PUSHING PERFORMANCE
ADJUVANT

SPRING 2021

Hit your goal, gain control of weeds with Sorrento

Overcome weed control obstacles post-emergence with Sorrento

- ✓ Improves spreading & retention
- ✓ Increases cuticle penetration
- ✓ May increase yield

INTERAGRO
THE ADJUVANT EXPERTS

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Overcome weed control obstacles

Keeping crops free from early weed competition is crucial to protect yield in the first month or so after emergence. Weeds can easily smother the crop, competing for light, water and nutrients, but treating weeds post-emergence can cause a particular set of physical challenges that limit herbicide performance, where even the best herbicide formulation will need assistance to reach it's target site inside leaf tissue. Interagro's spreading and penetrant adjuvant Sorrento has shown excellent performance benefits in cereals and maize and could be a useful insurance policy for growers at the post-emergence spray timing to optimise available chemistry and minimise weed competition.

Water beading limits coverage and retention across the leaf

As the crop increases in size, the delivery of post-emergence herbicides to target weeds becomes more tricky. Weeds can become shaded and herbicide intercepted by the crop, leading to poor coverage and a significant reduction in the control of target weeds – also now larger and more difficult to control by this stage. Weed control can also be particularly challenging with spring germinating weeds such as fat-hen and sowthistle that have hairy/waxy leaves which reduce the herbicide:leaf contact required for effective coverage across the whole leaf. This is because both hairy and waxy leaves reduce the ability of the herbicide to spread out and be retained on the leaf. **Whilst the in-can adjuvancy provided with some herbicide formulations will help to a certain extent, only tank mix adjuvants deliver near perfect spreading. This is because the rate of the in-can adjuvant is fixed by the pesticide rate per hectare, whereas the adjuvant added in a tank mix can be adjusted based on the total volume of water and pesticide being used.**

The leaf cuticle is the biggest barrier to pesticide applications

Once the herbicide has spread out on the leaf it must penetrate the leaf cuticle and the living tissue inside. The cuticle, on the upper and lower surfaces of the leaf, to protect against water loss and desiccation, is the biggest barrier to effective weed control. Weeds which are particularly waxy such as fat-hen, are also more hardened to herbicide so uptake can be slow. With the resulting poor coverage and uptake into weeds, a significant reduction in weed control can be of real threat to the crop.

Moderate to highly water soluble herbicides need an adjuvant

The ability of a herbicide active to enter the cuticle is determined by its chemical properties. Herbicide active ingredients with low water solubility are able to penetrate leaf cuticles by simple diffusion through the waxy components, which make up the most part of the cuticle. The rate of movement through the cuticle for herbicides with moderate to high water solubility is much less, resulting in less herbicide being absorbed. **Herbicide actives with moderate to high water solubility need a suitable adjuvant to penetrate the waxy cuticle in order to increase the flow of active ingredient into the leaf.**

Water solubility of some common actives

Herbicide	Water solubility at 20^{o}C (mgl^{-1})	Interpretation
Bentazone	7,112	High
Clodinafop	4	Low
Clopyralid	7,850	High
Cycloxydim	53	Moderate
Fenoxaprop	0.43	Low
Halauxifen	3,070	High
Imazamox	626,000	High
Iodosulfuron methyl sodium	25,000	High
Mecoprop-p	250,000	High
Mesosulfuron methyl	483	Moderate
Sulfonyl-ureas		Moderate - high
Nicosulfuron	7,500	High
Pinoxaden	200	Moderate
Pyroxsulam	3,200	High
Metsulfuron methyl	2,790	High

Source: University of Hertfordshire Pesticide Database: http://sitem.herts.ac.uk/aeru/ppdb/en/atoz_herb.htm

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Overcome weeds with Sorrento

Sorrento is a new and unique activator adjuvant based on the latest technology that helps to optimise the performance of post-emergence herbicides for the highest levels of weed control possible.

OPTIMUM COVERAGE

Improves spreading across the leaf

Sorrento lowers surface tension, allowing herbicide droplets to spread out and cover the leaf. Increasing herbicide contact across the weed leaf surface is critical to getting the coverage needed for effective weed control.

