



ADAMA



# Quadrant<sup>®</sup>

Strength in numbers.

Product Guide



HERBICIDE

[ADAMA.COM](https://www.adama.com)



# Quadrant® herbicide from ADAMA provides more effective, more robust and more convenient control of broadleaf weeds than industry-standard herbicides and tank-mixes.

## Four-way power

Quadrant herbicide is a unique co-formulation that combines four proven active ingredients and three modes of action for powerful control or suppression of 60 broadleaf weeds, including Wild Radish, Capeweed, Doublegee and Indian Hedge Mustard, in cereals.

## More effective

More than 40 independent trials conducted throughout Australia between 2016 and 2018 have confirmed Quadrant provides similar or superior knockdown and residual control of key broadleaf weeds when compared to industry-standard herbicides or tank-mixes.

## More robust

Quadrant controls actively-growing weeds under a wide range of growing conditions. By comparison, the performance of some herbicides can be adversely impacted by cloud cover or low light conditions.

## More convenient

Quadrant is a unique, co-formulation of four active ingredients, making it easier to use than tank-mixes. It contains a unique blend of emulsifiers for optimal stability and performance under Australian conditions.

## Managing herbicide resistance

Quadrant contains three modes of action (Groups 12, 6 & 4). Trials have confirmed Quadrant controls Wild Radish with single, dual or multiple resistance profiles and is suitable for use in herbicide resistance programs.

## Local innovation

Quadrant was developed by ADAMA Australia to provide grain growers with a new tool to address herbicide resistance. ADAMA is one of the world's leading crop protection companies. We are committed to developing simple, practical and innovative solutions that make the complex job of farming easier.

## Three modes of action

<b>GROUP</b>	<b>12</b>	<b>6</b>	<b>4</b>	<b>HERBICIDE</b>
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Active ingredient	Picolinafen	Diflufenican	Bromoxynil (present as the octonate)	MCPA (present as the ethyl hexyl ester)
<b>Concentration</b>	10 g/L	20 g/L	240 g/L	250 g/L
<b>Chemical family</b>	Picolinamide	Nicotinanilide	Nitrile	Phenoxy-carboxylic acid
<b>Group</b>	12		6	4
<b>Mode of action</b>	Inhibitor of carotenoid biosynthesis at the phytoene desaturase step (PDS)		Inhibitor of photosynthesis at photosystem II (PS II)	Disruptor of plant cell growth
<b>Plant uptake</b>	Shoots and roots		Shoots	Shoots
<b>Activity</b>	Limited translocation		Contact	Systemic
<b>Site of activity</b>	Apical meristems		Leaf tissue	Shoot and root meristems
<b>Soil residual activity</b>	Up to 4 weeks		No	No
<b>Visual symptoms</b>	Bleaching of younger leaves		Blisters and necrosis	Twisting and distortion of stems and leaves, followed by wilting and necrosis
<b>First sign of symptoms</b>	2-7 days		2-7 days	2-7 days

## At a glance

<b>Broad spectrum</b>	Quadrant provides broad spectrum control or suppression of 60 broadleaf weeds, including Wild Radish, Capeweed, Doublegee and Indian Hedge Mustard, in winter cereals.
<b>Efficacy</b>	Quadrant provides similar or superior efficacy of Wild Radish, Capeweed and Doublegee, as industry-standard herbicides.
<b>Robust control</b>	Quadrant controls actively-growing weeds under a wider range of application conditions than some herbicides.
<b>Convenient</b>	Quadrant is a unique, ready-to-use co-formulation of four active ingredients, making it easier to use than tank-mixtures.
<b>Resistance management</b>	Trials have confirmed Quadrant controls Wild Radish with single, dual or multiple resistance profiles and is suitable for use in herbicide resistance programs.
<b>Local innovation</b>	Quadrant was developed by ADAMA Australia to provide grain growers with a new tool to address herbicide resistance.

