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Early season fungicide programmes for disease management in autumn sown wheat: products, timings and rates

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Summary

An effective fungicide programme for autumn sown wheat is designed to balance disease control and corresponding yield with economic returns and pesticide stewardship. Cultivars provide the foundation of your disease management strategy, with fungicides playing a supporting role in protecting your yield potential.

Balanced fungicide programmes consider the number of applications, mixes mode-of-action groups, alternates products and uses appropriate doses to prolong the effective life of fungicides. As always, this will look different for each farm and will consider cultivar, sowing date, stubble management, seasonal disease pressure, whether you are irrigated or dryland and target disease. The goal is to grow profitable wheat crops that reduce pressure on both cultivars and chemistry.

In previous strategies, we have listed the fungicide options for each application timing based on disease pressure. In this revised edition, fungicide options will be listed based on crop yield potential.

Product costs

The fungicide products and programmes in this strategy may differ from other quotes you've received. Take the time to run the numbers for your own farm and consider the cost-benefit based on your yield potential and the season.

Get real about yield potential

Before deciding what to apply, it is important to use accurate long-term yield averages to determine realistic yield potential. Often programmes are built for the best-case scenario, but actual performance can be limited by timing and execution, labour constraints and equipment capacity. Also consider any physical constraints you may have in your system. Things like soil type, drainage, access to water and the season itself are all factors that influence yield potential. Build your programme based on what your farm can reliably achieve, and review this as the season progresses. Even the top 5% of growers make adjustments.

Fungicide timings

Getting fungicide timings right plays a key role in successful disease control and protecting yield. Ideally, every fungicide application would be made at exactly the right time, but weather and logistics don't always cooperate. Ask yourself, how quickly can I act on a recommendation? Do I rely on contractors? With this in mind, FAR has made some subtle adjustments to application timings to better reflect what is achievable without compromising overall effectiveness.

T0: GS 28 – early GS 31

Late tillering – early first node formation on main stem – leaf 4 emergence

Yield response to T0 applications is typically low, but they can be considered as insurance against a delayed T1 application. Previous strategies considered GS 30 as the start of the T0 application timing. In this strategy, the start of T0 has been brought forward to late tillering to provide some flexibility and to better support getting the more important T1 timing right. Sensitivity shifts to triazole fungicides in pathogen populations have changes in how fungicide applications are prioritised as we try to protect both our chemistries and cultivars. Applications are now more complex and expensive than they were a few years ago. However, some instances where a T0 can be of benefit. The T0 Application Decision tree developed by FAR and the Fungicide Resistance Industry Initiative can help you decide whether your crop stands to benefit from a T0.

T1: late GS 31 – GS 33

Late first node formation – early third node formation on main stem – leaf 3 fully emerged, leaf 2 emerging

This can be the hardest application to get right. Ideally, it targets GS 32 (leaf 3 emergence on the main stem), but getting the timing right can be challenging if conditions are wet and/or windy. Another potential challenge is uneven growth stages. This isn't uncommon on rolling country, particularly south facing slopes, which can be a growth stage behind more forward pasts of the paddock. As a result, many T1 applications end up being applied at GS 33 – 37, by which time disease is already established.

The T1 window is GS 31 – 33, which typically spans around 10 – 14 days, which does provide some flexibility. However, timing can be tricky to judge, so the key is to walk your paddocks with plenty of time to act. If the main stems are at GS 31, you still have a little time, but if the main stems are at GS 33, by the time you come to apply, it may be too late. Sometimes you don't get much of a choice, but if in doubt and an appropriate weather window presents itself, err on the side of going earlier rather than later.

What about generics?

With input costs rising, some growers may be considering generic fungicides to reduce cost. FAR trials are largely conducted using proprietary products, and we will continue to invest in these products to help support innovation and ensure access to new chemistry when it comes available. Product choice is a business decision for each grower, but whatever you decide, all fungicides should be used correctly and responsibly to safeguard product performance and longevity. A full list of active ingredients and their trade names are included in Table 12.

Triazole stacking

Reduced sensitivity in triazole (Group 3) fungicides has seen the need for more robust strategies, such as use of products that include a second triazole, such as Prosaro® or Kestrel® (prothioconazole + tebuconazole) or Bolide® (epoxiconazole + prochloraz). Whilst from the same mode-of-action group, the active ingredients in these products have different cross-resistance pathways, so use of one, does not confer resistance to the other. Avoid mixing triazoles that have the same cross-resistance mechanisms, as concurrent use of these active ingredients selects for resistance to both!

Another important thing to remember is that repeat application of the same stacked product in the same season also selects for resistance so alternation of triazole active ingredients between applications remains an important resistance management strategy.