Critical for:

- **Weeds with very waxy leaves e.g. Fat-hen**
- **Hairy weeds e.g. Wild oats, ryegrass**
- **Large weeds, advanced growth stages**

OPTIMUM CONTACT

Improves retention on the leaf

One of the most notable benefits of Sorrento is its exceptional binding properties which increases herbicide pinning to the leaf surface. With a greater concentration of herbicide sticking and staying on the leaf, weed control will be more effective.

Critical for:

- **Grass-weeds**
- **Large broadleaf weeds**
- **High water volumes**

HIGHER UPTAKE

Increases cuticle penetration

Owing to its unique hydrophilic/lipophilic balance, Sorrento helps herbicide actives with moderate - high water solubility penetrate leaf cuticles. This increases the speed and mobility of the herbicide into the leaf for faster and more effective weed control.

Critical for:

- **Established weeds - with thicker cuticles**
- **Weeds with waxy cuticles e.g. Fat-hen**
- **Herbicide actives with moderate to high water solubility e.g. sulfonylureas, pyroxsulam, nicosulfuron, halauxifen, mecoprop-p, imazamox, pinoxaden**

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Maximise coverage, insure against weeds

Complete coverage

Research at FERA Science Ltd was undertaken in 2019 to demonstrate the water beading that occurs when applying sprays to a leaf, and how the addition of Sorrento helps spray droplets to spread out, resulting in vastly improved coverage. Photos taken 3 minutes after application.

WATER

Water beads on leaf surface – poor coverage, wet

AXIAL PRO 0.6 L/ha

Beading on leaf surface – good coverage, slow drying

AXIAL PRO 0.6 L/ha + SORRENTO 0.1%

Reduced beading – complete coverage, fast drying

KEY TAKEAWAYS

- Herbicides formulated with in-can adjuvancy offer some improvement in coverage across the leaf but spray droplet beading still prevents optimum coverage
- Addition of Sorrento to Axial Pro delivered optimum spreading and coverage across the leaf for more effective weed control

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Improved control with Axial Pro at FERA

Improved Wild Oat & Ryegrass control with Sorrento

0.4 L/ha

0.6 L/ha

0.82 L/ha

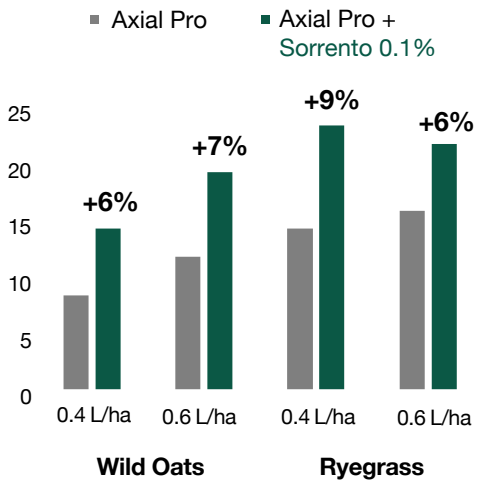
- Research at FERA Science Ltd also investigated the affect of Sorrento on Axial Pro speed of kill of wild oats & ryegrass
- The addition of Sorrento to Axial Pro improved control just 7 days after application - at all 3 rates tested - 0.4 L/ha, 0.6 L/ha and 0.82 L/ha

Pot 1: Untreated
Pot 2: Axial Pro
Pot 3: Axial Pro + Sorrento

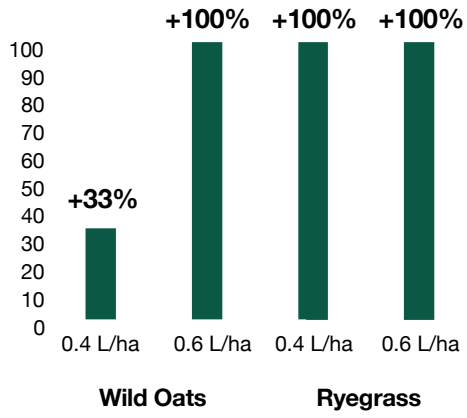
Growth reduction, reddening & meristem growth inhibition all much faster

