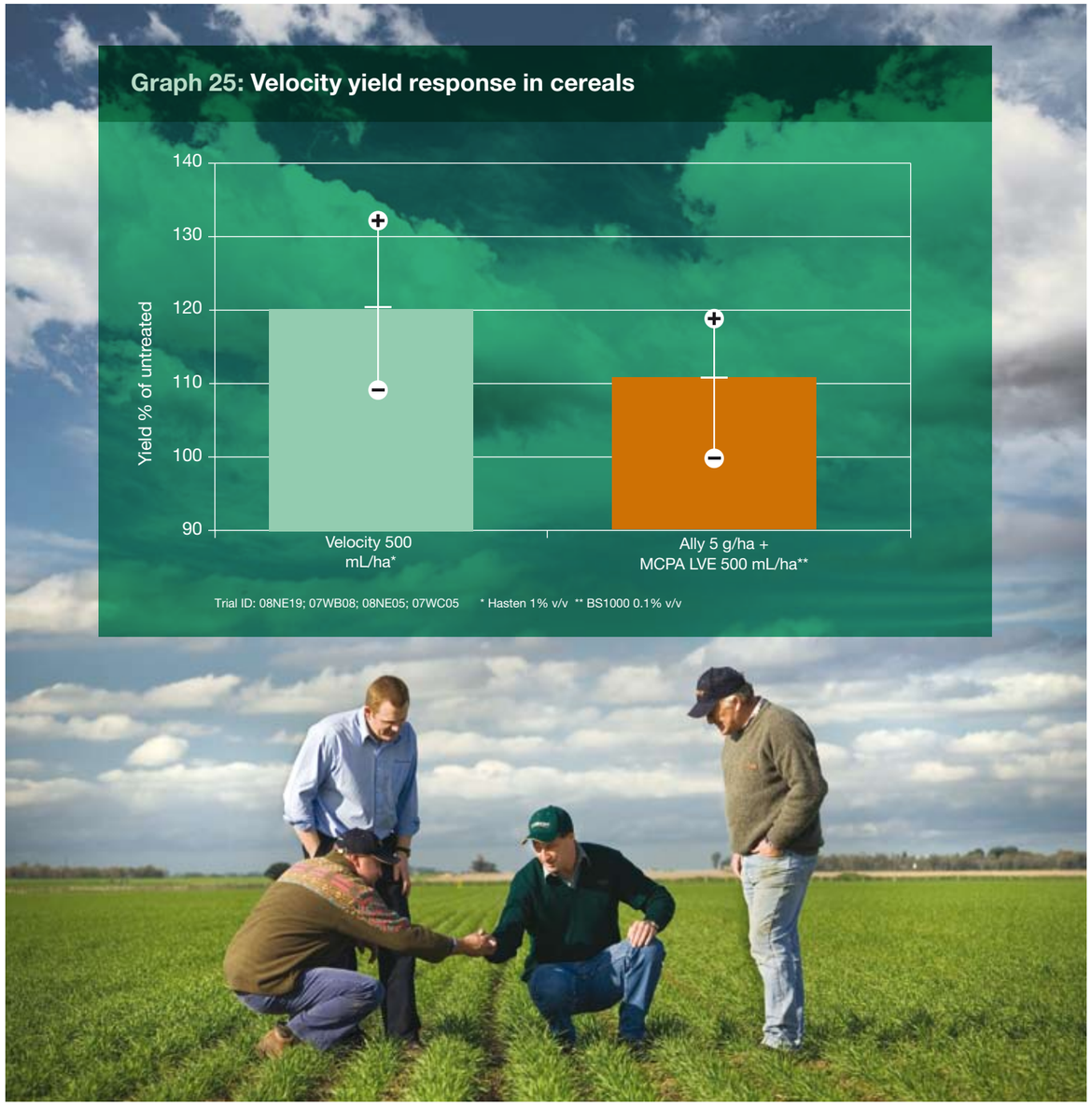
* Hasten 1% v/v ** Uptake 0.5% v/v ^ BS1000 0.1% v/v # Not a registered label rate. Data represents an overlap situation at the highest registered label rate.

