THIRD EDITION

Nufarm

imiCrops®

THE GUIDE TO NUFARM IMICROPS® HERBICIDES AND BEST MANAGEMENT PRACTICES

Unique Nufarm Registration

Nufarm Grow a better tomorrow.

CONTENTS

Introducing Sentry and Intercept

Nufarm's Imidazolinone herbicides have been specifically developed for application to imiCrops (imidazolinone herbicide tolerant crops). Sentry® and Intercept® are registered for pre or post emergent application to imiCrops as specified below:

Pre-emergent use pattern:

Sentry is registered for pre-emergent use in imidazolinone herbicide tolerant barley, canola and wheat (single gene) at 40-50g/ha.

Post-emergent use pattern (applied with Supercharge® Elite at 0.5 % v/v):

Sentry is registered post emergent in imidazolinone herbicide tolerant canola at 20 or 40 or 55g/ha, and imidazolinone herbicide tolerant wheat (single gene only) at 20 or 40g/ha.

Intercept is registered post emergent in imidazolinone herbicide tolerant canola at 300-500mL/ha or 600-750mL/ha and imidazolinone herbicide tolerant barley at 375-750ml/ha.

Imidazolinone herbicides

Imidazolinones have been used in the Australian wheat belt since 1992. They kill plants by inhibiting acetolactate synthase (ALS), an enzyme required by plants to manufacture branch chain amino acids for protein synthesis at all root and shoot growth points. They are classified as Group B herbicides. They share this mode of action with two other ALS Inhibitor sub groups, the sulfonylureas (eg chlorsulfuron, metsulfuron etc) and the triazolopyrimidines or sulfonanilides (pyroxsulam, flumetsulam, florasulam, metosulam).

There is now widespread resistance to ALS Inhibitor herbicides in a number of key weed species.

Integrated weed management

Potential users of imiCrops herbicides Sentry and Intercept are encouraged to obtain a copy of the brochure developed by the Herbicide Resistance Management Review Group of CropLife Australia (available on the CropLife website www.croplife.org.au titled "Herbicide Resistance Management Strategies"). Controlling weed escapes before they set and shed viable seed is an extremely important resistance management strategy. Any non-chemical technique that can be implemented when growing Imidazolinone herbicide tolerant crops is strongly encouraged by Nufarm. Managing weed seed at harvest, either through baling stubbles, or by burning stubbles, chaff piles and windrows, or by collecting seed through the use of chaff carts or the Harrington® Seed Destructor are all options.

Herbicide resistance

ImiCrops herbicides are classified as Group B herbicides for resistance management purposes, and are categorized as a High Resistance Risk. CropLife Australia indicate that "as few as four applications to the same population of annual ryegrass can result in the selection of resistant individuals and as few as six applications for wild radish. A population can transform from a small area of resistant individuals to a whole paddock failure in one season."

To impede the onset of resistance, the Herbicide Resistance Management Strategies recommend:-

1. Avoid applying more than two Group B herbicides in any four year period on the same paddock.
2. If there are significant escapes following the herbicide application consider using another herbicide with a different mode of action or another control method to stop seed set.

Sentry pre-emergent in ImiCrops application advice

Sentry herbicide offers a unique pre-plant use pattern in imidazolinone herbicide tolerant barley, imidazolinone herbicide tolerant canola and imidazolinone herbicide tolerant wheat (single gene). These pre-emergent use patterns are exclusive to Nufarm - Sentry. Pre-emergent application enables earlier season weed control which increases yield potential due to less weed competition at establishment (Figures 1, 2 & 3).

Sentry has strong residual components that are readily taken up by roots and moved to growth points once in the root zone. To reach the root zone the product needs adequate soil moisture at or following application. Sentry is not volatile or subject to UV degradation, nor is it "bound" to stubble.

Sentry can be applied to dry soil but will not move into the profile until adequate rainfall is received. When Sentry is applied to a dry soil surface there is a risk that weeds can germinate from depth- in this case control may be impaired. Best control is achieved if weed seeds germinate in soil already infused with Sentry.

For these reasons it is advised that pre-emergent applications of Sentry be mechanically incorporated during sowing using seeders equipped with knife or blade point tines and press wheels. Trailing harrows are likely to improve incorporation though this technique has not been tested in trial work to date. The use of Sentry in front of disc seeders is not recommended due to the potential variability in soil moisture moving the product to the root zone. This method relies on 15–20 mm subsequent rainfall.

Ideally Sentry should be applied to a light stubble situation and a moist, friable soil immediately prior to sowing. The high rate, 50 g/ha, should be considered for heavier stubble cover, heavier soil types and when a high weed burden is expected. If weeds are present at application it is advised to mix Sentry with a knockdown herbicide. Sentry is compatible with Gladiator® Optimax, Alliance®, Shirquat®, Revolver®, weedmaster ARGO® and weedmaster DST®.

Sentry applied pre emergence may allow a percentage of weeds to germinate, however with adequate soil moisture to allow the Sentry to dissipate through the soil solution, absorption by the weeds will occur and visible symptoms should be seen within 5-14 days after emergence.