Effect of Sorrento on Wild Oat & Ryegrass control with Axial Pro 7DAA

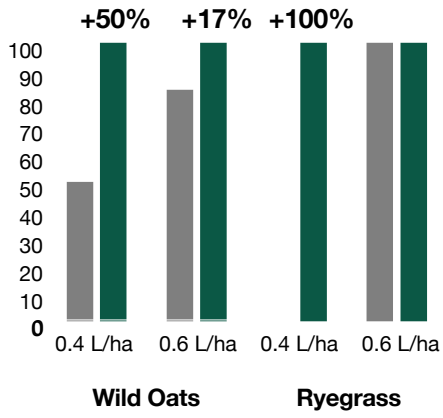
% of plants showing growth reduction



% of plants showing reddening



% of plants showing meristem growth inhibition



KEY TAKEAWAYS

- The addition of Sorrento increased the uptake of Axial Pro at all 3 rates tested even at 7 days after application
- Sorrento increased speed of kill of wild oats and ryegrass at all rates of Axial Pro

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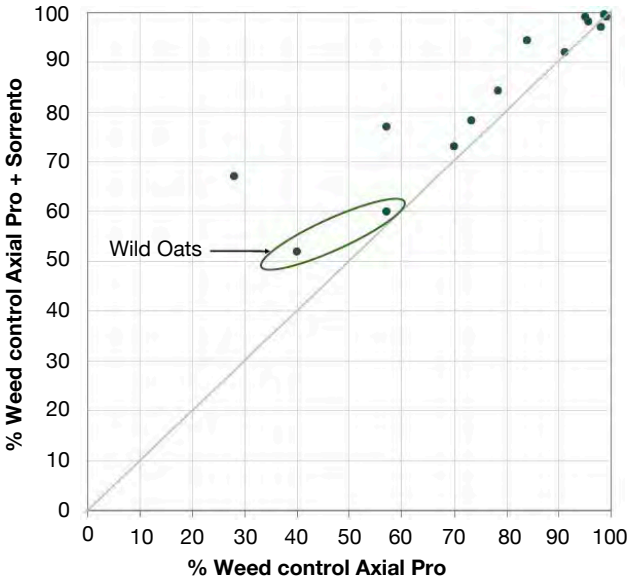
Powering Axial Pro in the field - best partner

Improved control of Ryegrass & Wild Oats

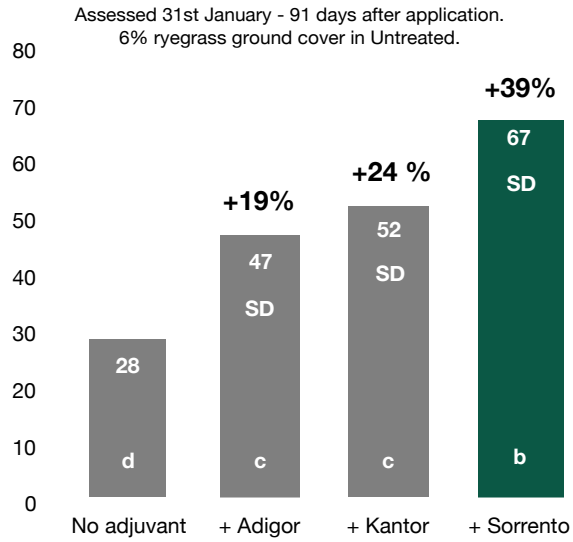
Effect of Sorrento on Axial Pro control of Ryegrass & Wild Oats - all results



Sorrento used at 0.1%. Data from 4 trials, various assessment timings and Axial Pro rates.