Yield Potential 8 – 10 t/ha

If the yield potential of your crop is 8 – 10 t/ha, fungicide decisions will be focused on maximising return on investment rather than maximising yield at any cost. Crops are often dryland with shorter rotations, and second-year wheat is more common. Wet or windy springs can make application timings a challenge, so programmes should be flexible and still deliver disease control when timings are less than perfect. In lower yield potential or drier years, growers may be prepared to reduce or skip fungicide applications if the return doesn't justify the cost. To help spread risk, growers need disease resistant cultivars that perform consistently across a range of conditions.

T0: GS 28 – early GS 31
Late tillering – early first node formation on main stem – leaf 4 emergence

Yield Potential 11 - 14 t/ha
These crops can be found all over the country, from Southland to the South-West or Eastern North Island. Rotations are likely broader than 8 – 10 t/ha crops, but wheat can still often follow grass or maize, with fewer break crops which can see higher disease carryover. Crops may be irrigated, or on rolling country with different soil types but what unites them is the need to balance cost and performance. If the yield potential of your crop is 11 – 14 t/ha, you can expect to invest more than a grower targeting 8 – 10 t/ha, however it can be easy to overspend. Not all crops have the capacity to exceed expectation. Prioritising timing and getting the basics right will do more for supporting yield potential than choosing a high-end programme and missing the spray windows. This is why having a sound understanding of average yields and what you can reliably expect from your farm is so important.

T0: GS 28 – early GS 31
Late tillering – early first node formation on main stem – leaf 4 emergence
Every season is different so when it comes to T0 think about what you're trying to achieve and how that decision fits with the rest of your programme, particularly if your T1 timing is likely to be stretched or compromised. By T0, leaf 5 and 6 will be fully emerged, with leaf 4 not far behind. This raises two important questions: how many of these leaves are clean, and what disease am I chasing?

At T0, a resistant cultivar can do the heavy lifting in the fight against disease, so if these leaves are clean, consider whether a T0 application could be skipped.

If STB is present at moderate-high levels on leaves 5-6 (i.e. one or two leaves below the newest emerging leaf), a T0 may be of benefit. Similarly, if stripe or leaf rust are present, getting on top of these diseases before they gain a foothold is key.

We now know the number of triazoles applied in a season is just as important as the dose. Multiple exposures through repeated use will select for resistance in pathogen populations such as *Zymoseptoria tritici*. We also know that use of solo triazoles is particularly risky. If rusts are the target, consider including a strobilurin (Group 11) such as azoxystrobin at an appropriate rate (e.g. Amistar®, AgPro Azoxystrobin, Atlantis® Flo, Avior 250 SC, Azoxystar®, Inspire®, Kingstar 250, Roxy®, Tazer®). Options for T0 are outlined in Tables 3 - 4.

Fungicide cost for T0: $66 - $190/ha

- No application if appropriate (see Decision Support Tree)

Table 3. Stacked triazole options that can be considered at T0 (GS 28 – 31)

Product and rate (L/ha)	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Bolide® (2.0)	50 g/L epoxiconazole + 225 g/L prochloraz)	Triazole	3	$66
Prosaro® (1.0)	125 g/L prothioconazole + 125 g/L tebuconazole	Triazole	3	$60
Kestrel® (1.0)	160 g/L prothioconazole + 80 g/L tebuconazole	Triazole	3	$72

The fungicides listed above + Phoenix® (a.i. 500 g/kg folpet, Group M4) (1.5 L/ha) at approximately $45/ha.

Table 4. Solo active ingredient triazole options that can be considered at T0.

Product and rate	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Stellar® (1.0) + Phoenix® (1.5)	125 g/L epoxiconazole 500 g/kg folpet	Triazole Multisite	3 M4	$75
Proline® (0.6 – 0.8) + Phoenix® (1.5)	250 g/L prothioconazole 500 g/kg folpet	Triazole Multisite	3 M4	$95 - $112
Revylution® (1.5) + Phoenix® (1.5)	100 g/L mefentrifluconazole 500 g/kg folpet	Triazole Multisite	3 M4	$140

The fungicides listed in tables 6-7 above + Amistar (a.i. 250 g/L azoxystrobin, Group 11) (500 – 750 mL/ha) at approximately $34 - $50/ha

T1: late GS 31 – GS 33

Late first node formation – early third node formation on main stem – leaf 3 fully emerged, leaf 2 emerging

This is the first of the economically important application but is the also the one that is frequently applied too late. A good time to start walking crops ahead of decision making is when the tip of leaf 3 is emerging towards the later end of GS 31 on the main stem. Remember that the remaining tillers are half to one full growth stage behind. Once the tip of leaf 3 emerges, there will be around 10 - 14 days in the application window. This creates some flexibility if you're experiencing challenging weather, have a lot of ground to cover or are relying on contractors. This timing also sets the platform for the T2 application later in the season. The important thing is not to leave it too late, as a poorly timed programme is more likely to struggle, even with the perfect combination of products. Prioritising timing over complexity is key.