## Broad spectrum control

Common name	Scientific name	Common name	Scientific name
Amsinckia	<i>Amsinckia</i> spp.	Marshmallow	<i>Malva parviflora</i>
Canola	<i>Brassica napus</i>	Mexican Poppy	<i>Argemone mexicana</i>
Capeweed	<i>Arctotheca calendula</i>	Mouse-eared Chickweed	<i>Cerastium glomeratum</i>
Chamomile	<i>Matricaria matricarioides</i>	Night-scented Stock	<i>Matthiola longipetala</i>
Charlock	<i>Sinapis arvensis</i>	Mintweed	<i>Salvia reflexa</i>
Chickweed	<i>Stellaria media</i>	Mountain Sorrel	<i>Oxalis acetosella</i>
Cleavers	<i>Galium aparine</i>	Paterson's Curse	<i>Echium plantagineum</i>
Climbing Buckwheat	<i>Fallopia convulvulus</i>	Peppergrass	<i>Lepidium</i> spp.
Common Peppergrass	<i>Lepidium hyssopifolium</i>	Prickly Lettuce	<i>Lactuca serriola</i>
Common Sowthistle (Milk thistle)	<i>Sonchus oleraceus</i>	Purple Calandrinia	<i>Calandrinia menziesii</i>
Corn Gromwell	<i>Buglossoides arvensis</i>	Purple Goosefoot	<i>Scleroblitum atriplicinum</i>
Cowvine	<i>Ipomoea lonchophylla</i>	Rough Poppy	<i>Papaver hybridum</i>
Crassula (Stonecrop)	<i>Crassula</i> spp.	Saffron Thistle	<i>Carthamus lanatus</i>
Deadnettle	<i>Lamium amplexicaule</i>	Scarlet Pimpernel	<i>Anagallis arvensis</i>
Dock	<i>Rumex</i> spp.	Shepherd's Purse	<i>Capsella bursa-pastoris</i>
Doublegee (Spiny Emex)	<i>Emex australis</i>	Skeleton Weed	<i>Chondrilla juncea</i>
Fat Hen	<i>Chenopodium album</i>	Slender Thistle	<i>Cordurus tenuiflorus</i> , <i>C. pycnocephalus</i>
Field Madder	<i>Sherardia arvensis</i>	Sorrel	<i>Rumex</i> spp.
Fireweed	<i>Senecio</i> spp.	Stemless Thistle	<i>Onopordum acaulon</i>
Fumitory	<i>Fumaria</i> spp.	Three-horned Bedstraw	<i>Galium tricornutum</i>
Hedge Mustard	<i>Sisymbrium officinale</i>	Toad Rush	<i>Juncus bufonius</i>
Hexham Scent (King Island Melilot)	<i>Melilotus indicus</i>	Tree Hogweed	<i>Polygonum patulum</i>
Horehound	<i>Marrubium vulgare</i>	Turnip Weed	<i>Rapistrum rugosum</i>
Horned Poppy	<i>Glaucium flavum</i>	Variegated Thistle	<i>Silybum marianum</i>
Hyssop Loosestrife	<i>Lythrum hyssopifolia</i>	Vetch (Tares)	<i>Vicia sativa</i>
Iceplant	<i>Mesembryanthemum</i> spp.	Volunteer Lupins	<i>Lupinus</i> spp.
Indian Hedge Mustard	<i>Sisymbrium orientale</i>	Ward's Weed	<i>Carrichtera annua</i>
Lesser Swinecress	<i>Coronopus didymus</i>	Wild Radish	<i>Raphanus raphanistrum</i>
London Rocket	<i>Sisymbrium irio</i>	Wild turnip	<i>Brassica tournefortii</i>
Long Storksbill	<i>Erodium botrys</i>	Wireweed (Hogweed)	<i>Polygonum aviculare</i>

## Wild Radish

### Application rate and timing

Up to the 4 leaf stage (120 mm diameter)	600 mL/ha
Up to the 6 leaf stage (150 mm in diameter)	800 mL/ha
Up to the 8 leaf stage (180 mm in diameter)	1.0 to 1.2 L/ha

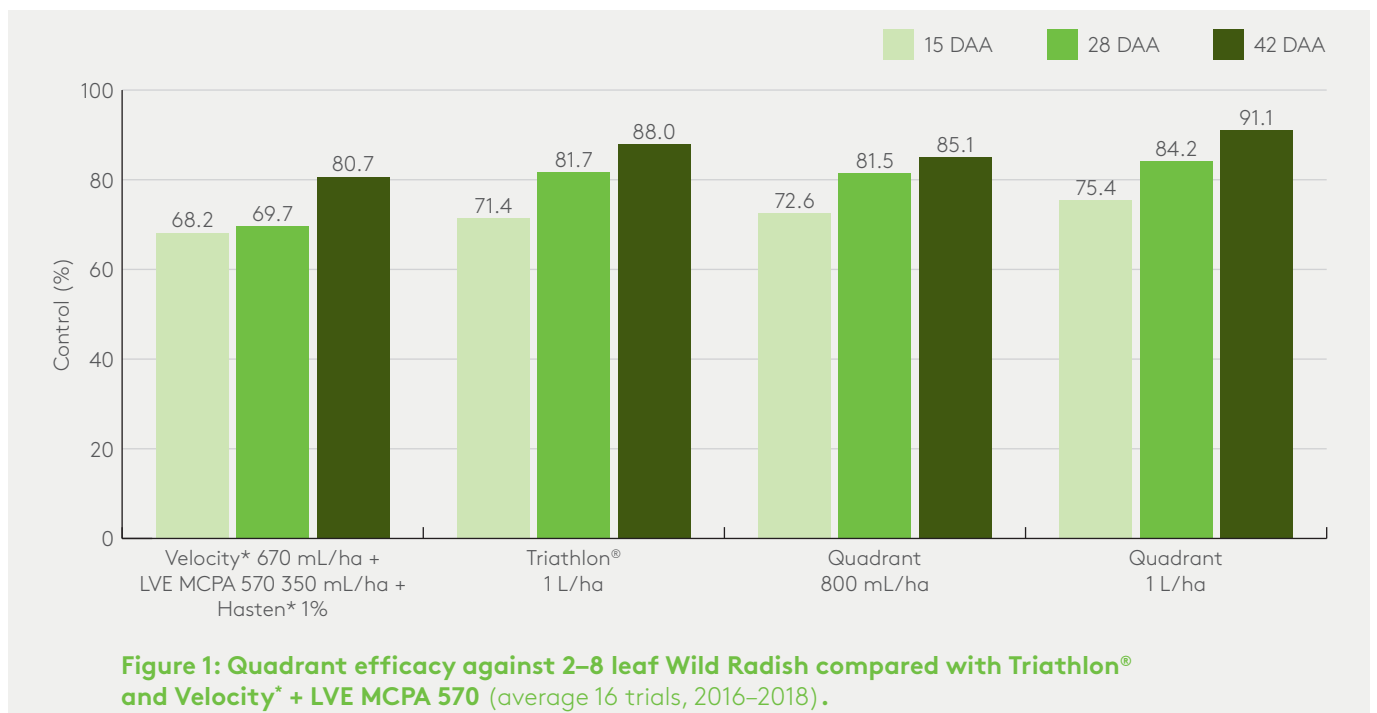
### Australian trial summary

Trials conducted between 2016 and 2018 have shown Quadrant provided equivalent or superior control of Wild Radish as industry standard co-formulations or tank-mixes, including Triathlon® and Velocity\* + LVE MCPA (Figure 1).