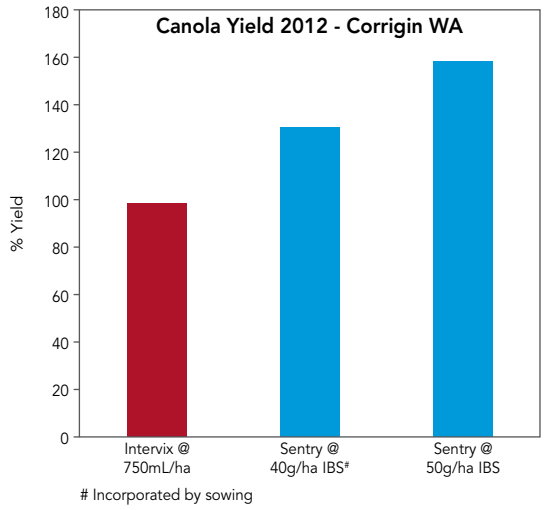


Figure 1

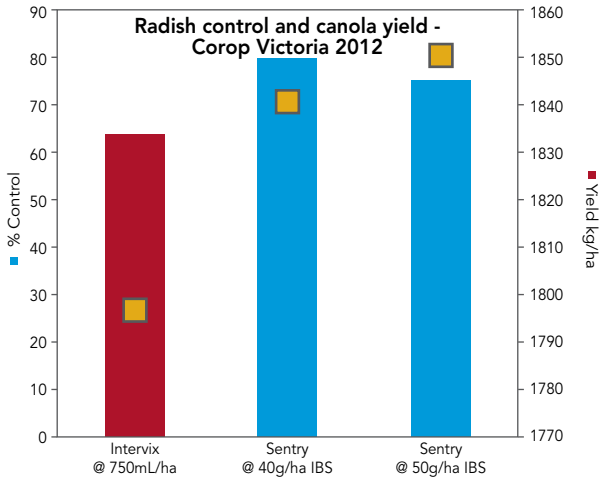


Figure 2

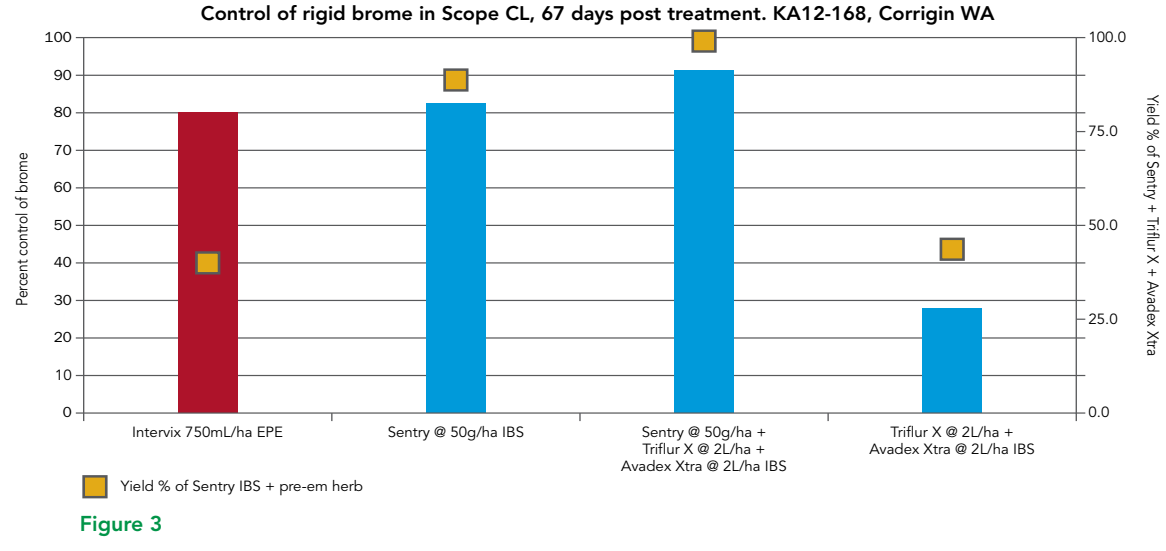


Figure 3

Applying Sentry pre-emergent in tank mixtures as a resistance management strategy

Unique Nufarm Registration

Sentry may be applied in a tank mix with pre-emergent and knockdown herbicides prior to planting. It is recommended that Sentry be applied in conjunction with other pre-emergent herbicides that have alternative modes of action, such as TriflurX (Group D herbicide) and/or Avadex® Xtra (Group J herbicide).

To achieve optimal pre-emergent weed control or provide an effective strategy against the development of herbicide resistance, these tank mix partner herbicides need to be applied at robust label rates. In field trials TriflurX® at 3 L/ha or TriflurX at 2L/ha plus Avadex Xtra at 2 L/ha consistently demonstrated desirable control.

Using Sentry pre-emergent in imidazolinone herbicide tolerant canola to control Brassicaceae weed species.

Unique Nufarm Registration

Sentry provides good to excellent control of Group B sensitive Brassicaceae weed species encountered in imidazolinone herbicide tolerant canola crops. Despite this high level of control, escapes and later germination of Brassicaceae weed species may occur in crop and require a subsequent post-emergent herbicide treatment to prevent or reduce seed set. If a post-emergent Group B follow-up treatment is applied it MUST be accompanied by appropriate non-chemical management of weed seed at harvest.

Using Sentry pre-emergent in imidazolinone herbicide tolerant wheat (single gene) and imidazolinone herbicide tolerant barley to control broadleaf species.

Unique Nufarm Registration

Sentry provides useful control or suppression of most broadleaf weed species encountered in imidazolinone herbicide tolerant cereal crops detailed above. Post-emergent broadleaf weed control, with appropriate non-Group B broadleaf herbicides (e.g. Bentley®,Agtryne® MA, Bromicide® MA, T-Rex,® Eliminar ® C, Flight® EC, Velocity®) is recommended to control subsequent germinations and escapes so as to reduce or prevent seed set and the shedding of viable seed.

Using Sentry pre-emergent in imidazolinone herbicide tolerant wheat (single gene) and imidazolinone herbicide tolerant barley to control grass weed species other than brome or barley grass.

Unique Nufarm Registration

Sentry provides good to excellent control of most grass weed species. Post-emergent grass weed control with Group A herbicides (e.g. Achieve® or Axial®) is recommended to control subsequent germinations and escapes so as to reduce or prevent seed set and the shedding of viable seed.

Using Sentry pre-emergent in imidazolinone herbicide tolerant wheat (single gene) and imidazolinone herbicide tolerant barley to control brome or barley grass.

Unique Nufarm Registration

Sentry provides very good to excellent control of brome and barley grass. Despite this high level of pre-emergent control, some escapes and subsequent germination will likely result in a small population of brome and barley grass in-crop. In this situation a post-emergent application of a Group B herbicide may be unavoidable to try to reduce or prevent seed set and the shedding of viable seed. In all scenarios above, if a post-emergence Group B herbicide treatment is applied following a Sentry pre-emergent treatment, it MUST be accompanied by non-chemical management of weed seed at harvest.

Using Sentry post-emergent in imidazolinone herbicide tolerant wheat (single gene)

Sentry provides very good to excellent control of brome and barley grass. It will also control a diverse range of grass and broadleaved weed species encountered in imidazolinone herbicide tolerant wheat (single gene), particularly brome and barley grass. In situations where grass weeds are anticipated and likely to be yield debilitating, It is recommended that a pre-emergent herbicide from an alternative group (e.g. TriflurX, Rifle®440, Avadex Xtra, Sakura® or Boxer® Gold) be applied prior to sowing, to reduce weed pressure on the post emergent application of Sentry and introduce an alternative Mode of Action (MOA).

Using Sentry or Intercept post-emergent in imidazolinone herbicide tolerant canola

Both Sentry and Intercept provide knockdown and residual control of key annual grass and broadleaf weeds in imidazolinone herbicide tolerant canola. Sentry is the preferred choice where longer residual protection is required. Intercept is used where flaxibility is required for following crops, as Intercept can have a shorter plantback period when compared with Sentry. Check label for full details. The Intercept formulation has been developed to provide unsurpassed foliar uptake, hence its' post emergent use pattern.