Like all applications, T1 is triazole based, so product stewardship rules will apply – avoid use of solo active ingredient triazoles on their own, integrate a multi-site or use a stacked triazole product. If you have already applied a T0, use a different triazole to what was used previously, and consider something different again for T2 if possible. If STB pressure is particularly high, you may wish to consider adding the Group 21 Questar™ (a.i. fenpicoxamid), which will add around $75/ha to your fungicide spend. The options for T1 are outlined in Tables 5 – 6.

Fungicide cost for T1: $66 - $215/ha

Table 5. Stacked triazole options that can be considered at T1 (GS 31 – 33)

Product and rate (L/ha)	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Bolide® (2.0)	50 g/L epoxiconazole + 225 g/L prochloraz)	Triazole	3	$66
Prosaro® (1.0)	125 g/L prothioconazole + 125 g/L tebuconazole	Triazole	3	$60
Kestrel® (1.0)	160 g/L prothioconazole + 80 g/L tebuconazole	Triazole	3	$72

The fungicides listed above + Phoenix® (a.i. 500 g/kg folpet, Group M4) (1.5 L/ha) at approximately $45/ha.

Table 6. Solo active ingredient triazole options that can be considered at T1 (GS 31 – 33)

Product and rate	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Stellar® (1.0) + Phoenix® (1.5)	125 g/L epoxiconazole 500 g/kg folpet	Triazole Multisite	3 M4	$75
Proline® (0.6 – 0.8) + Phoenix® (1.5)	250 g/L prothioconazole 500 g/kg folpet	Triazole Multisite	3 M4	$95 - $112
Revylution® (1.5) + Phoenix® (1.5)	100 g/L mefentrifluconazole 500 g/kg folpet	Triazole Multisite	3 M4	$140

The fungicides listed in Tables 8 - 9 + Questar™ (a.i. 50 g/L fenpicoxamid, Group 21) (1.5 L/ha) at approximately $75/ha.

Yield Potential 15 + t/ha

These crops rarely happen by accident. If the average yield potential of your crop is 15 t/ha or more, fungicide decisions will be fine tuned to achieve as much out of each application timing as possible. It can be tempting to push every crop for 15 + t/ha, as these kinds of yields are supported by benevolent seasons. But not every crop can get there. Real success is built on the accumulation of correct timing, accurate execution and consistent management across the season. Cropping rotations are likely to be more diverse, with greater opportunity for break crops and less chance of disease carryover. However, crops can also have highly dense canopies, which when coupled with irrigation creates a higher humidity environment that can drive disease pressure. Often crops can be in the ground longer, even from a mid-April sowing, as they are set up to be as efficient as possible through the long, slow grain fill period. This makes timing even more critical to get right. While fungicide programmes can be intensive, even high achievers can practice product stewardship through alternating chemistry and considering if marginal applications are worth their while.

T0: GS 28 – early GS 31

Late tillering – early first node formation on main stem – leaf 4 emergence

For a 15 + t/ha crop, while a T0 isn’t always essential, it is often applied to for consistency with the aim to compound the small improvements made at each timing. It can also play a role in protecting against poor timing later in the programme. Previously these high yielding crops were nearly exclusively sown early, particularly in mid to late-March, which naturally comes with increased disease pressure. Cultivars were often highly susceptible to disease and required intensive fungicide programmes to achieve high yields. These days high yielding crops have a wider sowing window, but most are in the ground by the middle of April. Growers now favour cultivars with at least moderate resistance to disease that help keep the canopy greener for longer.

If a decision has been made to spray, the approach is the same for all crops, regardless of yield potential. Because fungicide programmes are typically built around T2 and T1, there’s a good chance you already know what chemistry you plan to use at those stages, so try to use something different at T0 to reduce selection pressure while maintaining programme flexibility.

Sensitivity shifts to triazole fungicides means T0 is no longer a low-cost solo triazole timing. While there is seldom a yield response to a T0, even under high disease pressure, it is always better to get on top of stripe of leaf rusts. Options include stacked triazoles and solo active ingredient triazoles with a multi-site. If stripe or leaf rusts are the target, consider including a strobilurin. The options for T0 are outlined in Tables 7 - 8.

Fungicide cost for T0: $66 - $190/ha

- No application if appropriate (see Decision Support Tree)

Table 7. Stacked triazole options that can be considered at T0 (GS 28 – 31)

Product and rate (L/ha)	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Bolide® (2.0)	50 g/L epoxiconazole + 225 g/L prochloraz)	Triazole	3	$66
Prosaro® (1.0)	125 g/L prothioconazole + 125 g/L tebuconazole	Triazole	3	$60
Kestrel® (1.0)	160 g/L prothioconazole + 80 g/L tebuconazole	Triazole	3	$72

The fungicides listed above + Phoenix® (a.i. 500 g/kg folpet, Group M4) (1.5 L/ha) at approximately $45/ha.

Table 8. Solo active ingredient triazole options that can be considered at T0.