Quadrant provided a high level of control when applied to small weeds at the correct label application rate. Higher levels of control and residual activity were achieved when Quadrant was applied at higher rates.

Quadrant provides residual control of Wild Radish for up to four weeks after application. Optimum results will be obtained applying Quadrant to smaller weeds and if good soil moisture exists at and after application. Residual activity may be reduced in the following situations:

- Lower application rates (<800 mL/ha)
- Dry conditions
- Poor coverage of soil surface
- Non-wetting soils
- Soils with high levels of organic matter



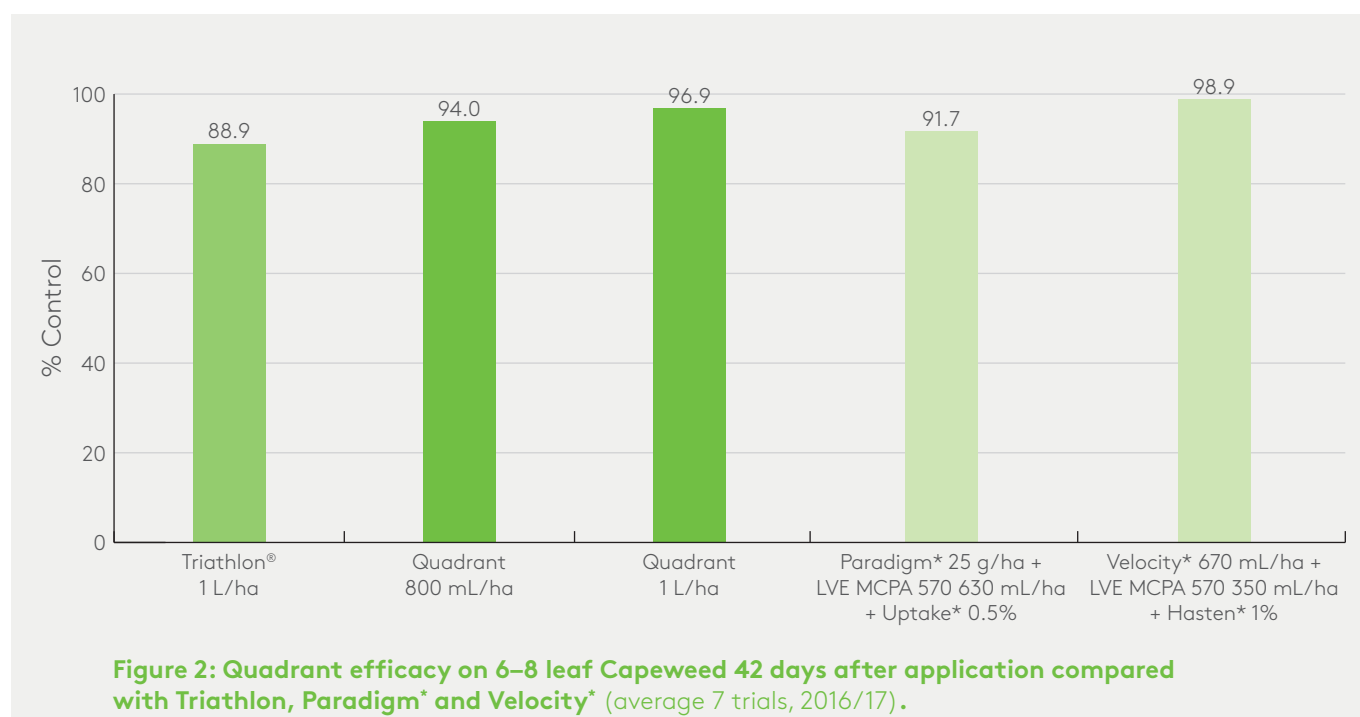
## Capeweed

### Application rate and timing

Up to the 2 leaf stage (60 mm diameter)	600 mL/ha
Up to the 4 leaf stage (120 mm diameter)	800 mL/ha
Up to the 6 leaf stage (150 mm in diameter)	1.0 to 1.2 L/ha

### Australian trial summary

Seven trials conducted between 2016 to 2018 have shown Quadrant provided equivalent or superior control of Capeweed as industry standard co-formulations or tank-mixes when applied at 0.8 to 1.2 L/ha (Figure 2). The application of Quadrant at higher rates improved the level of control up to 42 days after application by reducing the number of surviving plants and controlling subsequent germinations.