Graph 24: Crop biomass reduction in barley trials



Trial ID: 05ND03, 05SA05, 05VA09, 05VA11, 05NW22, 05SA41, 05VB10, 05WB26, 05SA59, 06WB25, 06VA19, 06NW06, 06QC01, 06QC02, 06QC03, 06QC04, 06SA04, 06SA59, 04VA18, 06WA11, 06WB25, 07ND11, 07QA01, 07QA06, 07SA13, 08NE04, 08SB11, 08SB12, 08VD08, 08VD181, 06VA13, 06VB05, 06VB07, 06WB06, 06WB25, 06WC08, 06WC09, 06WC10, 07NW05, 07QA07, 07SA10, 07VB05 07WB08, 08NE01, 08NE02, 08NE03, 08NE05, 08SA16, 08SB08, 08VD19, 08WA05.

* Hasten 1% v/v ** Uptake 0.5% v/v ^ BS1000 0.1% v/v # Not a registered label rate. Data represents an overlap situation at the highest registered label rate.



COMPATIBILITY

With mixed infestations of broadleaf weeds and grass weeds, the flexibility to choose effective and efficient combinations is crucial.

Mixtures of Velocity with grass herbicides may lead to a reduction in grass weed control or an increase in crop effects. These effects can be minimised by closely following all use recommendations and restrictions.

The following table summarises our current knowledge of the compatibility of Velocity.

Compatibility

Always observe the more rigorous of the crop and crop safety restrictions from the Velocity and companion herbicide labels when tank-mixing.

When mixing with other herbicides increased crop effects may occur.

Under normal growing conditions this should not result in any yield loss.

For the latest information on mixing Velocity with other products, contact Bayer CropScience.

Table 2: Grass herbicide compatibility

Velocity Rate (mL/ha)	Herbicide mixing partner	Weed species				Crop effects	
		Wild oats (*Avena* spp.)	Brome grass (*Bromus* spp.)	Annual rye grass (*Lolium rigidum*)	Annual Phalaris (*Phalaris paradoxa*)	*Biomass*	*Discolour*
500	Achieve® (label rates)	*ID*	*NR*	*ND*	*NR*	*ND*	*ND*
670	Achieve (label rates)		*NR*	*ND*	*NR*		
500	Atlantis® OD 330 mL/ha				*ID*		
670	Atlantis OD 330 mL/ha				*ID*		
500	Axial® (label rates)		*NR*				
670	Axial (label rates)		*NR*				
500	Cheetah® Gold 1.0 L/ha	*	*NR*		*		
670	Cheetah Gold 1.0 L/ha		*NR*				
500	Crusader® 500 mL/ha				*		
670	Crusader 500 mL/ha						
500	Decision® 1.0 L/ha	*NR*	*NR*		*NR*		
670	Decision 1.0 L/ha	*NR*	*NR*		*NR*		
670	Hoegrass®	*ND*	*NR*	*ND*	*ND*	*ND*	*ND*
500	Hussar® OD 100 mL/ha	*ID*	*NR*	*ND*	*		
670	Hussar OD 100 mL/ha		*NR*	*ND*			
500	Monza® (Label rates)	*ND*	*ID*	*NR*	*ND*		
670	Monza (Label rates)	*ND*	*ID*	*NR*	*ND*		
500	Topik® 65 mL/ha		*NR*	*NR*	*ND*		
670	Topik 65 mL/ha		*NR*	*NR*			
500	Topik 85 mL/ha		*NR*	*NR*	*ND*		
670	Topik 85 mL/ha		*NR*	*NR*	*ND*		
500	Topik 105 mL/ha	*ID*	*NR*	*NR*	*ND*		
670	Topik 105 mL/ha	*ID*	*NR*	*NR*			
500	Tristar® Advance 1.5 L/ha		*NR*		*ND*		
670	Tristar Advance 1.5 L/ha		*NR*		*ND*		
500	Wildcat® 300 mL/ha		*NR*	*NR*	*ND*		
670	Wildcat 300 mL/ha		*NR*	*NR*	*ND*		
500	Wildcat 400 mL/ha		*NR*	*NR*			
670	Wildcat 400 mL/ha		*NR*	*NR*	*ND*		
500	Wildcat 500 mL/ha	*ND*	*NR*	*NR*			
670	Wildcat 500 mL/ha	*ND*	*NR*	*NR*			