In imidazolinone herbicide tolerant canola, Sentry or Intercept may be tank mixed with Archer® for the control of certain broadleaved weeds, or Havoc® for control of grass weeds. Havoc and Archer can be tank mixed with Sentry or Intercept in a three-way mix.

In situations where grass weeds are anticipated, it is recommended that a pre-emergent herbicide from an alternative group (e.g. TriflurX, Rifle 440 or Avadex Xtra) be applied prior to sowing to reduce weed pressure on the post emergent application of Sentry or Intercept. Havoc or Factor® WG herbicide should be applied post- emergent to imidazolinone herbicide tolerant canola in a tank mix with Sentry or Intercept to provide broader spectrum control of emerged grass weeds. When using these herbicides strictly observe additional advice relating to crop age at application. Archer herbicide aids in the control of legumes, prickly lettuce, capeweed and other thistle-like weed species. When these weeds require control apply a tank mix of Sentry or Intercept with Archer.

Using Intercept post emergent in imidazolinone herbicide tolerant barley.

Intercept provides robust post emergent control of many annual grass and broadleaf weeds in imidazolinone herbicide tolerant barley.

Tank mixes with Archer® will broaden weed spectrum to target composite and legume weeds.

In situations where grass weeds are anticipated and likely to be yield debilitating, it is recommended that a pre-emergent herbicide from an alternative group (e.g. TriflurX, Rifle®440, Avadex Xtra, Sakura® or Boxer® Gold) be applied prior to sowing, to reduce weed pressure on the post emergent application of Intercept and introduce an alternative MOA.

Sentry Compatibility
Sentry is compatible with a range of herbicides including TriflurX, Avadex Xtra and Archer herbicide at the rates indicated in the Directions for Use Table. Sentry is also compatible with Sakura, Havoc, Factor WG, Gladiator Optimax, weedmaster® DST®, weedmaster® ARGO®, Alliance®, Shirquat® and Revolver® to complement knock down of emerged weeds.

Sentry is compatible with insecticides including Astound® Duo, Dimethoate, Astral® 250EC (bifenthrin) and Chlopyrifos 500EC.

Sentry is compatible with spray adjuvants including Supercharge Elite or Banjo.

DO NOT tank mix with foliar fertilisers.

Applying complex tank mixes

Sentry is compatible with a number of insecticides and herbicides commonly applied prior to sowing, thus providing greater flexibility with crop management techniques. Whilst a number of Sentry + glyphosate + residual herbicide mixes were found to show biological and chemical compatibility in field trials, the table below lists a number of complex mixes found to be chemically compatible in laboratory tests though not tested biologically.

Chemically/Physically Compatible Tank Mixes – Nufarm Laboratory, Laverton 2012

Sentry @ 50g/ha	Sentry @ 50g/ha	Sentry @ 50g/ha	Sentry @ 50g/ha
Astral 250EC @ 40mL/ha	Astral 250EC @ 40mL/ha	Astral 250EC @ 40mL/ha	Astral 250EC @ 40mL/ha
Chlorpyrifos 500EC @ 1L/ha	Chlorpyrifos 500EC @ 1L/ha	Chlorpyrifos 500EC @ 1L/ha	Chlorpyrifos 500EC @ 1L/ha
Triflur X @ 2L/ha	Triflur X @ 2L/ha	Triflur X @ 2L/ha	Triflur X @ 2L/ha
Avadex Xtra @ 2L/ha	Avadex Xtra @ 2L/ha	Avadex Xtra @ 2L/ha	Avadex Xtra @ 2L/ha
Gladiator Optimax @ 1L/ha	Alliance @ 1.5L/ha	Shirquat 250 @ 2L/ha	Revolver @ 2L/ha

Each of these combinations were mixed with tap water and in World Health Organisation (WHO3) "hard" water, with and without Liase® at 2% v/v. The only mixes that were found to lack complete compatibility contained Gladiator Optimax and Liase (in tap and hard water). The Gladiator Optimax mixes without Liase were completely compatible. It is therefore advised not to add Liase to these complex mixes containing glyphosate formulations.

Always adhere to recommending mixing order when preparing sprays of more than one product, maintain agitation and do not leave for extended periods before spraying.

Intercept Compatibility
Intercept herbicide offers unsurpassed foliar uptake of key grass and broad leaved weeds and greater flexibility with cropping rotations.

In imidazolinone herbicide tolerant canola, Intercept is compatible with herbicides including Factor, Archer (clopyralid), Achieve*, Havoc and Select*.

Tank mixes of Archer and Factor WG with Intercept herbicide (three-way mixes) are chemically and biologically compatible. Other tank mixes have not been tested.

Intercept is compatible with insecticides including Astound Duo and Dimethoate. Intercept is compatible with adjuvants including Supercharge Elite or Banjo.

DO NOT tank mix with foliar fertilisers.
Tank mixes with Havoc and Archer are chemically stable over a 24-hour period. In the event of delayed spraying, store tank load out of direct sunlight and maintain agitation if possible. Biological stability of other mixes is unknown.

	Sentry	Sentry	Intercept
	pre-plant (IBS)	post-em	post-em
single gene wheat	NEW 40g-50g/ha Unique Nufarm Registration	20g or 40g/ha	Not tolerant
imi barley	NEW 40g-50g/ha Unique Nufarm Registration	Not registered	NEW 375-750ml/ha
imi canola	40g-50g/ha Unique Nufarm Registration	20g or 40g or 55g/ha	300ml-500ml or 600ml-750ml/ha

Managing imiCrops Plantbacks

ImiCrops (imidazolinone) herbicides such as Sentry and Intercept are residual herbicides that may carry over from one year to the next. It is vital that growers take adequate precautions to prevent any potential effect in the following crop.