## Doublegee/Spiny Emex

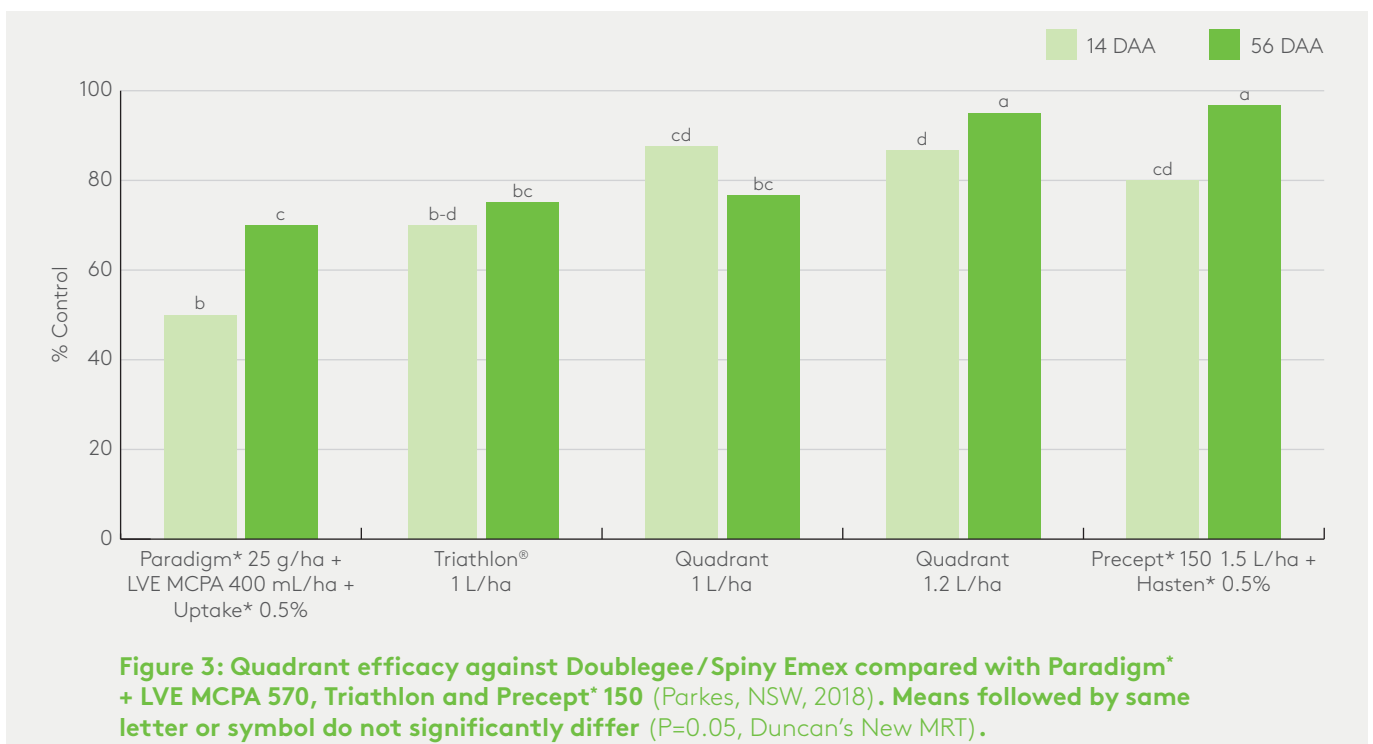
### Application rate and timing

Plants up to the 4 leaf stage 800 mL to 1.2 L/ha

Use the lower application rate on smaller plants with up to two leaves. Use higher application rates if larger plants with up to four leaves dominate the population. Suppression only may occur at the lower application rate if high weed densities are present or if conditions are not favourable for control.

### Australian trial summary

A trial conducted near Parkes, NSW, found Quadrant provided equivalent or superior control of 2 to 4 leaf Doublegee/Spiny Emex as industry standard co-formulations or tank-mixes when applied at 1 or 1.2 L/ha (Figure 3).