Sorrento - Best adjuvant partner

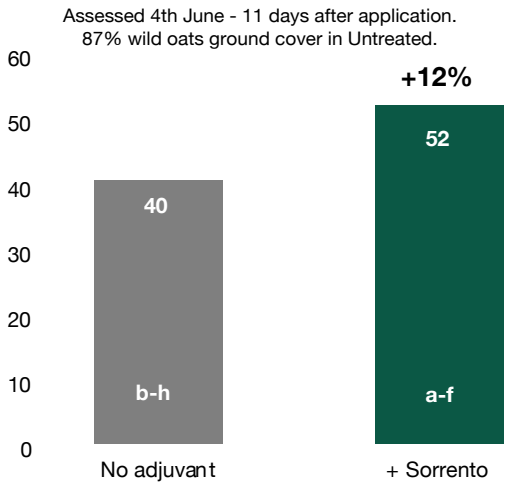
Effect of adjuvants on Ryegrass control in Winter Wheat with 67% rate Axial Pro (0.55 L/ha)



Agrii 2019, 19033 Goldsticks. Ryegrass control in Winter Wheat. Treatments applied on 31st october 2018. No pre-em herbicide was applied. Different letters indicate statistically significant difference.

Faster knockdown of Wild Oats

Effect of Sorrento on Wild Oat control in Winter Wheat with 67% rate Axial Pro (0.55 L/ha)



Agrii 2019. 19095 Fowlmere. Wild Oat control in Winter Wheat. Treatments applied post-emergence on 24th May 2019 at GS31 of the Wild Oats. No pre-em herbicide was applied.

KEY TAKEAWAYS

- The addition of Sorrento to Axial Pro for ryegrass and wild oat control has delivered valuable improvements in replicated field trials
- In all cases Sorrento has increased the speed of kill and led to higher overall levels of weed control
- Graph top left - All data points above the diagonal line show improved control of ryegrass/ wild oats over and above Axial Pro alone - all data points have been above in replicated trials
- Sorrento has helped to improve the efficacy of Axial Pro at the recommended rates
- Sorrento has shown excellent improvements in efficacy when compared to other adjuvant options tested

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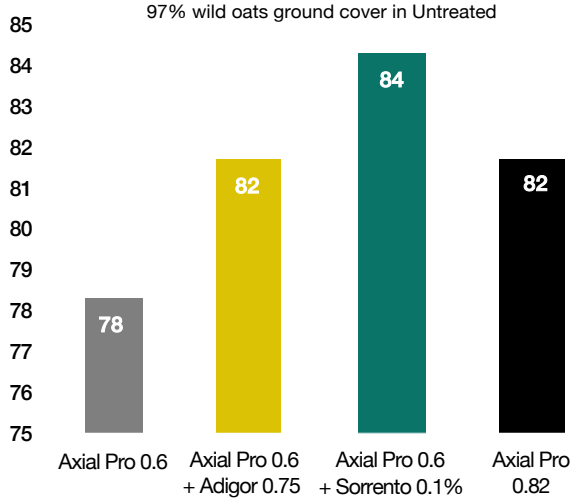
Toughest on the toughest growth stages

Highest control at the latter timing

Effect of Sorrento on Wild Oat control in Winter Wheat at Stem Extension timing

Assessed 7th July - 40 days after application.
97% wild oats ground cover in Untreated

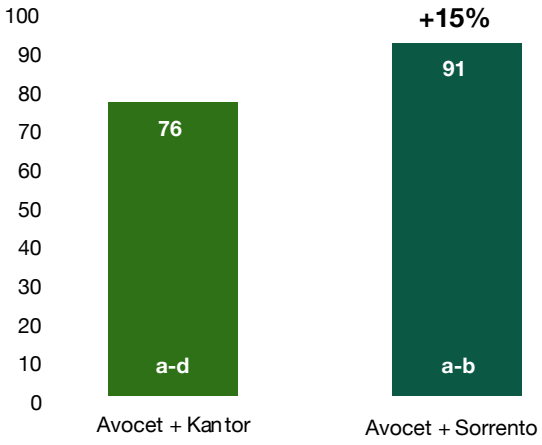


Agrii 2020. 20119 Fowlmere. Wild oat control in Winter Wheat. Treatments applied post-emergence on 27th May 2020 at GS31 of the wild oats. No pre-em herbicide was applied.