ID = Insufficient data *ND* = No data *NR* = Not relevant * Under adverse conditions, substantial reduction in weed control may occur.

Trial ID's: 06ND08, 06ND10, 06ND18, 06ND19, 06ND20, 06NW13, 06NW15, 06VB11, 06QC07, 06WA15, 07ND05, 07ND06, 07ND15, 07NW33, 07WA02, 07WA44, 07WA45, 07SA08, 07VA15, 07VA16, 07ND07, 07NW26, 07SA66, 07SA72, 07SA73, 07VB13, 07QC01, 08WA01, 08WA02, 08WA03, 08ND06, 08ND07, 08WA02, 08NW03, 08WB08, 08SA08, 08SA10, 08VE01, 08QC03, 08QA07, 08QA05, 08NE06, 08NE07, 08VB19, 08QA06, 08SB09, 08SB10, 08QC02.

Table 2 Legend

Trials indicate no significant reduction in grass weed control when used as recommended. Results at below recommended rates may indicate some reduction in some cases. Mixtures may be used with minimal loss of activity under good growing conditions, with all label recommendations followed.

No data available.

Trials indicate some reduction in grass weed control or slightly increased crop effect at recommended rates, even under good growing conditions.

Trials at recommended rates indicate severe reduction in grass weed control and/or significant crop injury.

Table 3: Wetting agent/adjuvant recommendation with compatible grass selective herbicides
(also see Table 2)

COMPATIBLE PRODUCTS	Adjuvant recommendations
Achieve	Supercharge 0.75% v/v
Atlantis	Hasten 1% v/v
Axial	Adigor® 0.5% v/v
Cheetah Gold	Hasten 1% v/v
Decision	Hasten 1% v/v or Uptake 0.5% v/v
Hoegrass® 500	Hasten 1% v/v
Hussar OD	Hasten 1% v/v
Topik	Hasten 0.5% v/v
Tristar Advance	Hasten 1% v/v
Wildcat 110EC	BS1000 0.25% v/v

Table 4: Wetting agent/adjuvant recommendation with compatible broadleaf herbicides

COMPATIBLE PRODUCTS	Mix rate	Adjuvant
Ally	5 g	Hasten 1% v/v
Lontrel	Label rates	Hasten 1% v/v

Table 5: Compatibility with insecticides

Insecticides
These insecticides are physically compatible with Velocity, but have not been tested for biological compatibility.

INSECTICIDES	Mix rate
Le-mat® 290SL	Label rates
Fastac® Duo	240 mL/ha
Decis Options®	Label rates
Dimethoate	85 mL/ha
Bulldock® Duo	Label rates
Lorsban® 500EC	900 mL/ha

Table 6: Compatibility with fungicides

Fungicides
These fungicides are physically compatible with Velocity Selective Herbicide, but have not been tested for biological compatibility.

FUNGICIDES	Mix rate
Prosaro® 420 SC**	Label rates
Folicur® 430 SC	Label rates
Amistar® Extra	up to 800 mL/ha
Bayleton® 125 EC	1.0 L/ha
Tilt® Extra	500 mL/ha
Opus® 125 EC	500 mL/ha

** An application for registration of Prosaro 420 SC fungicide has been made. At the time of publication (April 2009), it is not registered.

For advice on the compatibility with other products, contact Bayer Crop Science.

