

BEST PRACTICE WHEN USING PRE EMERGENT HERBICIDES

PROJECT PARTNERS



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Key takeaways

- Ensure good seed–herbicide separation. Tyne and press wheel systems are preferred to disc seeders for crop safety.
- Choose low-mobility (low solubility, strong soil binding) herbicides for improved crop safety and weed control in the seed zone. Note they may underperform if post-break rainfall is limited or if weed seeds emerge from depth following cultivation.
- Avoid dry sowing with high weed seedbanks.
- Have a back-up weed control plan if the season changes.

Dry sowing often relies on pre-emergent herbicides to suppress early weed growth, but this comes with a risk of crop damage from residual herbicides. Dry soils slow herbicide breakdown and reduce microbial activity, allowing residues from the previous season to persist, particularly where rainfall has been low or rates were high.

The risk of herbicide carryover is higher when:

- Rainfall was limited in the previous season and over summer.
- The product has high soil persistence (e.g. trifluralin, simazine, imazapic).
- High application rates were used last season, with minimal cultivation or stubble breakdown to promote degradation.
- Soils are sandy or low in organic matter, increasing herbicide mobility.
- Sowing is earlier than usual, shortening the breakdown window from the previous season.

Assessing herbicide carryover risk

Growers can assess herbicide carryover risk by reviewing paddock history, recent rainfall, and herbicide labels. Labels provide guidance on the amount of rainfall required for breakdown and plant-back intervals. The key is knowing how much growing season rainfall has fallen between last year's application and this year's sowing.

Commercial residue testing is available for some herbicides, but it's expensive, slow, and often unhelpful in practice. Lab test results provide a number, but not a clear answer about crop safety.

One option is to use a Carter Ring or bioassay. The Carter ring test involves hammering a metal ring into the soil, adding water and crop seeds, and returning 10 days later to assess weed emergence or seedling health. The main limitation is timing. If you run a ring test in early April and it shows residue risk, but rain falls before sowing, the

situation may have changed. These tests are best viewed as a guide (not a guarantee) but they can give useful paddock-specific insight when conditions are marginal.

Herbicide choice

Select pre-emergents with low solubility and good persistence to avoid leaching and maintain control until rain. Avoid highly soluble products, which can move into the seed zone or below the weed root zone with the first significant rainfall. If soil is dry to sowing depth, initial rain may drive herbicides deeper than expected (as there is no soil moisture to slow herbicide movement). Low-mobility products are safer in these cases. Expect some weed escapes and plan for an early post-emergent follow-up.

Seeding depth

Shallow sowing increases the risk of crop damage from pre-emergent herbicides, especially in dry or uneven soils where maintaining depth is difficult.

Deeper sowing helps keep the seed below the herbicide band. See the sowing depth and long coleoptile case studies for more detail.

Soil types

Sandy soils pose a higher risk of herbicide damage—especially when dry—due to low organic matter and fewer binding sites. Soluble herbicides can leach more easily into the seed zone, increasing the chance of crop damage. Clay soils with more organic matter bind herbicides more tightly, reducing movement but potentially limiting weed control if the herbicide isn't incorporated or activated by rainfall. Grey calcareous soils are also problematic. With low organic matter and limited nutrient holding capacity, it's harder for the crop to recover from herbicide damage.

Understanding the soil types will help reduce herbicide damage.

Stubble retention

Heavy stubble loads can intercept herbicide, reducing the amount that reaches the soil and leading to uneven coverage. This is a bigger issue for products like trifluralin, which bind tightly and don't wash off easily once dry. Most other herbicides are more mobile and will wash off with rainfall.

To minimise stubble interception during spraying (see Congreve, 2020, for more tips):

- Use coarse droplets and narrow fan angles.
- Lower boom height as far as practical double overlap to be maintained at top of stubble, weeds, crop or soil – whichever is highest).