Faster kill with Avocet

Effect of Sorrento on Wild Oat control in Winter Wheat with Avocet (250 g/ha)

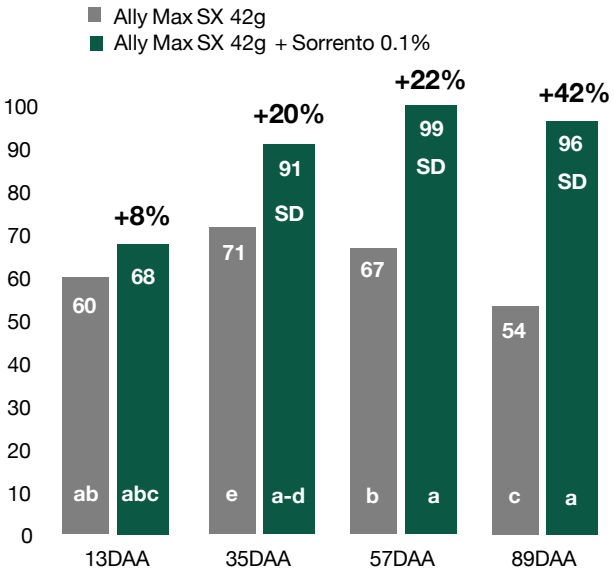
Assessed 4th June - 60 days after application.
87% wild oats ground cover in Untreated



Agrii 2019. 19095 Fowlmere. Wild oat control in Winter Wheat. Treatments applied post-emergence on 30th April 2019 at GS21-23 of the wild oats. No pro-em herbicide was applied.

Significant increase in Ally Max efficacy

Effect of Sorrento on Common Fumitory control in Spring Barley with full rate Ally Max SX



Crop Plot 2016, Ireland. Common fumitory control in Spring Barley. Treatments applied 26th May 2016. Untreated fumitory population at spraying 68 plants per sqm. GS 2-6 leaf & 2-8cm.

KEY TAKEAWAYS

- Trials have demonstrated over the last few years that Sorrento is particularly effective with herbicide actives with moderate-high water solubility - i.e. herbicides which need help to penetrate leaf cuticles e.g. Axial Pro, Avocet, SUs such as Ally Max, Samson Extra
- In cereals, Sorrento has proven highly valuable with hard to control target weeds - wild oats, ryegrass, and other hairy/waxy weeds which are challenging targets for any herbicide e.g. Fat-hen

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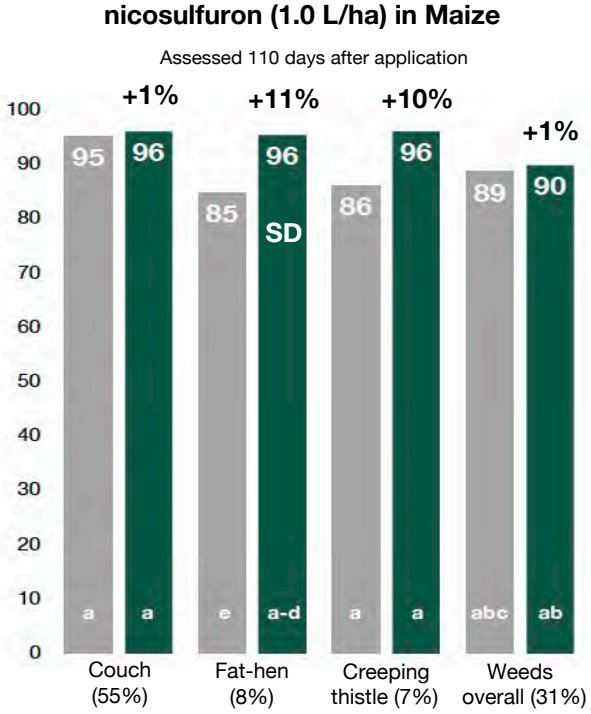
Significant weed control benefits in Maize