Product and rate	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Stellar® (1.0) + Phoenix® (1.5)	125 g/L epoxiconazole 500 g/kg folpet	Triazole Multisite	3 M4	$75
Proline® (0.6 – 0.8) + Phoenix® (1.5)	250 g/L prothioconazole 500 g/kg folpet	Triazole Multisite	3 M4	$95 - $112
Revylution® (1.5) + Phoenix® (1.5)	100 g/L mefentrifluconazole 500 g/kg folpet	Triazole Multisite	3 M4	$140

The fungicides listed in tables 6-7 above + Amistar (a.i. 250 g/L azoxystrobin, Group 11) (500 – 750 mL/ha) at approximately $34 - $50/ha

T1: late GS 31 – GS 33

Late first node formation – early third node formation on main stem – leaf 3 fully emerged, leaf 2 emerging

Depending on the season, crops can reach T1 anywhere between 2 – 4 weeks after T0. This spray mainly targets STB on the fully emerged leaf 3. It can also provide additional protection from other disease such as stripe and leaf rusts and powdery mildew on leaves 2 and 4, which enjoy the humidity in bulkier, high yield potential crops. The ideal timing for is as soon as leaf 3 is fully emerged, which normally coincides with GS 32 on the main stem, but the window for application can fall anywhere between late GS 31 and GS 33. Prompt timing will always be more successful than going waiting until later.

Even under high disease pressure conditions, a triazole based T1 application can still provide adequate control without having to use an SDHI (Group 7). In these situations, consider full label rates of solo active ingredient triazoles with a multi-site, or stacked triazole products. If STB pressure is particularly high, including the Group 21 Questar™ is also an option. Remember you can only use two applications of the multi-site folpet in a season, so if it was used previously at T0, it can only have one more application up to GS 39 in wheat.

If disease pressure is particularly high due to early sowing and wet weather, some growers may look to apply an SDHI at T1. There are number of SDHI products available, which provides the opportunity to mix and match products between application timings and seasons. Elatus® Plus (a.i. 100 g/L benzovindiflupyr – SOLATENOL®) and Vimoy® Iblon® (a.i. 50 g/L isoflucpyram) are both sold as solo products and can be applied with any appropriate mixing partner. In Revystar®, 50 g/L fluxapyroxad (Group 7) is co formulated with 100 g/L mefentrifluconazole (Group 3). Note: Vimoy® Iblon® has a maximum of one application per calendar year.

Fungicide cost for T1: $66 - $233/ha

Table 9. Stacked triazole options that can be considered at T1 (GS 31 – 33)

Product and rate (L/ha)	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Bolide® (2.0)	50 g/L epoxiconazole + 225 g/L prochloraz)	Triazole	3	$66
Prosaro® (1.0)	125 g/L prothioconazole + 125 g/L tebuconazole	Triazole	3	$60
Kestrel® (1.0)	160 g/L prothioconazole + 80 g/L tebuconazole	Triazole	3	$72

The fungicides listed above + Phoenix® (a.i. 500 g/kg folpet, Group M4) (1.5 L/ha) at approximately $45/ha.

Table 10. Solo active ingredient triazole options that can be considered at T1 (GS 31 – 33)

Product and rate	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Stellar® (1.0) + Phoenix® (1.5)	125 g/L epoxiconazole 500 g/kg folpet	Triazole Multisite	3 M4	$75
Proline® (0.6 – 0.8) + Phoenix® (1.5)	250 g/L prothioconazole 500 g/kg folpet	Triazole Multisite	3 M4	$95 - $112
Revylution® (1.5) + Phoenix® (1.5)	100 g/L mefentrifluconazole 500 g/kg folpet	Triazole Multisite	3 M4	$140

The fungicides listed in Tables 8 - 9 + Questar™ (a.i. 50 g/L fenpicoxamid, Group 21) (1.5 L/ha) at approximately $75/ha.

Table 11. SDHI and triazole options that can be considered at T1 (GS 31 – 33).