RE-CROPPING

Minimum re-cropping intervals apply for all crops following Velocity application. To reduce the potential for herbicide damage to following crops, full soil disturbance cultivation prior to sowing is recommended. Re-cropping intervals are dependent on the rate of product applied, rainfall and soil pH. When used as directed grain yield is not compromised where transient biomass reduction or discolouration occurs.

Areas that receive double rates (boom overlaps) may show symptoms of damage in sensitive crops. This is generally restricted to discolouration (bleaching) of the crop, but may also result in biomass reduction or reduced yields in some situations.

Table 7: Re-cropping intervals

Crop – winter-sown	Re-cropping interval – alkaline soil	Velocity rate applied
Wheat, barley, oats, triticale	3 weeks	500 to 670 mL/ha
Canola, chickpeas, clover, faba beans, field peas, lentils, lucerne, lupins, vetch	9 months	500 to 670 mL/ha
Medic	21 months	500 to 670 mL/ha

Crop – summer-sown	Re-cropping interval – alkaline soil	Velocity rate applied
Maize, sorghum	5 weeks	500 to 670 mL/ha
Mung beans, soybeans, sunflowers	9 months	500 to 670 mL/ha
Cotton (Not suitable for planting less than 12 months after Velocity Selective Herbicide application. Biomass reduction or discolouration may occur where cotton is re-cropped following Velocity Selective Herbicide application on alkaline soils. For further advice, contact, Bayer CropScience.)	Re-cropping interval not yet available	500 to 670 mL/ha

Other factors influencing crop rotations

Rainfall – winter re-cropping

For crops listed as requiring a 9-month re-cropping interval, rainfall of less than 250 mm following use of Velocity may result in an extended re-cropping interval.

Patchy rain with extended dry periods may also result in an extended re-cropping interval, even when rainfall exceeds 250 mm. If in doubt, seek specialist advice.

Rainfall – summer re-cropping

Rainfall of less than 300 mm following application of Velocity may result in extended re-cropping intervals. Patchy rain, with extended dry periods may also result in extended re-cropping intervals, even when rainfall exceeds 300 mm. If in doubt, seek specialist advice.

pH

Application to soils with a pH greater than 8.4 (soil in water) has not been tested and is not recommended.

Re-cropping intervals may be reduced on acid soils (pH <7).

Tank-mixture with other herbicides

In the event that a tank-mixture of Velocity and another herbicide has been used, the longer re-cropping interval of the tank-mix products should be observed for the crop in question.

PRODUCT FORMULATION

Active ingredients

Trade name: Velocity Selective Herbicide

Crop safener: 9.4 g/L mefenpyr-diethyl

Solvent: 381 g/L hydrocarbon liquid

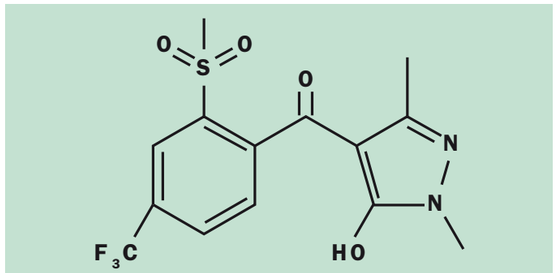
Active constituents: A. 37.5 g/L pyrasulfotole
B. 210 g/L bromoxynil

Active constituent A: 37.5 g/L pyrasulfotole

Chemical name: ((5-hydroxy-1, 3-dimethyl-1H-pyrazole-4-ethyl) [2-methylsulfonyl)-4-(trifluoromethyl)phenyl] methanone

Structural formula

(pyrasulfotole)