Higher efficacy with nicosulfuron in ideal application conditions

Effect of Sorrento on weed control with 40 g/l nicosulfuron (1.0 L/ha) in Maize

Assessed 110 days after application

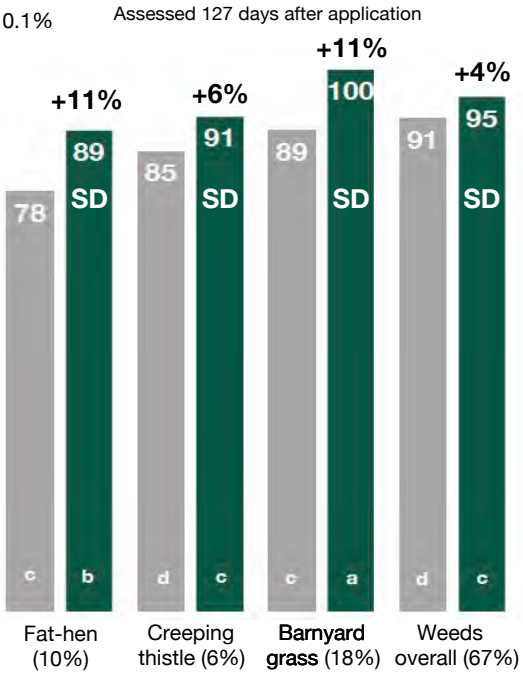


Czech Republic 2017. Maize cv P8201. Treatments applied on 1st June 2017 in ideal conditions at crop GS14. P=.05. SD = significant difference. (%) = % ground cover in untreated.

Significant weed control benefits in dry conditions

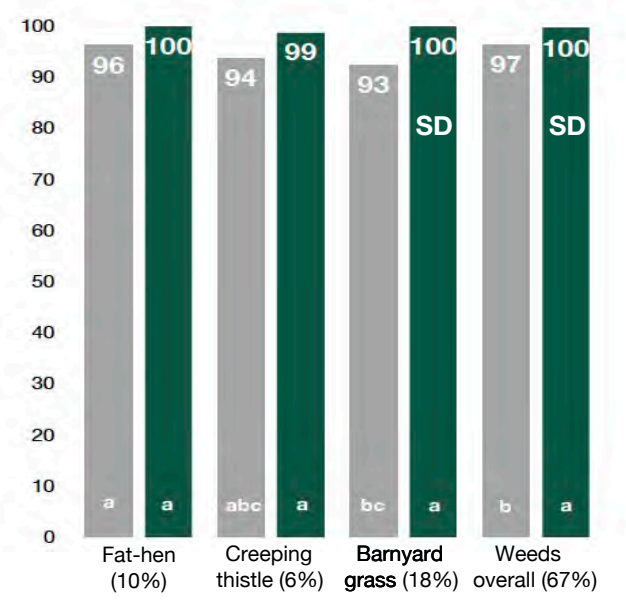
Effect of Sorrento on weed control with 40 g/l nicosulfuron (1.0 L/ha) in Maize

Assessed 127 days after application



Effect of Sorrento on weed control with 75 g/l mesotrione + 30 g/l nicosulfuron (1.0 L/ha)

Assessed 127 days after application



Right top & bottom: Slovakia 2017. Maize cv P9074. Treatments applied on 12th June 2017 in dry soil conditions at crop GS15. P=.05. SD = significant difference. (%) = % ground cover in untreated.

KEY TAKEAWAYS

- The addition of Sorrento to post-emergence herbicides has proven highly effective in maize, particularly for the control of troublesome weeds fat-hen, creeping thistle and barnyard grass
- Even in ideal application conditions, Sorrento increased control of fat-hen with nicosulfuron significantly
- In dry application conditions Sorrento has improved overall weed control significantly with straight nicosulfuron and mesotrione + nicosulfuron
- Sorrento has proven particularly valuable against barnyard grass, which can be notoriously tricky in maize

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Significant improvement in grass control on farm

With Sorrento 0.1%

Without Sorrento

Enhanced grass-weed control seen in forage maize

A tramline trial was set up in 2020 to assess weed control with and without the addition of Sorrento, with the help of Agrii agronomist Todd Jex.

The weed profile in the field was mostly broadleaf weeds, including black bindweed and field speedwell, with annual meadow grass, wild oats and barnyard grass.

The trial was set up to include an area of the field where barnyard grass was most prolific. A pre-em was applied and followed by 0.75 L/ha Samson Extra plus 0.5 L/ha Callisto at around the six-leaf stage of the maize crop. Sorrento was added to the tank at a 0.1% inclusion rate in the treated tramline.