## Fumitory

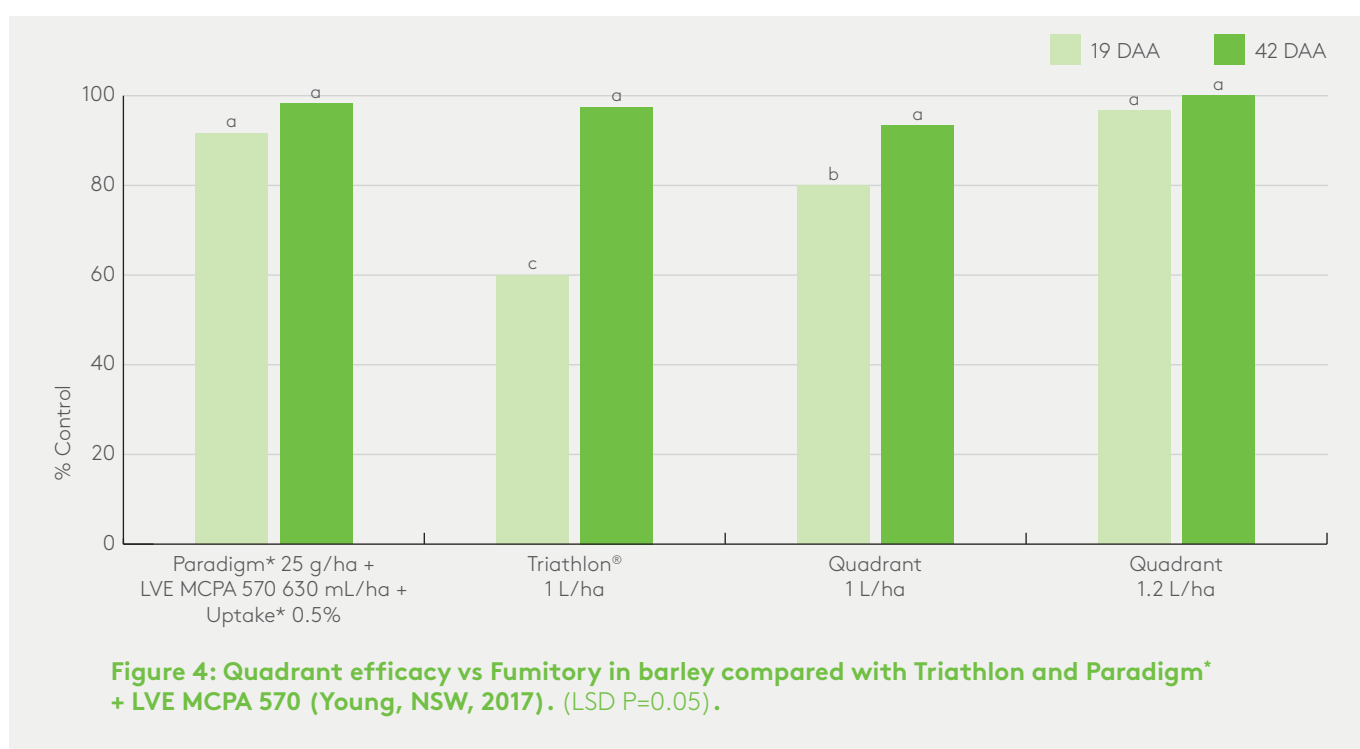
### Application rate and timing

Plants up to the 4 leaf stage 800 mL to 1.2 L/ha

Use the lower application rate on smaller plants with up to two leaves. Use higher application rates if larger plants with up to four leaves dominate the population. Suppression only may occur at the lower application rate in high weed densities or if conditions are not favourable for control.

### Australian trial summary

A trial conducted near Young, NSW, found Quadrant provided equivalent or superior control of 3 to 10 cm fumitory as the industry standard. The application of Quadrant at 1 L/ha and 1.2 L/ha achieved 93.3% and 100% control, respectively, when assessed 42 days after application (Figure 4).



## Wireweed

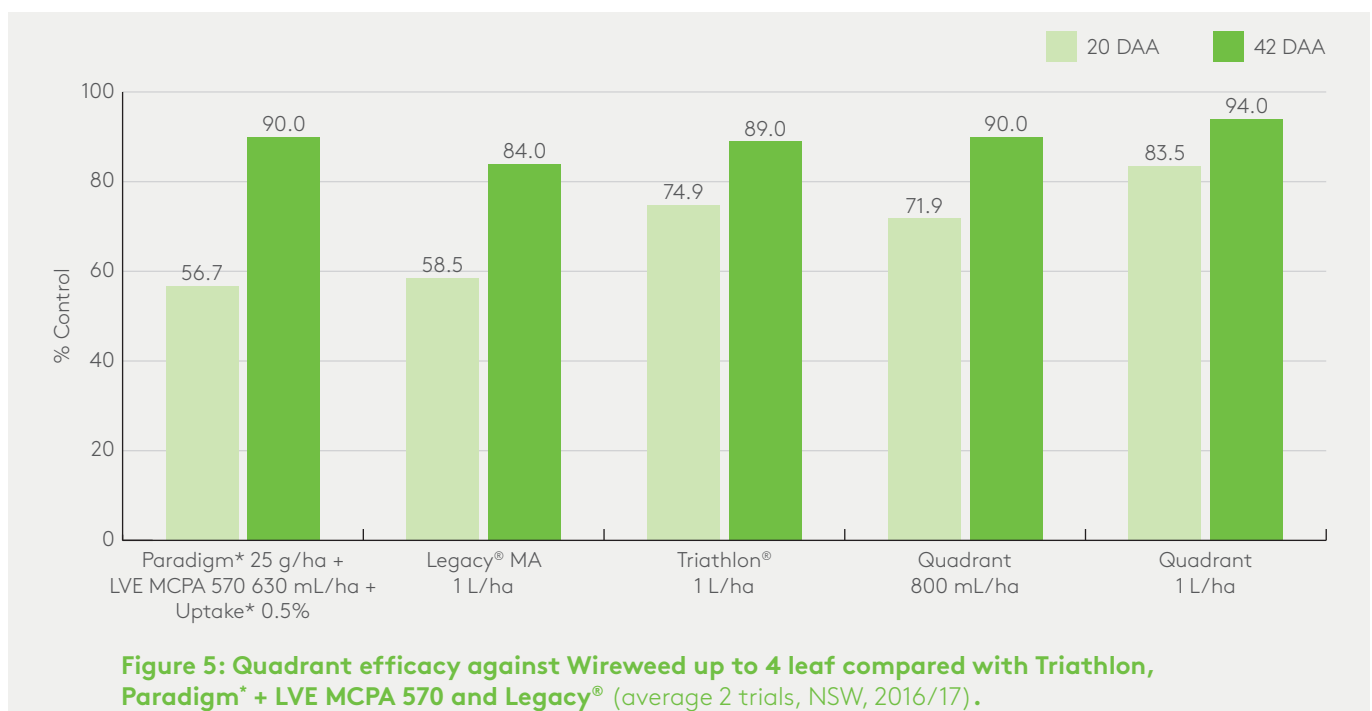
### Application rate and timing

Plants up to the 4 leaf stage 800 mL to 1.2 L/ha

Use the lower application rate on smaller plants with up to two leaves. Use higher application rates if larger plants with up to four leaves dominate the population. Suppression only may occur at the lower application rate if high weed densities are present or if conditions are not favourable for control.

### Australian trial summary

Two trials conducted in 2016 and 2017 found Quadrant provided effective control of Wireweed up to the 4 leaf growth stage when applied 0.8 to 1 L/ha. Apply Quadrant at a minimum of 1 L/ha if the Wireweed population is dominated by 4 leaf plants (Figure 5). Wireweed growing in low fertility red soils has been found to be less susceptible to Quadrant.