Introduction

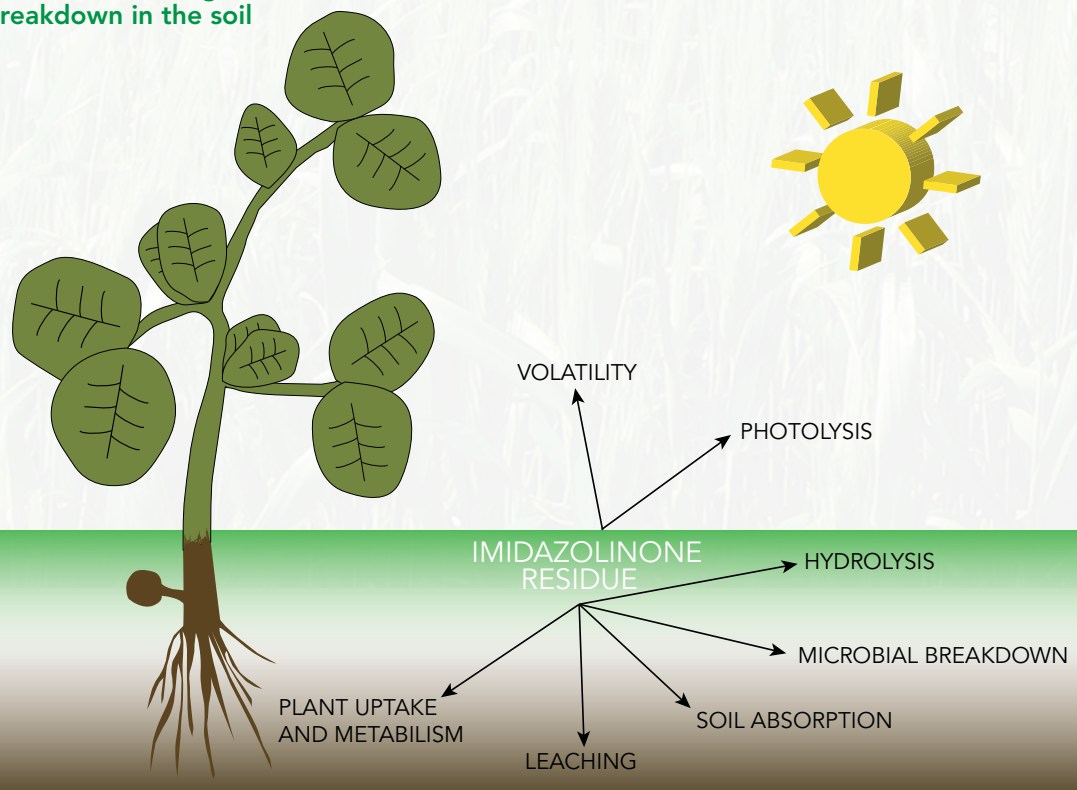
Due to the residual nature of ImiCrops herbicides, managing plantbacks through crop varietal selection is essential to minimise potential crop effect. Rainfall, soil microbes and time are three key influencers of herbicide breakdown. Conditions need to be monitored after applications of these herbicides to enable the selection of the most appropriate follow crop.

ImiCrops imidazolinone herbicide breakdown

The primary method of degradation for imiCrops herbicides (Sentry and Intercept) is via microbial degradation. Microbial degradation is dependent on the presence of soil microbes, which are more prevalent in soils with higher organic matter. As soil microbes are most active when soils are wet, degradation of imiCrops herbicides is enhanced during periods when topsoil moisture is present.

- Highest degradation rate: Moist soils, high organic matter %, aerobic conditions, pH above 6 and warm soil temperatures.
- Lowest degradation rate: Dry soils, low organic matter %, anaerobic conditions, pH below 6 and cold soil temperatures.

Factors influencing breakdown in the soil



breakdown of imiCrops herbicides. When soil moisture levels increase following rain, it takes time for the imidazolinone residues to be released and become available for microbial breakdown. Hot, dry conditions following summer rain can limit the breakdown benefits of this moisture. Five rainfall events of 20mm fortnightly is a much better scenario than a 'one-off' rainfall event of 100mm.

Plantback options for the following season

Follow the three steps below to work out what crop can be sown after using an ImiCrops herbicide:

1. Determine date of herbicide application.
2. Quantify the rainfall from the date of application up until sowing the proposed crop (exclude 'one-off' rainfall events during the summer months of December, January and February).
3. Consult the product label recommendations with respect to plantback considerations and other critical comments. ImiCrops product labels are available on the Nufarm website at: www.nufarm.com.au

Sentry plantback

The following minimum re-cropping intervals (months after application) should be observed.

Sentry rate used	Replant interval – months after application	Follow crops
20, 40, 50 and 55g/ha	0	Imidazolinone herbicide tolerant barley, wheat and canola varieties.
20 and 40g/ha	8	Chickpeas, faba beans, field peas, lucerne, lupins, pasture legumes, vetch, oats*, triticale*, barley*, wheat*.
20 and 40g/ha	22	Safflower
50 and 55g/ha	8	Chickpeas, faba beans, field peas, triticale*, barley*, wheat*.
50 and 55g/ha	22	Lucerne, lupins, oats, pasture legumes, safflower, vetch.
20, 40, 50 and 55g/ha	34	All other crops including conventional, TT and RR canola varieties.

* The following additional requirements apply if sowing conventional (non imidazolinone herbicide tolerant) cereals the winter season following the use of Sentry:

- DO NOT use Sentry at rates above 20g/ha in areas where rainfall from spraying to sowing non-imidazolinone herbicide tolerant cereals or canola is expected to be below 150mm.
- DO NOT use Sentry at 40g/ha or higher in areas where rainfall from spraying to sowing non-imidazolinone herbicide tolerant cereals or canola is expected to be below 250mm.
- DO NOT use Sentry at 50-55g/ha in areas where rainfall from spraying to sowing non-imidazolinone herbicide tolerant cereals or canola is expected to be below 350mm.
- DO NOT apply Sentry later than the end of August (end of July in Western Australia) unless it is intended to grow an imidazolinone herbicide tolerant crop the following year.
- DO NOT use Sentry at 40-55g/ha on shallow, strongly duplex soils unless imidazolinone herbicide tolerant crops are sown the following year.
- If Sentry is applied in an imidazolinone herbicide tolerant crop and is followed by another Group B herbicide applied post-emergent, sow only an imidazolinone herbicide tolerant crop the following year.
- DO NOT use Sentry above 20g/ha in the lower Great Southern area of Western Australia, nor rates above 40g/ha anywhere in Western Australia unless it is intended to grow an imidazolinone herbicide tolerant crop the following year.

Intercept plantback

The following minimum re-cropping intervals (months after application) should be observed.

Months after application	Follow crops
0	Imidazolinone herbicide tolerant barley, wheat and canola varieties.
10	Chickpeas, faba beans, field peas, lucerne, lupins, pasture legumes, vetch, oats*, triticale*, non-imidazolinone herbicide tolerant barley*, non imidazolinone herbicide tolerant wheat*.
34	Conventional and other herbicide tolerant canola, all other crops.