Product and rate	Active ingredient	Mode of Action	MoA Group	Cost ($/ha)*
Revystar® (1.5)	50 g/L fluxapyroxad + 100 g/L mefentrifluconazole	SDHI Triazole	7 + 3	$150
Vimoy® Iblon® (1.5) + Stellar® (1.0)	50 g/L isoflucpyram + 125 g/L epoxiconazole	SDHI Triazole	7 + 3	$122
Vimoy® Iblon® (1.5) + Bolide® (2.0)	50 g/L isoflucpyram + 50 g/L epoxiconazole + 225 g/L prochloraz	SDHI Triazole	7 + 3	$150
Vimoy® Iblon® (1.5) + Proline® (0.6 – 0.8)	50 g/L isoflucpyram + 250 g/L prothioconazole	SDHI Triazole	7 + 3	$142 - $159
Vimoy® Iblon® (1.5) + Kestrel® (1.0)	50 g/L isoflucpyram + 160 g/L prothioconazole + 80 g/L tebuconazole	SDHI Triazole	7 + 3	$164
Vimoy® Iblon® (1.5) + Prosaro® (1.0)	50 g/L isoflucpyram + 125 g/L prothioconazole + 125 g/L tebuconazole	SDHI Triazole	7 + 3	$152
Vimoy® Iblon® (1.5) + Revylution® (1.5)	50 g/L isoflucpyram + 100 g/L mefentrifluconazole	SDHI Triazole	7 + 3	$187
Elatus® Plus (0.75) + Stellar® (1.0)	100 g/L benzovindiflupyr – SOLATENOL® + 125 g/L epoxiconazole	SDHI Triazole	7 + 3	$123
Elatus® Plus (0.75) + + Bolide® (2.0)	100 g/L benzovindiflupyr – SOLATENOL® + 50 g/L epoxiconazole + 225 g/L prochloraz	SDHI Triazole	7 + 3	$159
Elatus® Plus (0.75) + + Proline® (0.6 – 0.8)	100 g/L benzovindiflupyr – SOLATENOL® + 250 g/L prothioconazole	SDHI Triazole	7 + 3	$143 - 160
Elatus® Plus (0.75) + + Kestrel® (1.0)	100 g/L benzovindiflupyr – SOLATENOL® + 160 g/L prothioconazole + 80 g/L tebuconazole	SDHI Triazole	7 + 3	$165
Elatus® Plus (0.75) + + Prosaro® (1.0)	100 g/L benzovindiflupyr – SOLATENOL® + 125 g/L prothioconazole + 125 g/L tebuconazole	SDHI Triazole	7 + 3	$153
Elatus® Plus (0.75) + + Revylution® (1.5)	100 g/L benzovindiflupyr – SOLATENOL® + 100 g/L mefentrifluconazole	SDHI Triazole	7 + 3	$188

The fungicides listed above + Phoenix® (a.i. 500 g/kg folpet, Group M4) (1.5 L/ha) at approximately $45/ha.

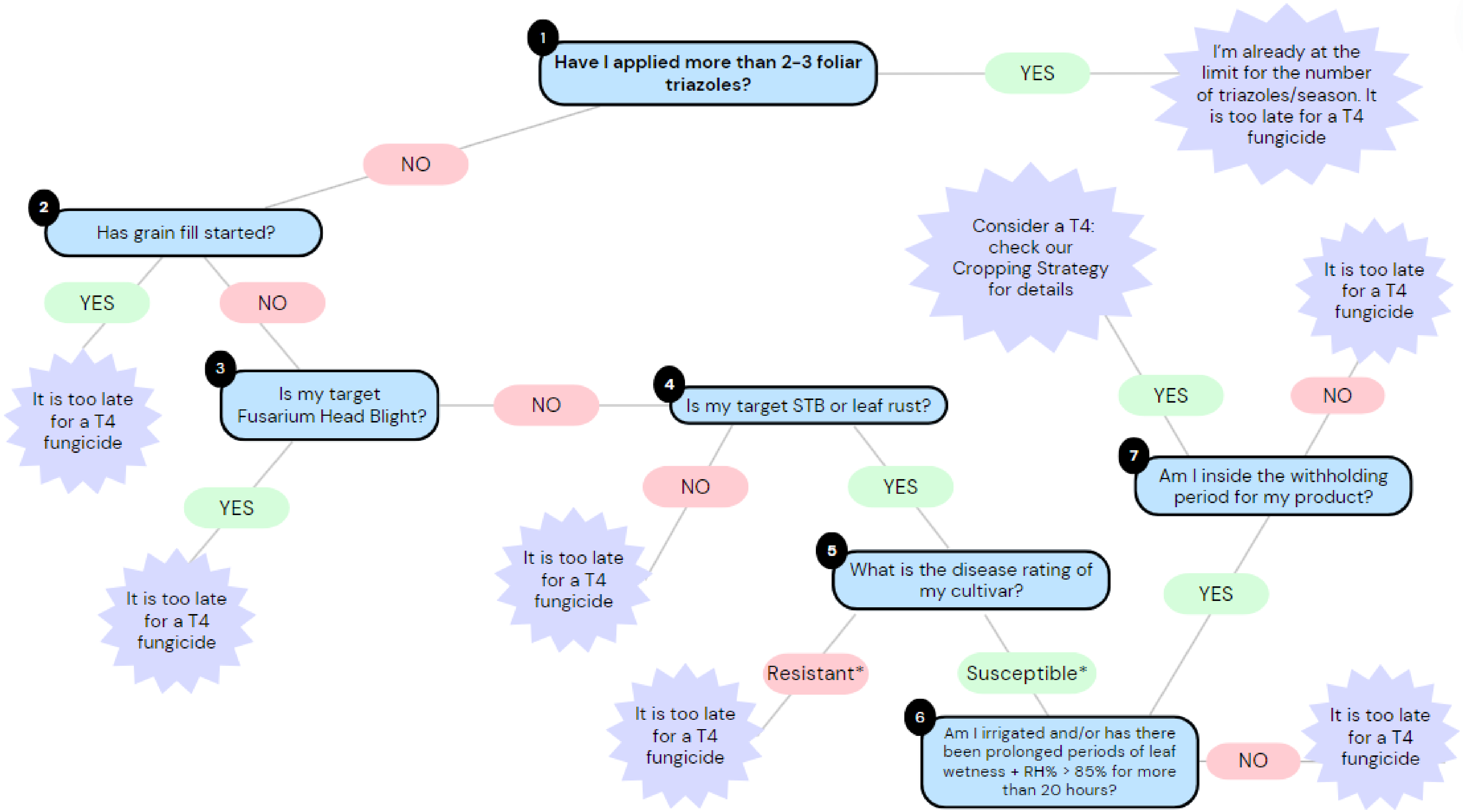
Table 12. Fungicide trade names, rates, active ingredients, mode of action (MoA) groups and withholding periods.