## Indian Hedge Mustard

### Application rate and timing

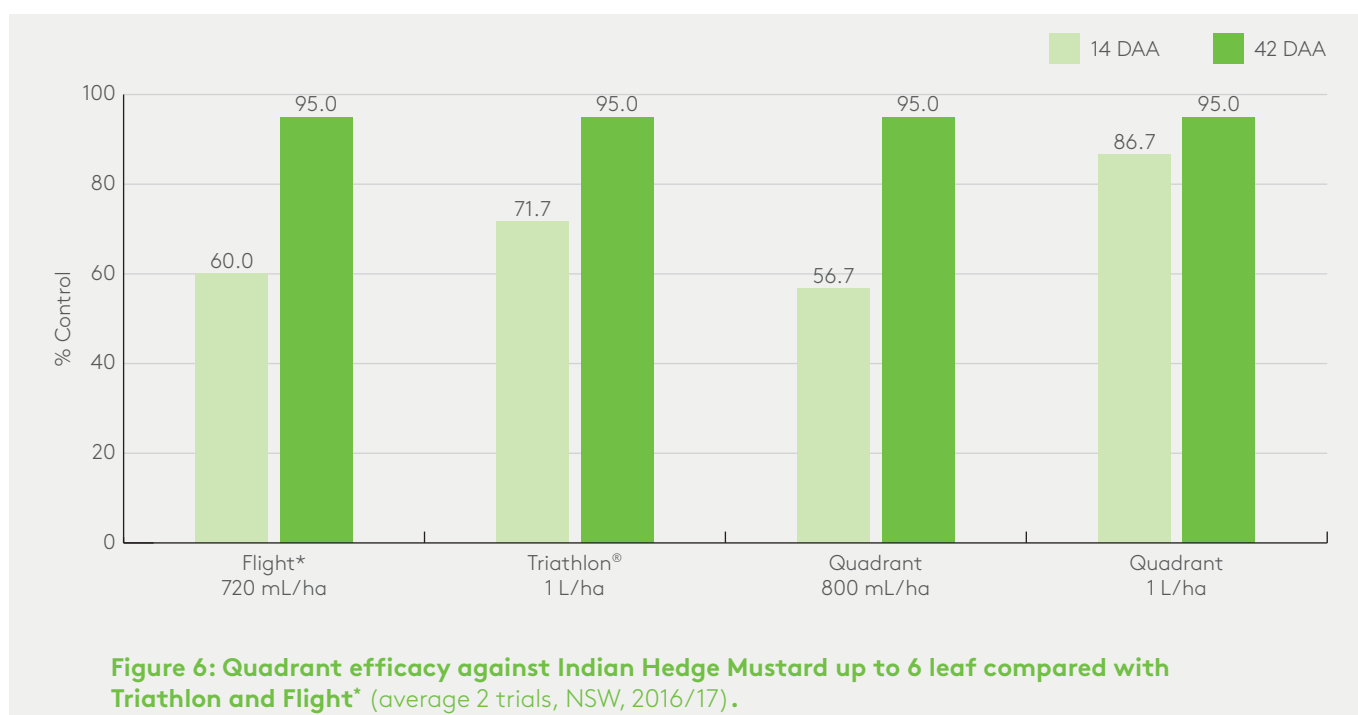
Up to the 2 leaf stage (60 mm diameter)	600 mL/ha
Up to the 4 leaf stage (120 mm diameter)	800 mL/ha
Up to the 6 leaf stage (150 mm in diameter)	1.0 to 1.2 L/ha

Use the lower application rate on smaller plants with up to two leaves. Use higher application rates if larger plants with up to six leaves dominate the population. Suppression only may occur at the lower application rate in high weed densities or if conditions are not favourable for control.



### Australian trial summary

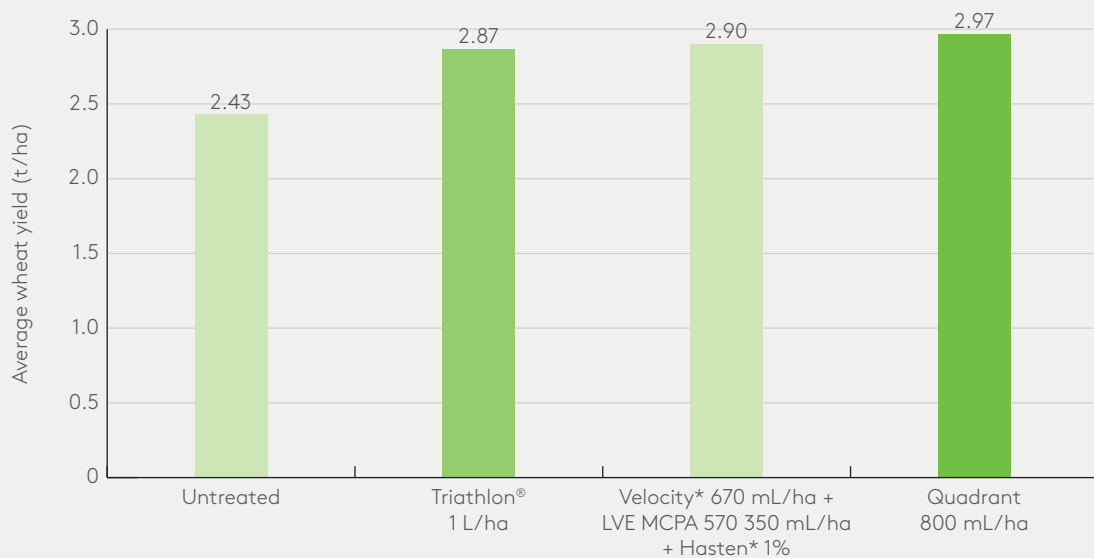
Two trials conducted in Eugowra, NSW (2016) and Condobolin, NSW (2017) found Quadrant provided effective control of Indian Hedge Mustard up to the 6 leaf growth stage when applied 0.6 to 1.2 L/ha. Apply Quadrant at a minimum of 1 L/ha if the Indian Hedge Mustard population is dominated by 6 leaf plants (Figure 6). At 1 L/ha, Quadrant provided quick knockdown of Indian Hedge Mustard compared to Triathlon® and an industry standard. Residual control of new germinations is improved at higher application rates.