* The following additional requirements apply if sowing conventional (non imidazolinone herbicide tolerant) cereals or canola the winter season following the use of Intercept:

- DO NOT apply Intercept herbicide later than the end of August (no later than the end of July in WA).
- DO NOT use Intercept herbicide in areas where rainfall from spraying to sowing of cereals or canola the following year is expected to be below 150mm (for 300-375mL/ha use), 200mm (for up to 500mL/ha use) and 250mm (for 600-750mL/ha use).
- DO NOT use above 375mL/ha in the Lower Great Southern region of Western Australia

Managing ImiCrops Plantbacks

When sowing a plantback crop at the lower end of its plantback range, ensure the following steps are taken to help minimise potential crop damage as a result of imidazolinone herbicide residues:

1. Root disease & nematode test – crop effect will be magnified in the presence of root disease and/or nematodes.
2. Apply zinc to the seed – allowing for early root development.
3. Delay seeding – to maximise potential breakdown.
4. Sow at the right depth and ensure there is adequate nutrition – to promote rapid germination and emergence.
5. DO NOT use another Group B herbicide in the plantback crop – to avoid the potential of compounding herbicide effects.
6. Avoid stress during the growing season – Any stresses encountered during the growing season may also exascerbate symptoms (ie. poor growing conditions (cold, dry), insect damage, herbicide applications (Achieve), nematodes, or trace element deficiency (especially potassium)

Product benefits and fit

Growers of imidazolinone tolerant crops need to constantly balance the management between optimum weed control and optimum yield. In many cases early weed control will offer the greatest yield, but dependant on weed species targeted and seasonal conditions subsequent germinations may not be controlled.

Table 1 below offers a guide to enable growers and agronomists to make a decision on which product and use pattern will suit a particular paddock. The greater the number of stars the better the product for that use. The rating takes into consideration both yield and weed control.

Canola product fit - taking into consideration weed control and yield benefits

	Sentry IBS#	Sentry Post Em	Intercept Post Em
Early germinating weeds			
Low weed pressure	****	***	***
Med weed pressure	****	***	***
High weed pressure	****	***	**
Later germinating weeds			
Low weed pressure	**	****	****
Med weed pressure	***	****	****
High weed pressure	***	****	****

Table 2 demonstrates the key characteristics of the various products and use patterns in relation to weed control and plant back risk.

Key Characteristics

	Sentry IBS	Sentry Post Em	Intercept Post Em
Residual weed control	***	****	***
Broadleaf weed control	***	****	****
Grass weed control	***	***	****
Plant back risk	Moderate	High	Low

IBS - Incorporated by sowing

SENTRY DIRECTIONS FOR USE:

DIRECTIONS FOR PRE-EMERGENCE USE:

RESTRAINTS: DO NOT apply to barley, wheat or canola varieties that lack imidazolinone tolerance.
DO NOT apply by aircraft.

Situation	Weeds controlled	Rate	Critical Comments
Imidazolinone herbicide tolerant Barley, Canola and Wheat (single gene) varieties only	Barley grass (*Hordeum* spp.) Brome grass (*Bromus* spp.) Climbing buckwheat (*Fallopia convolvulus*) Hedge mustard (*Sisymbrium officinale*) Indian hedge mustard (*S. orientale*) Wild radish (*Raphanus raphanistrum*) Wireweed (*Polygonum aviculare*) **Suppression of the following weeds:** Annual ryegrass (*Lolium rigidum*) Capeweed (*Arctotheca calendula*) Clover (*Trifolium* spp.) Fumitory (*Fumaria* spp.) Long storksbill (*Erodium botrys*) Paterson's curse (*Echium plantagineum*) Phalaris (*Phalaris* spp.) Volunteer barley (*Hordeum vulgare* - other than imidazolinone herbicide tolerant barley varieties) Volunteer canola (*Brassica napus* - other than imidazolinone herbicide tolerant canola varieties) Volunteer wheat (*Triticum aestivum* - other than imidazolinone herbicide tolerant wheat varieties) Volunteer oats (*Avena sativa*) Wild oats (*Avena* spp.)	40-50 g/ha Refer to Compatibility Section and Critical Comments for advice and rates of Triflur X®, Avadex® Xtend, Avadex® Xtra or Sakura* 850WG Herbicide.	**DO NOT apply Sentry (to a crop) more than once in a growing season.** **Where Sentry is used pre-emergence followed by a post-emergent treatment with another imidazolinone-based herbicide or any other Group B herbicide to control grasses in cereals or brassicaceous weeds in canola, only sow an imidazolinone herbicide tolerant crop the following season.** **Ensure follow crop comments and restrictions on the label are consulted prior to use.** Sentry may be applied up to and immediately prior to planting with incorporation by the sowing process using knife/blade points and press wheels. Best weed control will be achieved when applied to weed free, moist, friable soil immediately prior to sowing. Sentry can be applied to dry soil but will not be active until follow up rain disperses the product to the root zone of germinating weeds. Applying Sentry to dry soil when weeds are germinating from depth can impair performance. A 15-20 mm rainfall event received within a fortnight of application will limit this risk. The low rate of Sentry may not provide adequate control when used in heavy stubble covers, on high weed density burdens and in heavier soil types. Tank mixing with a suitable pre-emergence grass herbicide is recommended (see Compatibility section). Applying Sentry in tank mix with pre-emergence grass herbicides will improve grass control, particularly Annual ryegrass, and the control of some broadleaf weed species. This is especially applicable when using Sentry at 40g/ha. Choice of the mixing partner regime depends upon weed spectrum and site conditions. DO NOT apply a Sentry tank mix in a manner contrary to advice provided on the label of the mixing partner. Wherever possible, an appropriate follow up post- emergence herbicide regime using alternative modes of action herbicides is recommended for weed seed set management. Harvest Weed Seed Set Control (HWSSC) measures are recommended in all situations in order to limit the survival of Group B resistant seeds, but are essential where Group B based herbicides, including Sentry, have been applied pre- and post-emergence. See Best Management Practice.

DIRECTIONS FOR POST-EMERGENCE USE:

RESTRAINTS: DO NOT apply to canola and wheat varieties that lack imidazolinone tolerance.
DO NOT apply to crops or weeds which are suffering moisture stress (waterlogged or drought affected), insect, disease or nutritional disorders, frost affected (or if frosts are imminent) or stress from previous herbicide of foliar fertiliser treatment.
DO NOT apply by aircraft.