Chemical trade names	Label rate		Active ingredient (g ai/L)	MoA Group	Withholding periods (days)	
	Barley (L/ha)	Wheat (L/ha)			Forage	Grain
AgPro Azoxystrobin 250 SC (AgPro NZ Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Amistar® (Syngenta Crop Protection Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Atlantis® Flo (Adria New Zealand Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Avior 250 SC (Kenso New Zealand Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Azoxystar® (Grosafe Chemicals Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Inspire® (Ravensdown Fertiliser Co-Operative Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Kingstar 250 (Shandong Rainbow International Co. Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Roxy® (Agri Solutions Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Tazer® (Nufarm Ltd)	0.75	0.75	azoxystrobin 250	11	28	35
Aviator Xpro® (Bayer Crop Science Ltd)	0.7 - 1.0	0.7 - 1.0	bixafen 150 + prothioconazole 150	7 + 3	42	56
Concero® (Adria New Zealand Ltd)	0.7 - 1.0	0.7 - 1.0	bixafen 150 + prothioconazole 150	7 + 3	42	56
Elatus® Plus (Syngenta Crop Protection Ltd)	XX	0.75	benzovindiflupyr 100	7	28	42
Accuro® 125 SC (Adria New Zealand Ltd)	1	1	epoxiconazole 125	3	28	42
Epozole™ (Shandong Rainbow International Co. Ltd)	1	1	epoxiconazole 125	3	28	42
Fortify™ (Ravensdown Fertiliser Co-Operative Ltd)	1	1	epoxiconazole 125	3	28	42
Sonata 125SC (PGG Wrightson Ltd)	1	1	epoxiconazole 125	3	28	42
Stellar® (Adama NZ Ltd)	1	1	epoxiconazole 125	3	28	42
Bolide® (Adama NZ Ltd)	2	2	epoxiconazole 225 + prochloraz 50	3	42	42

Questar™ (Corteva Agriscience NZ Ltd)	XX	1.5 - 2.0	fenpicoxamid 50	21	28	None if used as directed
Aspire® (Agri Solutions Ltd)	1.5	1.5	folpet 500 (g/kg)	M4	28	Latest appl.GS 59 (barley) GS 39 (wheat)
Phoenix® (Adama NZ Ltd)	1.5	1.5	folpet 500 (g/kg)	M4	28	Latest appl.GS 59 (barley) GS 39 (wheat)
Valeo® 500 SC (Adria New Zealand Ltd)	1.5	1.5	folpet 500 (g/kg)	M4	28	Latest appl.GS 59 (barley) GS 39 (wheat)
Vimoy® Iblon® (Bayer Crop Science Ltd)	1.5	1.5	isoflucypram 50	7	42 (barley), 28 (wheat, triticale)	56 (barley), 42 (wheat, triticale)
Seguris® Flexi (Syngenta Crop Protection Ltd)	0.6	0.6 or 1.0 (STB)	isopyrazam 125	7	28	42
Revylution® (BASF NZ Ltd)	1.5	1.5	mefentrifluconazole 100	3	28	35
Revystar® (BASF NZ Ltd)	1.5	1.5	mefentrifluconazole 100 + fluxapyroxad 50	3 + 7	28	35
Mergent (Shandong Rainbow International Co. Ltd)	1	1	prochloraz 450	3	-	42
Mirage® 450 (Adama NZ Ltd)	1	1	prochloraz 450	3	-	42
Prosper® (Agri Solutions Ltd)	1	1	prochloraz 450	3	-	42
Sportak® EW (FMC New Zealand Ltd)	1	1	prochloraz 450	3	-	42
Varicur® 450EW (Adria New Zealand Ltd)	1	1	prochloraz 450	3	-	42
Joust® (Nufarm Ltd)	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56
Pilot™ 250 EC (Orion AgriScience Ltd)	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56
Procyon 250 EC	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56