There was very little difference to be seen on the broadleaf weeds where Sorrento was or wasn't added to the mix. What was noticeable was an increased speed of effect on the barnyard grass. At four weeks post-application this difference was significant.

For the farmer, George Fraser, the barnyard grass was the worst he'd seen it in the continuous maize field so the additional level of control achieved with the Sorrento was seen to be very valuable.

Photos and feedback courtesy of Todd Jex.

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Sorrento key crop recommendations

CEREALS

Apply Sorrento at 0.1% of the final spray volume

- **Herbicides with moderate to high water solubility eg. Axial Pro, Avocet**

FORAGE MAIZE

Apply Sorrento at 0.1% of the final spray volume

- **Herbicides with moderate to high water solubility eg. Samson Extra**

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Sorrento
Technical Summary

A new activator adjuvant to help you hit your goal and gain control of weeds

Sorrento	Product information
Classification	Adjuvant
Composition	Emulsifiable concentrate containing 50% w/w alkoxylated alcohol
Recommended use	With all approved post-emergence herbicides, particularly with high water solubility
Rates of use	0.1% of the final spray volume
Mixing	Add to the spray tank first before adding plant protection products or fertiliser
Pack size	3 litres
Key features / benefits	Improves spreading and retention across the leaf for optimum coverage and contact Increases cuticle penetration, resulting in higher uptake into the leaf May increase yield, particularly in crops such as maize that struggle with weed competition

Approved crops and application timings

Sorrento may be used with all approved plant protection products applied at full rate up to and including the following growth stages below. Application of Sorrento beyond the latest timing is permitted only where using half the approved rate of the plant protection product and up to the latest timing of the plant protection product.

Arable & Veg.	Latest timing of application
Cereals	Up to and including 1/4 inflorescence (GS52)
Beans*	Up to and including first pod set
Broccoli/Calabrese	Up to and including heads begin to form
Brussel Sprout	Up to and including lateral buds begin to develop
Cabbage	Up to and including heads begin to form
Carrot and Parsnip	Up to and including 9 true leaves unfolded
Cauliflower	Up to and including heads begin to form
Collard and Kale	Up to and including main shoot at 30% of height
Combining Peas	Up to and including flat pod
Forage Maize	Up to and including tip of tassel visible
Hops	Up to and including cone set
Leak and Onions**	Up to and including 9 leaves clearly visible
Linseed	Up to and including 10% capsules formed
Oilseed Rape	Up to and including 10% of pods at final size
Potatoes	Up to and including tuber initiation
Pumpkin/Squash	Up to and including first fruit set
Soyabean	Up to and including first pods visible
Spinach	Up to and including leaf rosette 30% diameter
Red/Sugar Beet	Up to and including 6 leaves fully expanded
Swede and Turnip	Up to and including 9 true leaves unfolded
Vining Peas	Up to and including flat pod

Fruit and Salad	Latest timing of application
Almond	Up to and including first fruit set
Apple and Pear	Up to and including fruit 5-10 mm
Apricot and Cherry	Up to and including first fruit set
Aubergine	Up to and including first fruit set
Black/Strawberry	Up to and including first fruit development
Black/Redcurrant	Up to and including first visible green fruitlet
Chilli and Pepper	Up to and including first fruit set
Cucumber	Up to and including first fruit set
Lettuce (heads)	Up to and including heads begin to form
Lettuce (no heads)	Up to and including leaf rosette 30% diameter
Melon	Up to and including first fruit set
Peach and Nectarine	Up to and including first fruit set
Plum	Up to and including first fruit set
Raspberry	Up to and including first fruit set
Rocket	Up to and including 3rd true leaf unfolded
Sweetcorn	Up to and including tip of tassel visible
Tomato	Up to and including first fruit set on first truss
Wine/Table Grapes	Up to and including first fruit set

Beans*: Includes Broad, Dwarf French, Field, Runner, Edible Podded Pea
Onions**: Includes Bulb, Salad, Shallot, Garlic

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Sorrento - setting a new standard in performance

Technical Support

For technical support, please contact:

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General Enquiries

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