Crop	Weeds controlled	Rate	Critical Comments
Imidazolinone herbicide tolerant Canola varieties only	Hedge mustard (*Sisymbrium officinale*) Indian hedge mustard (*S. orientale*) London rocket (*S. irio*) Shepherd's purse (*Capsella bursa-pastoris*) Wild radish (*Raphanus raphanistrum*) Wild turnip (*Brassica tournefortii*)	20g/ha plus Supercharge® Elite at 0.5L/100L spray volume Refer to Compatibility Section and Critical Comments for advice and rates of Archer® Herbicide and Havoc® Herbicide.	**DO NOT use a post emergent application if a pre-emergent Sentry application was applied.** **DO NOT apply more than once per season to any one crop.** **Ensure follow-crop comments and restrictions on the label are consulted prior to use.** Apply to crops in the 2-6 leaf stage. Apply early post-emergence to actively growing grass weeds in the 3-5 leaf stage (Z13-15) and broadleaf weeds in the 2-4 leaf stage (20g rate) or grass weeds in the 3 leaf to 2 tillers stage (Z13-22) and broadleaf weeds in the 2-6 leaf stage (40 or 55g rate). Where Sentry herbicide is used alone and annual ryegrass is a significant weed in the total weed population, use the 55g/ha rate to achieve suppression. Weeds will either be killed or will be stunted and uncompetitive with the crop. Sentry is physically and biologically compatible with Archer Herbicide and Havoc Herbicide, both in two- way and three-way mixes. Havoc Herbicide aids in the control of selected grass species (refer to the Havoc label). When these weeds require control apply a tank mix of Sentry and Havoc using the recommended label rate of Havoc. 175mL/ha of Havoc will normally be sufficient to achieve good control of light populations. Use higher rates when grasses are primary weeds in the paddock, and when their growth stage requires it, to ensure highest levels of control. When mixing with Havoc Herbicide, use 1L/100L spray volume of Supercharge Elite. Archer Herbicide aids in the control of legumes, prickly lettuce, capeweed and other thistle-like weed species. When these weeds require control apply a tank mix of Sentry and Archer using the recommended label rate of Archer.
	Above weeds plus: Amsinckia (*Amsinckia* spp.) Barley grass (*Hordeum leporinum*), Bedstraw (*Galium tricornutum*) Brome grass (*Bromus* spp.) Climbing buckwheat (*Fallopia convolvulus*) Clover (*Trifolium* spp.) Corn gromwell (*Buglossoides arvense*) Crassula (*Crassula* spp.) Dead nettle (*Lamium amplexicaule*) Double gee (*Emex australis*) Fumitory (*Fumaria* spp.) Paterson's curse (*Echium plantagineum*) Phalaris (*Phalaris* spp.) Toadrush (*Juncus bufonius*) Volunteer barley (*Hordeum vulgare* - other than varieties with imidazolinone-tolerance) Volunteer canola (*Brassica napus* - other than varieties with imidazolinone-tolerance)	40 or 55g/ha plus Supercharge Elite at 0.5L/100L spray volume Refer to Compatibility Section and Critical Comments for advice and rates of Archer® Herbicide and Havoc® Herbicide.	

SENTRY POST EMERGENCE DIRECTIONS FOR USE (CONTINUED):

Crop	Weeds controlled	Rate	Critical Comments
	Volunteer wheat (*Triticum aestivum* - other than varieties with imidazolinone-tolerance) Wild oats/ Volunteer oats (*Avena* spp.) Wireweed (*Polygonum aviculare*) **Suppression only:** Annual ryegrass# (*Lolium rigidum*) Medics (*Medicago* spp.) Silver grass (1-2 leaf only) (*Vulpia* spp.) Storksbill (*Erodium* spp.) Volunteer vetch (*Vicia* spp.)		Rates of Archer above 150mL/ha can impair grass control. The addition of Havoc Herbicide at 175mL/ha to the tank mix will overcome this antagonism. (Refer to the Compatibility section of this label and the Havoc and Archer labels for further details of use). #Where Group A and/or Group B – resistant ryegrass is known to be present or ryegrass populations in excess of 200 plants per m2 are expected, an application of Rifle® 440 Herbicide or Trifluralin should be made prior to sowing. DO NOT use Sentry at 40-55g/ha on shallow, strongly duplex soils in Western Australia.
Imidazolinone herbicide tolerant Wheat (single gene) varieties only	Hedge mustard (*Sisymbrium officinale*) Indian hedge mustard (*S. orientale*) London rocket (*S.irio*) Shepherd's purse (*Capsella bursa- pastoris*) Wild radish (*Raphanus raphanistrum*) Wild turnip (*Brassica tournefortii*)	20g/ha plus Supercharge Elite at 0.5L/100L spray volume	**DO NOT use a post emergent application if a pre-emergent Sentry application was applied.** **DO NOT apply more than once per season to any one crop.** **Ensure follow-crop comments and restrictions on the label are consulted prior to use.** Apply to crops in the 4 leaf (Z14) to commencement of flag leaf (Z37) stage. Apply early post-emergence to actively growing grass weeds in the 3-5 leaf stawge (Z13-15) and broadleaf weeds in the 2-4 leaf stage (20g rate) or grass weeds in the 3 leaf to 2 tillers stage (Z13-22) and broadleaf weeds in the 2-6 leaf stage (40g rate). Weeds will either be killed or will be stunted and uncompetitive with the crop. #Where ALS resistant ryegrass is known to be present or ryegrass populations in excess of 200 plants per m2 are expected, an application of a Group D herbicide, such as Rifle 440 Herbicide or Trifluralin, should be made prior to sowing. DO NOT use Sentry at 40g/ha on shallow, strongly duplex soils in Western Australia.
	Above weeds plus: Amsinckia (*Amsinckia* spp.) Barley grass (*Hordeum leporinum*) Bedstraw (*Galium tricornutum*) Brome grass (*Bromus* spp.) Climbing buckwheat (*Fallopia convolvulus*) Clover (*Trifolium* spp.) Corn gromwell (*Buglossoides arvense*) Crassula (*Crassula* spp.) Dead nettle (*Lamium amplexicaule*), Double gee (*Emex australis*) Fumitory (*Fumaria* spp.) Paterson's curse (*Echium plantagineum*) Phalaris (*Phalaris* spp) Toadrush (*Juncus bufonius*) Volunteer barley (*Hordeum vulgare* - other than varieties with imidazolinone-tolerance) Volunteer canola (*Brassica napus* - other than varieties with imidazolinone-tolerance) Volunteer wheat (*Triticum aestivum* - other than varieties with imidazolinone-tolerance) Wild oats/Volunteer oats (*Avena* spp.) Wireweed (*Polygonum aviculare*) Suppression only: Annual ryegrass# (*Lolium rigidum*), Medics (*Medicago* spp.), Silver grass (1-2 leaf only) (*Vulpia* spp.), Storksbill (*Erodium* spp.), Volunteer vetch (*Vicia* spp.)	40g/ha plus Supercharge Elite at 0.5L/100L spray volume	

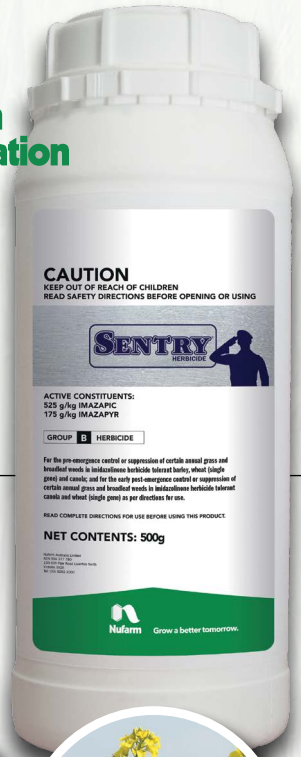
NOT TO BE USED FOR ANY PURPOSE, OR IN ANY MANNER, CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION.