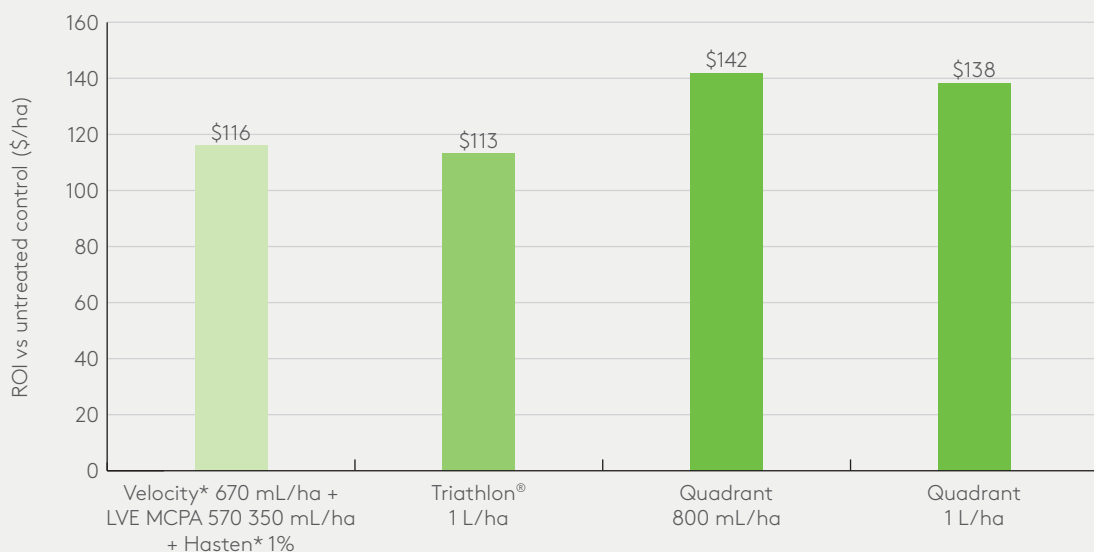
**Figure 6: Quadrant efficacy against Indian Hedge Mustard up to 6 leaf compared with Triathlon and Flight\* (average 2 trials, NSW, 2016/17).**

# Return on investment

Quadrant delivers a higher return on investment for the control of Wild Radish than other industry-standard herbicides. These increases are attributed to the removal of weed competition early in the growing season and residual activity against subsequent germinations.



**Figure 7: Wheat yield advantage from applying Quadrant compared with Triathlon, Velocity\* + LVE MCPA 570** (average 17 trials, 2016 to 2018).



**Figure 8: Return on investment in wheat vs. untreated controls based on a wheat price of \$300/t** (average 17 trials, 2016 to 2018).

# Crop tolerance

Quadrant may cause transient yellowing in cereals, particularly oats, or if application is made at higher rates and/or later in the application window. However, subsequent plant growth and crop development will be unaffected.

## All cereals

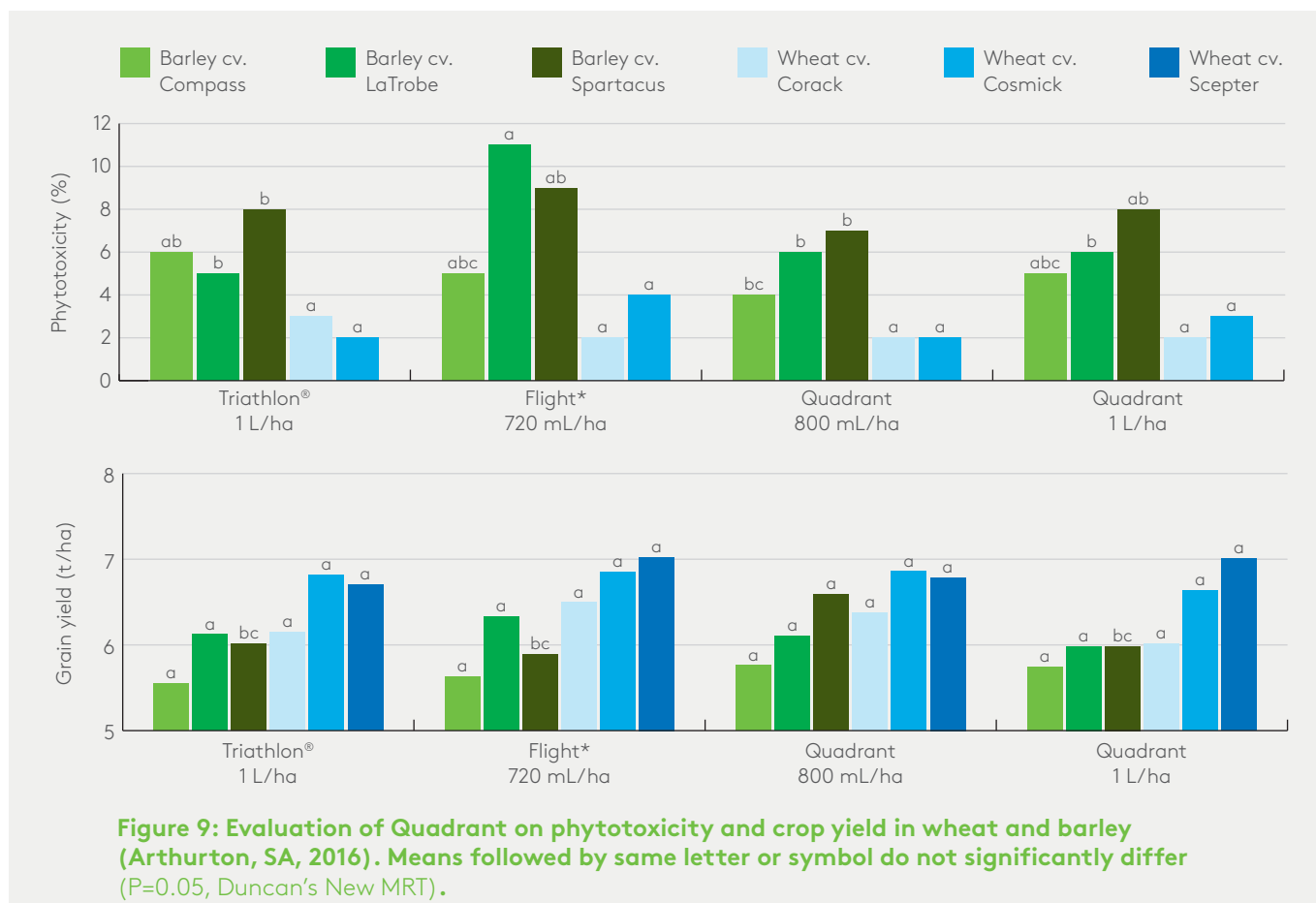
Transient crop yellowing may occur after application. This usually appears as yellow or white banding or blotching on leaves. Application to later growth stages may show increased discolouration due to the larger leaf area exposed. Provided the crop is not under stress from pre-emergent herbicide application, root disease, insect damage, frost, dry or excessively moist conditions, subsequent crop growth and development will not be significantly affected. Crop damage can be increased on highly alkaline sands or loams especially where free lime is present. Application during temperatures above 20°C may significantly increase crop effects.