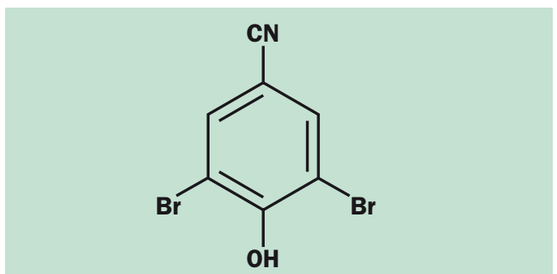


Active constituent B: 210 g/L bromoxynil

Chemical name: 3,5–dibromo hydroxybenzonitrile

Structural formula

(bromoxynil)



Formulation type: Emulsifiable concentrate (EC)

PHYSICAL PROPERTIES

Formulated product (Velocity):

Appearance: Translucent amber liquid

Odour: Aromatic solvent odour

Flash point: 91°C (combustible)

Corrosiveness: Velocity has shown itself to be mildly corrosive to steel in the development of the formulation. It is considered corrosive to the skin and eyes and care should be taken during manual handling of the formulation.

Specific gravity: 1.142 g/cm³ at 20°C

Dangerous good: Not classified as a dangerous good for road and rail transport.

Explosive properties: Velocity does not contain any formulants that have explosive properties, and therefore the formulation is not considered to have explosive potential.

Poison schedule: Schedule 6

Solubility in water: Emulsifies in water

TOXICOLOGICAL PROPERTIES

Velocity has a very favourable toxicological profile, exhibiting relatively low toxicity to mammalian species. Use of product as directed on the label poses minimal risk to non-target organisms.

Oral LD_{50} (rat): 500 mg/kg

Dermal LD_{50} (rat): >4000 mg/kg

Inhalation LC_{50} (4 h) (rat): >5 mg/L (aerosol) – highest attainable concentration

Skin irritation (rabbit): Mild skin irritation

Eye irritation (rabbit): Moderate eye irritation

Sensitisation (guinea pig): Non-sensitising

BEHAVIOUR IN THE ENVIRONMENT

In crop

Pyrasulfotole: Pyrasulfotole degrades rapidly in cereals, with degradation further enhanced by the addition of the crop safener mefenpyr-diethyl. All residue levels in wheat and barley grain at harvest were below the limit of quantitation in Australian trials (0.02 mg/kg).

Bromoxynil: Bromoxynil is not readily translocated throughout the plant once it has been absorbed. Studies have shown that there are no detectable residues in cereal grain at harvest time.

In soil

Pyrasulfotole: Microbial activity is the major degradation pathway for the pyrasulfotole in soil under field conditions. Pyrasulfotole has been tested carefully in all different environmental compartments such as soil, water and air for its ecotoxicological properties. This comprehensive scientific knowledge confirms that pyrasulfotole to be a product which complies with today's highest safety standards. The substance exhibited a moderate tendency to adsorb to soil. This makes pyrasulfotole directly accessible for substantial mineralisation, which is driven by microbial activity. Several transformation processes for the compound could be observed. The degradation of pyrasulfotole leads to one main soil metabolite by the splitting of the molecule. Pyrasulfotole has a short half-life under microbially active field conditions. The half-life ranges from 11 to 72 days, and up to 421 days in aerobic soil degradation studies. In field dissipation studies, half-lives ranged from 7 to 31 days.

Bromoxynil: The half-life for radio-labelled bromoxynil octanoate, incubated aerobically in a sandy loam soil, was calculated to be 2 days. Principal degradation products were bromoxynil (phenol) and three other degradation products. These products with further degradation and increased incubation time gave $^{14}CO_2$. Bromoxynil demonstrated low to medium mobility when freshly applied to clay-loam, loamy-sand, loam and sandy-loam soils.

When freshly-applied and previously-aged bromoxynil (phenol) was used in clay-loam, loamy-sand, loam and sandy-loam soils, only small amounts of bromoxynil and bromoxynil-related material appeared in the leachate. Bromoxynil octanoate showed limited degradation and a low to medium mobility for freshly-applied and previously aged pesticide in sand, loam and two sandy-loam soils. It can be concluded from these results that bromoxynil octanoate, due to its quick degradation to bromoxynil, does not pose a problem for accumulation in the soil, nor for leaching into the ground to reach the groundwater level.