(Kenzo New Zealand Ltd)						
Proline® (Bayer Crop Science Ltd)	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56
Prothago® (Adama NZ Ltd)	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56
Quilt® (Agri Solutions NZ Ltd)	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56
Thiozole (Shandong Rainbow International Co. Ltd)	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56
Vitalis® (Adria New Zealand Ltd)	0.4 - 0.8	0.4 - 0.8	prothioconazole 250	3	42	56
Prosaro® (Bayer Crop Science Ltd)	1	1	prothioconazole 125 + tebuconazole 125	3	42	56
Kestrel® (Bayer Crop Science Ltd)	1	1-1.25	prothioconazole 80 + tebuconazole 160	3	42	56
Comet® (BASF NZ Ltd)	0.8	0.8	pyraclostrobin 250	11	28	56
Convoy™ (Orion AgriScience Ltd)	0.8	0.8	pyraclostrobin 250	11	28	56
Pyrax® (Adria New Zealand Ltd)	0.8	0.8	pyraclostrobin 250	11	28	56
Compass® (Orion AgriScience Ltd)	0.44	0.44	tebuconazole 430	3	28	49
Folicur® SC (Syngenta Crop Protection Ltd)	0.44	0.44	tebuconazole 430	3	28	49
Hornet® 430 SC (Nufarm Ltd)	0.44	0.44	tebuconazole 430	3	28	49
Praesedium™ 430 SC (Evossentials Ltd)	0.44	0.44	tebuconazole 430	3	28	49
Rebuke 430 (Kenzo New Zealand Ltd NZ)	0.44	0.44	tebuconazole 430	3	28	49
Silvzole™ (Shandong Rainbow International Co. Ltd)	0.44	0.44	tebuconazole 430	3	28	49

Will I benefit from a T4?



*Check the latest CPT ratings for your cultivar

Figure 2. GS 69-71 (T4) Decision Tree

Supported by the Fungicide Resistance Industry Initiative

Arable Update: Understanding Barley Yellow Dwarf Virus (BYDV)

Barley Yellow Dwarf Virus (BYDV) is part of a broader group known as Yellow Dwarf Viruses (YDV), which affect cereals and grasses. These viruses belong to different families:

- **BYDV** – *Luteovirus family*
- **Cereal Yellow Dwarf Virus (CYDV)** – *Polerovirus family*
- **Maize Yellow Dwarf Virus (MYDV)** – *Polerovirus family*

BYDV is transmitted by aphids. Infection occurs in two ways:

- **Primary infection**: when winged aphids fly into crops carrying the virus
- **Secondary infection**: when aphid offspring spread the virus within the crop

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BYDV Vectors

The main aphid species transmitting BYDV in New Zealand are:

- **Bird cherry–oat aphid (Rhopalosiphum padi)**
- **Rose grain aphid (Metopolophium dirhodum)**

Winged aphids migrate into crops from surrounding grasses and crops, establishing colonies of wingless aphids. When plants become overcrowded or unsuitable, new winged aphids develop and disperse to new hosts.

Flight patterns

- **Autumn peak**: mid-March to mid-June
- **Spring peak**: September to November

These flights establish new aphid colonies, which can survive through mild winters and drive **secondary spread of BYDV** in autumn-sown cereals.

Temperature thresholds

- Aphid flight: **14–15°C** (affected by humidity and wind)
- Virus transmission: stops below **12°C**
- Aphid development: **5.8°C**

Aphid populations can persist year-round if temperatures allow, resuming activity once conditions improve (Figure 1).

Do All Aphids Carry BYDV?

No. Aphids are **not born carrying the virus**.

- Aphids must feed on infected plants to acquire BYDV
- Virus is **not transmitted to offspring**

- International data suggests **less than 30% of aphids** typically carry the virus

However, infection rates vary depending on:

- Aphid species
- Season
- Proximity to grasses or infected hosts

Interestingly, virus-free aphids may preferentially settle on infected plants.

Because New Zealand data is limited, tools like **Aphid Chat** assume all detected aphids are potentially infective as a precaution.

BYDV Hosts

If Aphids aren't born carrying the virus, where does it come from?

BYDV affects a wide range of crops and grasses:

Primary hosts

- Wheat
- Barley
- Oats
- Rye
- Triticale

Alternative hosts (green bridges)

- Grasses (including weeds)
- Volunteer cereals
- Maize
- Some cover crops

These hosts allow the virus and aphids to persist between seasons, maintaining continuous infection pressure in agricultural systems (Figure 2).

When Are the Risk Periods?

The impact of BYDV depends heavily on **timing of infection** and **crop growth stage**.

Critical growth stages

- **Highest risk**: Emergence to early tillering (**GS 11–21**)
- **Moderate risk**: Up to **GS 31**
- **Low risk**: After GS 31

Infections early in the crop's life cycle cause the greatest yield loss.