WITHHOLDING PERIODS

Imidazolinone herbicide tolerant Barley and Canola:
DO NOT GRAZE OR CUT FOR STOCK FOOD FOR 6 WEEKS AFTER APPLICATION.
HARVEST FOR GRAIN: NOT REQUIRED WHEN USED AS DIRECTED.

Imidazolinone herbicide tolerant Wheat:
DO NOT GRAZE OR CUT FOR STOCK FOOD FOR 4 WEEKS AFTER APPLICATION.
HARVEST FOR GRAIN: NOT REQUIRED WHEN USED AS DIRECTED.

Unique Nufarm Registration



INTERCEPT DIRECTIONS FOR USE:

Crop use or Situation	Weeds controlled	Rate	Critical Comments
Imidazolinone herbicide tolerant barley	Barley (*Hordeum vulgare*)- non imidazolinone tolerant varieties Barley grass (*Hordeum leporinum*) Brome (*Bromus diandrus* and *B.rigidus*) Indian hedge mustard (*Sisymbrium orientale*) Muskweed (*Myagrum perfoliatum*) Oats (*Avena sativa*) Triticale (*Triticosecale* spp.) Wheat (*Triticum aestivum*) – non imidazolinone tolerant varieties Wild oat (*Avena fatua*) Wild radish (*Raphanus raphanistrum*) Wild turnip (*Brassica tournefortii*)	375-750 mL/ha	Always add Supercharge® Elite, Banjo® at 0.5L/100L spray solution. Read Follow Crop comments and restrictions on the label prior to use. Read Compatibility section for advice on tank mixes. Tank mixes with other herbicides can broaden the range of weeds controlled. Apply to Imidazolinone tolerant barley crops from the 5 leaf stage to 1st node stage (Z31). Applications should be targeted at grass weeds when the majority are in the 2-4 leaf stage and only when within the recommended crop stages. Application to multi-tillered crops may impair weed control because of poor contact and coverage of weeds. See Compatibility. Tank mixes with Archer® will broaden weed spectrum to target composite and legume weeds. The control of brassicaceous weeds will depend on the status of Group B resistance in the population. If other weeds require control, apply appropriate herbicides at least two weeks before or after Intercept, and only when signs of regrowth or renewed vigour appear, otherwise the effects of the early treatment may
	Charlock (*Sinapsis arvensis*) Dense flowered fumitory (*Fumaria densiflora*) Marshmallow (*Malva parviflora*) Sub clover (*Triflorium subterraneum*) **Suppression** Annual ryegrass (*Lolium rigidum*)# Bedstraw spp. (*Galium tricornutum* & *G.aparine*) Doublegee (*Emex australis*) Silver grasses (*Vulpia bromoides* & *V.myuros*) Stinging nettle (*Urtica urens*)	600-750 mL/ha	A**lways add Supercharge® Elite, Banjo® at 0.5L/100L spray solution.** Read Follow Crop comments and restrictions on the label prior to use. **See Compatibility. Tank mixes with Archer® will broaden weed spectrum to target composite and legume weeds.** Weed species will either be controlled or suppressed. Surviving plants will be stunted and will be uncompetitive with the crop, and seed set will be prevented or greatly reduced. †The control of annual ryegrass varies from excellent to poor depending on the status of Group B resistance in the population and environmental conditions. Where the population is expected to exceed 200 plants/m2 or a high level of control is required, or the ryegrass is known to be resistant or thought to be developing resistance, an application of a suitable pre-emergent herbicide should be made prior to sowing.
Imidazolinone herbicide tolerant canola	Indian hedge mustard (*Sisymbrium orientale*) Muskweed (*Myagrum perfoliatum*) Wild radish (*Raphanus raphanistrum*) Wild turnip (*Brassica tournefortii*)	300–500 mL/ha	**Always add Supercharge® Elite, Banjo® at 0.5L/100L spray solution.** Read Follow Crop comments and restrictions on the label prior to use. Read Compatibility section for advice on tank mixes, specifically Havoc® and Archer®. Tank mixes with other herbicides can broaden the range of weeds controlled. Apply to crop at the 2 to 6 leaf stage. Apply to actively growing grass weeds in the 3-leaf to 2-tiller stage and broadleaf weeds in the 2 to 6 leaf stage. Use the higher rate when weed numbers are high or towards the upper end of the recommended growth stages, or when the crop is at the 5 to 6 leaf stage to ensure better contact and coverage. Best weed control is achieved when 750mL/ha plus **Supercharge® Elite, Banjo®** is used. This rate provides both post-emergent and a longer in-crop residual control. If other weeds require control, apply appropriate herbicides at least two weeks after Intercept Herbicide and only when signs of re-growth or renewed vigor appear, or the effects of Intercept Herbicide may affect their performance. Weed species will either be controlled or suppressed. Surviving plants will be stunted and will be uncompetitive with the crop, and seed set will be prevented or greatly reduced. †The control of annual ryegrass varies from excellent to poor depending on the status of Group B resistance in the population and environmental conditions. Where the population is expected to exceed 200 plants/m2 or a high level of control is required, or the ryegrass is known to be resistant or thought to be developing resistance, an application of a suitable pre-emergent herbicide should be made prior to sowing. A tank mix with Havoc Herbicide may also be necessary.
	As above plus: Annual medic (*Medicago* spp.) Capeweed (*Arctotheca calendula*) Chickpea (*Cicer arietinum*) Faba bean (*Vicia faba*) Field pea (*Pisum sativum*) Lentil (*Lens culinaris*) Narrow leaf lupin (*Lupinus augustifolius*) Sub clover (*Trifolium subterraneum*)	300-500 mL/ha plus Archer at 150-300 mL/ha	
	Barley (*Hordeum vulgare*)- non-imidazolinone tolerant varieties Barley grass (*Hordeum leporinum*) Brome (*Bromus diandrus* & *B. rigidus*) Charlock (*Sinapsis arvensis*) Dense flowered fumitory (*Fumaria densiflora*) Indian hedge mustard (*Sisymbrium orientale*) Marshmallow (*Malva parviflora*) Oat (*Avena sativa*) Sub clover (*Trifolium subterraneum*) Wheat (*Triticum aestivum*) – non-imidazolinone tolerant varieties Wild oat (*Avena fatua)* **Suppression** Annual ryegrass (*Lolium rigidum*)# Bedstraw spp. (*Galium tricornutum* & *G.aparine*) Doublegee (*Emex australis*) Silver grasses (*Vulpia bromoides* & *V. myuros*) Stinging nettle (*Urtica urens*)	600–750 mL/ha	