Field trials conducted in Arthurton, SA in 2016 examined crop phytotoxicity and grain yield following the application of Quadrant and other

industry standard 'co-formulations' containing diflufenican or picolinafen. The application of Quadrant within the registered label rate range produced transient yellowing and 5 to 10% leaf damage but had no significant effect on grain yield (Figure 9).

## Oats

Quadrant can cause significant crop effects in oats, including yellowing, crop scorch and reduced vigour, particularly if applied later in the season. If applying Quadrant to oat crops grown for hay, target smaller weeds using the lower application earlier in the application window. Higher application rates and the incidence of frosts post-application may significantly reduce the biomass of oaten hay crops.



# Directions for use

## Crop stage

Apply Quadrant from 3 leaf to late tillering crop growth stage (GS13–28). Optimum results are achieved when Quadrant is applied at the 3–5 leaf crop stage (approximately 4 to 8 weeks after sowing) and before the crop canopy begins to close.

## Application rate

Apply when weeds are actively growing. In most situations, the application rate specified for each weed size will provide satisfactory control. Optimum results will be obtained if Quadrant is applied to smaller weeds and if good soil moisture exists at and after application. Efficacy will be reduced if weeds are stressed from previous herbicide applications. Quadrant will not effectively control regrowth of suppressed weeds, transplanted weeds or regrowth from rhizomes or roots.

Use higher application rates to control larger weeds, particularly if there is high crop and weed density; abnormal weed growth (including early flowering); or late season germinations. Higher application rates will also provide faster burndown of emerged weeds, increase residual control of susceptible weeds and increase total control. However, higher rates may increase the risk of crop effects, particularly if applied later in the application window.

## Mixing

Half-fill the spray tank with clean water and add the required amount of product. Agitate thoroughly then add the remainder of the water. Agitate again before spraying commences. Re-seal the product container immediately after use. Spray mixtures containing Quadrant should not be left to stand overnight. Prolonged periods of exposure to cold temperatures may result in 'settling out' of the product in the mixture.

## Compatibility

DO NOT use crop oils with Quadrant or tank-mixes of Quadrant and other products in cereals.

## Restrains

DO NOT apply to crops or weeds under stress due to disease or insect damage, nutrient deficiencies or other herbicide use.

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

DO NOT apply to crops or weeds that are stressed due to dry or excessively moist conditions, or excessively dry or moist conditions are expected post-application.

DO NOT apply if rain is expected within four hours, or if heavy rains or storms are forecast within two days.

DO NOT apply with crop oils.

DO NOT apply to crops undersown with lucerne, clover or medics.

Refer to the full list of restraints on the Quadrant label.

## Application

Complete coverage of weeds is essential. Select the appropriate nozzles, spray quality and water volume to ensure good coverage of target weeds.

**Boom sprayer:** A minimum of 50 L of water per hectare should be used. For optimum results, water rates of 70–100 L/ha are recommended and apply using a coarse spray quality in accordance with nozzle manufacturer specifications. Increase the water volume if weed infestation is heavy or crop cover is dense.

**Aircraft (NSW, Vic & SA only):** Apply in a minimum of 30 L water per hectare.

## Cleaning

Rubber components may be affected by exposure to the solvents contained in Quadrant and some other crop protection products. Thoroughly wash the spray unit with a suitable boom cleaner and fresh water after use.

## Withholding periods

**Harvest:** Not required when used as directed.

**Grazing:** Do not graze or cut for stock food for eight weeks after application.



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