Hart Field Site Group

Key messages

- **Tyned seeders with knife points and press wheels are generally safer for pre-emergent use in dry conditions because they can move soil off the seed row, but soil type, row spacing and machine settings all affect crop safety.**
- **Avoid relying on a single herbicide or mode of action, and use post-emergent options as a backup if needed.**

Dry sowing has become the norm for many of agronomist Simon Honner's clients around Clare in South Australia.

'For about 30% of my growers, dry sowing has been normal for nearly a decade,' Simon said. 'But last year was the first time a lot of people sowed their entire program dry—mainly because we'd had two very late breaks in a row.'

As dry sowing becomes more common, Simon said similar questions come up each year.

'Growers want to know: should we even be using pre-emergents if it's dry? Will they actually work on the weeds? And what if they damage the crop?' he says. 'But most of our weed control happens at seeding now, and when you're dry sowing, you're missing the knockdown window. So skipping the pre-em just isn't really an option.'

Instead, the focus shifts to crop safety. Simon notes separation is everything. 'A lot of the pre-emergents we use now can be quite damaging if they are placed into the seed row and root zone,' he says. 'But they're safe if you can keep them away from the seed row.'

That's where incorporation and seeding setup matter. 'Some products need to be applied and incorporated within 12 hours. Others give you up to seven days. If the soil is already damp, they bind more and don't move as much, but if there's no moisture, mechanical incorporation is essential.'

Tyned seeders, especially knife points and press wheels, are more reliable in dry conditions. 'They move soil off the row, which helps keep treated soil away from the seed. Disc machines don't move as much soil (which is why growers tend to like them), but that's also why they can be higher risk for some pre-emergents.'

Getting the soil throw right is critical. 'You need enough to incorporate the herbicide and keep it out of the seed row,' he said, 'but not so much that you're throwing it into the next row.'

Sowing speed plays a big role. 'Most people sow too fast,' Simon said. 'Dry soils are powdery and fragile—they move more than you think. So we usually slow things down a bit when dry sowing.'

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Crop selection

Consider altering your rotations using crops that aren't as sensitive to herbicide damage if there are concerns about herbicide breakdown from the previous season. This might mean choosing a cereal over lentils which are more prone to crop damage.

Seeder considerations

Tyne systems with press wheels are generally safest for dry sowing, as they can move treated soil into the inter-row and close the furrow. Excess soil throw increases crop injury risk, particularly with mobile herbicides, so slower speeds and careful setup are important. Disc seeders disturb less soil but provide little incorporation, leaving herbicide on the surface where it may wash into open slots. Triple-disc systems or residue managers can help reduce this risk. Always check herbicide labels, particularly for low-disturbance disc systems.

To minimise soil throw, operate at moderate speeds (6–8 km/h) and use narrow, low-profile tynes to limit soil movement. Adjust press wheels inward to close furrows

and block treated soil from falling back in. Narrower row spacing further reduces lateral soil throw.

The seeding system case study has more detail on seeder set-up.

Adapting to the season

Plans change and a dry sowing program can quickly turn into a wet one.

If herbicide has already been applied but rain is delayed, there is usually no need to re-sow or reapply. Most pre-emergents remain stable and effective for several weeks after sowing and will still work when it rains. The key is matching the herbicide's persistence to the expected delay. Shorter-lived products like are less suited to long, dry waits.

If rain arrives earlier than expected, review herbicide choice. It's useful to have other herbicides on hand for later application if needed.

References

Congreve, M., 2020. *Understanding pre-emergent herbicide availability, selectivity and persistence – and how we can use this knowledge to predict behaviour of new herbicides*. GRDC Update Paper. Available at: <https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2020/02/understanding-pre-emergent-herbicide-availability-selectivity-and-persistence-and-how-we-can-use-this-knowledge-to-predict-behaviour-of-new-herbicides>

Row spacing can also help manage the risk. 'Wider rows give you more room to throw soil without overlap.' 'But you still need crop competition to keep weeds in check. For most growers, 250 mm is the sweet spot. It's narrow enough for competition, but wide enough to sow through stubble.'

Soil type makes a difference too. 'Sandy soils are less forgiving, so you've got to be more cautious.'