In water

Pyrasulfotole: Depending on the characteristics of the sediment, most of the pyrasulfotole either remains in the water phase or dissipates from the water into the sediment, where it is irreversibly bound.

Bromoxynil: The solubility in water of both bromoxynil octanoate and phenol is very low (sub ppm). Bromoxynil octanoate is rapidly hydrolysed in water to form bromoxynil (phenol). Degradation at pH 7 and 9 and in natural (non-sterile) water is more rapid than in pH 5 and under sterile conditions. Bromoxynil phenol itself is stable to hydrolysis under sterile conditions. Bromoxynil photolyses in water solutions to two main photodegradation products. The half-life of bromoxynil octanoate is about 18 hours. The photo decomposition of bromoxynil octanoate involves debromination, cleavage of the ester carbon oxygen bond to give phenols and ring hydroxylation.

In animals

The behaviour and metabolism of pyrasulfotole in mammalian organisms was investigated in rats. Test substance labelled at two different positions was administered at a dose of 10 mg/kg body weight. After oral intake, the test substance is rapidly and predominantly absorbed and distributed in the body. Up to 95% is excreted as parent substance, mainly in the urine. Pyrasulfotole does not accumulate in animal tissues. Pyrasulfotole is not expected to be found in meat, milk or fat of animals or poultry when fed grain, forage or fodder from crops treated with Velocity. An MRL at or about the limit of quantitation has been set for these commodities. Residues can occasionally be found in mammalian offal. Appropriate MRLs have been established in forage and fodder of treated crops to ensure that inappropriate residues do not arise in livestock and poultry.

EFFECTS ON FLORA AND FAUNA

The effects of both pyrasulfotole and bromoxynil on a number of animal species have been extensively tested using various routes of administration. Generally, both active ingredients are of low toxicity.

Environmental impact

Pyrasulfotole:

Fish toxicity:

LC_{50} (96 h) for rainbow trout >100 mg/L

LC_{50} (96 h) for bluegill sunfish >100 mg/L

LC_{50} (96 h) for sheepshead minnow >100 mg/L

Aquatic invertebrate toxicity:

EC_{50} (48 h) for *Daphnia magna* >100 mg/L

Algae toxicity:

EC_{50} (96 h) for algae 29.8 mg/L (*Pseudokirchneriella subcapitata*)

Bird toxicity:

LD_{50} for bobwhite quail >2000 mg/kg feed

Bromoxynil octanoate:

Fish toxicity:

LC_{50} (96 h) for bluegill sunfish 0.029 mg/L

Aquatic invertebrate toxicity:

EC_{50} (48 h) for *Daphnia magna* 0.046 mg/L

Algae toxicity:

EC_{50} (72 h) for diatom algae 0.043 mg/L (*Navicula pelliculosa*)

Bird toxicity:

LD_{50} for bobwhite quail 170 mg/kg

LD_{50} for mallard duck 2350 mg/kg

Bromoxynil heptanoate:

Fish toxicity:

LC_{50} (96 h) for bluegill sunfish 0.029 mg/L

Aquatic invertebrate toxicity:

EC_{50} (48 h) for *Daphnia magna* 0.031 mg/L

Algae toxicity:

EC_{50} (120 h) for algae 0.083 mg/L (*Selenastrum capricornutum*)

Bird toxicity:

LD_{50} for bobwhite quail 379 mg/kg

Mefenpyr-diethyl:

Fish toxicity:

LC_{50} (96 h) for rainbow trout 4.2 mg/L

LC_{50} (96 h) for carp 2.4 mg/L

Aquatic invertebrate toxicity:

EC_{50} (48 h) for *Daphnia magna* 20.9 mg/L

Algae toxicity:

EC_{50} (72 h) for algae 5.8 mg/L (*Desmodesmus subspicatus*)

EC_{50} (72 h) for diatom algae 1.62 mg/L (*Navicula pelliculosa*)

Bacteria:

EC_{50} for activated sludge >1,000 mg/L

Bird toxicity:

LD_{50} for Japanese quail >2000 mg/kg

EC = Effect Concentration; LD = Lethal Dose;
LC = Lethal Concentration; h = hours

GENERAL INSTRUCTIONS

Protection of wildlife, fish, crustaceans and environment

DO NOT contaminate streams, rivers or waterways with this product or used containers.