NOT TO BE USED FOR ANY PURPOSE, OR IN ANY MANNER, CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION.
WITHHOLDING PERIODS:
GRAZING
Imidazolinone herbicide tolerant barley: DO NOT GRAZE OR CUT FOR STOCK FOOD FOR 4 WEEKS AFTER APPLICATION.
Imidazolinone herbicide tolerant canola: DO NOT GRAZE OR CUT FOR STOCK FOOD FOR 5 WEEKS AFTER APPLICATION.
HARVEST
ALL CROPS: NOT REQUIRED WHEN USED AS DIRECTED.

Frequently Asked Questions

1. Why a pre-emergent registration?

An application of Sentry pre-emergent offers increased yield, more flexibility with timing, improved crop safety and a great time management tool for growers.

2. Benefits of pre-emergence use pattern

Up to 23% increased yield over Intervix, reduced weed pressure early in the crops life, greater flexibility for mix partners and reduces pressure on post-emergent applications.

3. Characteristics of imidazolinones and how they impact pre-emergence use

Highly water soluble - Readily wash off stubble, move into the soil and into the furrow which improves weed control, readily taken up by plants, broad spectrum in their activity.

4. Can I apply Sentry when it is dry?

Sentry like all pre emergent herbicides, requires some moisture to work effectively. Being highly soluble the amount required is substantially less than many common pre emergent herbicides, 10–15mm should be adequate for most soil types. Ideally this should occur within 2 weeks of application.

5. What happens if I don't get this rainfall?

Sentry is non-volatile, and if applied with no rainfall onto dry soil, breakdown will occur very slowly. Most of the breakdown occurs from microbial activity, which requires moisture. If there is some deeper soil moisture there is the potential for weeds to germinate and not be controlled effectively.

6. Can I use Sentry if I sow with a disc seeder?

Crop safety is very good, however the current registration is only for seeding systems with knife points and press wheels. Disc seeders have not been extensively trialled and the lack of incorporation of Sentry into the profile may impact weed control.

7. What will happen to Sentry if we get a lot of rainfall after application?

Crop safety should not be an issue, unless there is waterlogging. With high rainfall there is the risk that the herbicide could leach which could impact on the performance of weed control, this would be more likely in lighter soil types.

8. If I have a heavy stubble, should I burn it before applying Sentry?

Sentry readily washes off stubble, but if the stubble is extremely thick uneven incorporation can impact weed control. It is not advisable to burn the stubble prior to application.

9. Will ash tie up Sentry?

We have no information if this will be the case, however we believe this is unlikely.

10. What sort of plant back intervals am I looking at if I use Sentry pre-emergence?

The label has the latest information regarding the plant back periods.

11. What's your advice in regard to optimising ryegrass control?

Although Sentry will offer suppression of Group B susceptible ryegrass, mixing with another pre emergent such as trifluralin, triallate, Boxer Gold or Sakura will be the preferred strategy.

12. Can we use "imi's" as a summer spray?

Technically there is no reason why this could not be done, however to get the best performance of weed control in crop it is recommended that this approach not be taken. It is a far better strategy to utilise a NON selective herbicide in summer fallows and utilise the imi's in crop where required.

13. Can Sentry be used Post Sowing Pre-Emergent (PSPE)?

Some trial work has been undertaken as PSPE, however trials indicate more reliable weed control occurs with Sentry applied prior to sowing, incorporated by sowing. Further work will be undertaken to determine if PSPE is a suitable use pattern.

14. I used Sentry Pre-Em and still have a lot of weeds germinating, is this normal?

Unlike some other pre-emergent herbicides it is normal for weeds to germinate, but after a short period of time (5-7 days) and with adequate rainfall, weeds will start to display herbicidal effects from the application of Sentry.

Clever approach needed to get on top of brome grass

Brome grass has become a serious problem in the southern wheatbelt over the past decade, as crop rotations have tightened up and reduced tillage has been widely adopted.

Dr Chris Preston, Associate Professor of Weed Management at the University of Adelaide, says the registration of Sentry herbicide for pre-emergence control of brome grass gives farmers and their advisers a new opportunity to tackle the weed.

"With this new registration, I believe farmers have a great opportunity to maximise brome grass control this season, with a pre-sowing application of Sentry and a post-emergence spray of Intercept a few weeks later," he said.

"In other words, hit brome grass hard with two consecutive sprays this season, and closer to harvest, employ other tactics like windrow burning and chaff carts to reduce the seed set of brome grass."

Dr Preston said while using these two Group B herbicides in sequence in the same crop would seem controversial, he reassured agronomists and farmers that it would make best use of the available chemistry without greatly increasing the risk of herbicide resistance.

"Using these two herbicides in sequence will control the staggered germinations of brome grass in one crop and reduce the seed bank," he said.

Dr Chris Preston, Associate Professor of Weed Management at the University of Adelaide

"This provides less selection pressure for herbicide resistance than when successive generations of weeds are sprayed with the same chemistry two years or more in a row."

Dr Preston added that farmers could no longer rely on other Group B herbicides such as Atlantis (mesosulfuron-methyl) and Crusader (pyroxsulam) in cereal crops because they were showing evidence of resistance to brome grass.

He cautioned that even though 'imi' herbicides like Sentry were still working on brome grass now, resistance would emerge if they were used too often.

Instead, Dr Preston advocated an integrated approach to managing brome grass and other tough weeds such as barley grass.

"By rotating the crops and the chemistry, we stand a better chance of controlling brome grass and maximising the life of the chemistry too."

Notes

Nufarm imiCrops®

SENTRY® HERBICIDE

Intercept HERBICIDE

nufarm.com.au

Want to stay updated?
Follow us on our socials!
@NufarmAustralia

Nufarm Grow a better tomorrow.