To reduce the risk of crop damage, Simon avoids highly soluble herbicides when conditions are dry. 'The big concern is getting a dump of rain after seeding that can move herbicide into the seed zone and cause damage.'

While setup still matters, Simon said growers now have more flexibility than they used to. 'There are more post-emergent herbicide options and new registrations. That's given people a bit more confidence that if things don't go perfectly, they've still got a fallback.'

He also warns against relying on a single product. 'We try not to put all our eggs in one basket,' he said. 'You don't know how the opening rains will behave, and it's not good agronomy to run the same mode of action across the whole farm.'



Simazine damage on faba beans following shallow sowing and heavy rain after seeding.

Photo: Simon Honner.

Early sown CWFS trial in the mid picture. The green strip to the right is another trial that did not have herbicide applied, suggesting the rain washed herbicide across the trial site.



Central West Farming Systems

The Central West Farming Systems (CWFS) trial site at Condobolin compared several pre-emergent herbicides. Wheat was sown in early April, but two heavy rainfall events soon after sowing (47 mm, then 78 mm) likely washed herbicides through the crop, reducing differences between treatments. This outcome raised concerns about product movement and crop safety, and became a catalyst for further discussion with growers.

Growers were interested in product behaviour under wet conditions and product safety after rain—how long herbicides last, what affects their breakdown, the longevity and wash-off risk of different products, and whether some

pre-emergents are safer than previously thought. These conversations also covered how different stubble loads or soil types influence risk, which paddocks are best suited to early sowing, and how to manage risk across the program, including the role of sowing depth.

Feedback from farmers highlighted that while the trial did not provide clear visual differences between treatments, it was still a useful learning experience. The extension work, particularly field day discussions and peer-to-peer sessions, were seen as highly beneficial. Growers appreciated being able to talk through herbicide options with advisors and other producers, and experience prompted some growers to rethink their risk tolerance and herbicide planning.



Weed emergence in the wheat crop.
Photo: Riverine Plains.

Riverine Plains

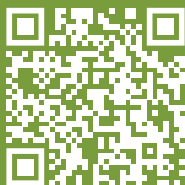
The Riverine Plains demonstration site at Murchison assessed different pre-emergent and early post-emergent herbicide strategies for managing weeds in early sown wheat. The paddock had a high weed burden following pasture. Wheat (Scepter[®]) was sown dry on 3 May 2024 at 75 kg/ha. Pre-emergent herbicides were applied within 24 hours of sowing, followed by 18 mm of rain one week later and 36 mm at the end of the month.

Two of the treatments also included a post-emergent spray applied at early tillering.

The five herbicide treatments included various combinations of trifluralin, Sakura[®], Terrain Flow[®], Voraxor[®] and Mateno Complete[®]. Weed counts were conducted at emergence and again on 23 July 2024.

Farmer takeaways

- The 18 mm of rain one week after sowing was essential for activating the applied products.
- Starting with a high weed seedbank placed greater pressure on the pre-emergent herbicides to perform well. Treatments that included both pre- and post-emergent strategies were more effective in managing this pressure.
- Relying on a single pre-emergent herbicide gave poor control of broadleaf weeds, with over 70–90 plants/m² still present by late July.
- Adding a post-emergent spray reduced broadleaf weed numbers by more than half.
- When sowing dry into paddocks with high weed pressure, consider using a two-phase herbicide strategy starting with a robust pre-emergent mix and following up with a post-emergent spray if conditions allow.



The project, “*De-risking the seeding program – Adoption of key management practices for the success of dry and early sown crops*” was led by Ag Excellence Alliance. It combined research and on-farm experience to support earlier and more strategic sowing decisions to build drought resilience. The project draws on the expertise and local knowledge of fourteen grower groups across the grain producing regions of South Australia, Victoria, New South Wales and Western Australia. Scan the QR code to find out more.

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Cover photo: Wheat bleaching caused by herbicide damage from excessive soil throw. Photo: Simon Honner.