DO NOT apply when there are aquatic and wetland areas, including aquacultural ponds or surface streams and rivers, downwind from the application area and within the mandatory no-spray zone listed in the Restraints.

Restraint: **DO NOT** apply if there are aquatic and wetland areas, including aquacultural ponds or surface streams and rivers, within **5 metres** downwind from the application area.

Protection of crops, native and other non-target plants

DO NOT apply under weather conditions, or from spraying equipment, that may cause spray to drift onto nearby susceptible plants/crops, cropping lands or pastures.

DO NOT apply if there are sensitive crops, gardens and landscaping vegetation or protected non-target vegetation within the mandatory no-spray zone listed in the Restraints.

Restraint: **DO NOT** apply if there are sensitive crops, gardens and landscaping vegetation or protected non-target vegetation within **40 metres** downwind from the application area.

Protection of livestock

DO NOT apply if there are livestock, pasture or any land that is producing feed for livestock downwind from the application area and within the mandatory no-spray zone listed in the Restraints. This no-spray zone is designed to assist in management of residues in livestock commodities at slaughter.

Restraint: **DO NOT** apply if there are livestock, pasture or any land that is producing feed for livestock within **180 metres** downwind from the application area.

Undersown clovers and medics

Velocity will kill undersown clovers, medics, lucerne or other broadleaf crops. **DO NOT** apply to crops undersown with clovers, medics, lucerne or other broadleaf crops.

Storage and disposal

Store in the closed, original container in a cool, well-ventilated area. **DO NOT** store for prolonged periods in direct sunlight.

(10, 15 and 20 L containers)

Triple rinse containers before disposal. Add rinsings to spray tank. **DO NOT** dispose of undiluted chemicals on site. If recycling, replace caps and return clean containers to recycler or designated collection point. If not recycling, break, crush or puncture and deliver empty packaging to an approved waste management facility. **DO NOT** burn empty containers or product. **DO NOT** re-use empty containers for any other purpose.

(110 L returnable containers)

If tamper evident seals are broken prior to initial use then the integrity of the contents cannot be assured. Empty container by pumping through dry-break connection system. Do not attempt to breach the valve system or the filling point, or contaminate the container with water or other products. Ensure that the coupler, pump meter and hoses are disconnected, triple rinsed with clean water and drained after each use. When empty, or contents no longer required, return the container to the point of purchase. This container remains the property of Bayer CropScience Pty Ltd.

(1000 L minibulk container)

If tamper evident seals are broken prior to initial use then the integrity of the contents cannot be assured. Empty product as required into the application equipment. Do not attempt to breach the valve system or filling point, or contaminate the cointainer with water or other products. Ensure that the equipment used in transfer of the product is disconnected, triple rinsed with clean water and drained after each use. When the container is empty, close all caps and valves and return the container to the point of purchase.

SAFETY DIRECTIONS

Harmful if swallowed. Will irritate the eyes and skin. Avoid contact with eyes and skin. When opening the container and preparing the spray, wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and elbow-length chemical resistant gloves. If product in eyes, wash it out immediately with water. Wash hands after use. After each day's use wash gloves and contaminated clothing.

First Aid

If poisoning occurs contact a doctor or Poisons Information Centre (telephone 13 11 26). If swallowed, do NOT induce vomiting. Give a glass of water.

Material Safety Data Sheet

Additional information is listed in the Material Safety Data Sheet, which can be obtained from www.bayercropscience.com.au

NOTES