Other key risk factors

- Proportion of infected plants
- Duration and intensity of autumn aphid flights
- Percentage of aphids carrying BYDV
- Virus strain
- Sowing date (earlier sowing generally increases exposure risk)

Why is BYDV a problem?

- Reduces plant vigour and tillering
- Leads to **patchy crops and uneven development**
- Symptoms often include yellowing or reddening of leaves, depending on crop type
- These symptoms can result in **yield loss**, particularly from early infection, as it prevents the plant from photosynthesising effectively

The virus is particularly difficult to manage because:

- It can look like other diseases or nutrient deficiencies
- It relies on mobile aphid vectors
- It persists in alternative hosts year-round
- Infection is often invisible before damage occurs

The only way to confirm BYDV is using real-time PCR. Testing is retrospective. It will determine whether BYDV was present and the virus strain. It does not provide a means to manage BYDV in subsequent seasons.

Can BYDV Be Managed?

Yes—but **management requires an integrated approach** rather than reliance on a single tactic.

Key strategies include:

1. Sowing date management

- Avoid early sowing where high aphid pressure is expected
- Later sowing reduces exposure to autumn aphid flights

2. Green bridge control

- Remove volunteer cereals and grass weeds before sowing
- Break the virus lifecycle between seasons

3. Monitoring aphid activity

- Crop walking or use tools like **Aphid Chat**
- **Aphid Chat** can help track flight timing and highlight infection risk

4. Insecticide use

- Seed treatments or foliar sprays may be used strategically

5. Crop and paddock planning

- Consider crop rotation to reduce inoculum sources

Summary

BYDV is a complex, aphid-transmitted disease that poses significant risks to cereal production in New Zealand. The greatest damage occurs when infection happens early in crop development. Because aphids and alternative hosts are widespread, eradication is not feasible—but risk can be significantly reduced through **timing, monitoring, and integrated management practices**.

Van den Eynde, R, Van Leeuwen, T, Haesaert, G. 2020. Identifying drivers of spatio-temporal dynamics in barley yellow dwarf virus epidemiology as a critical factor in disease control. *Pest Management Science* 76: 2548-2556. https://doi.org/10.1002/ps.5851

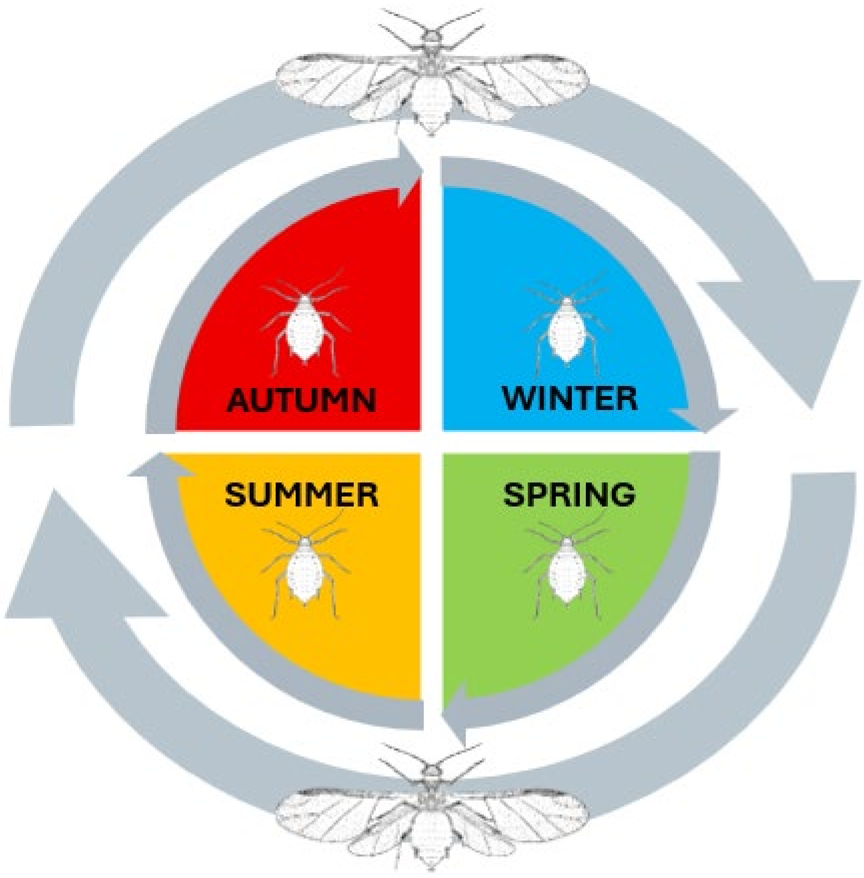

Figure 1. Life cycle of the bird cherry oat aphid, *Rhopalosiphum padi*.

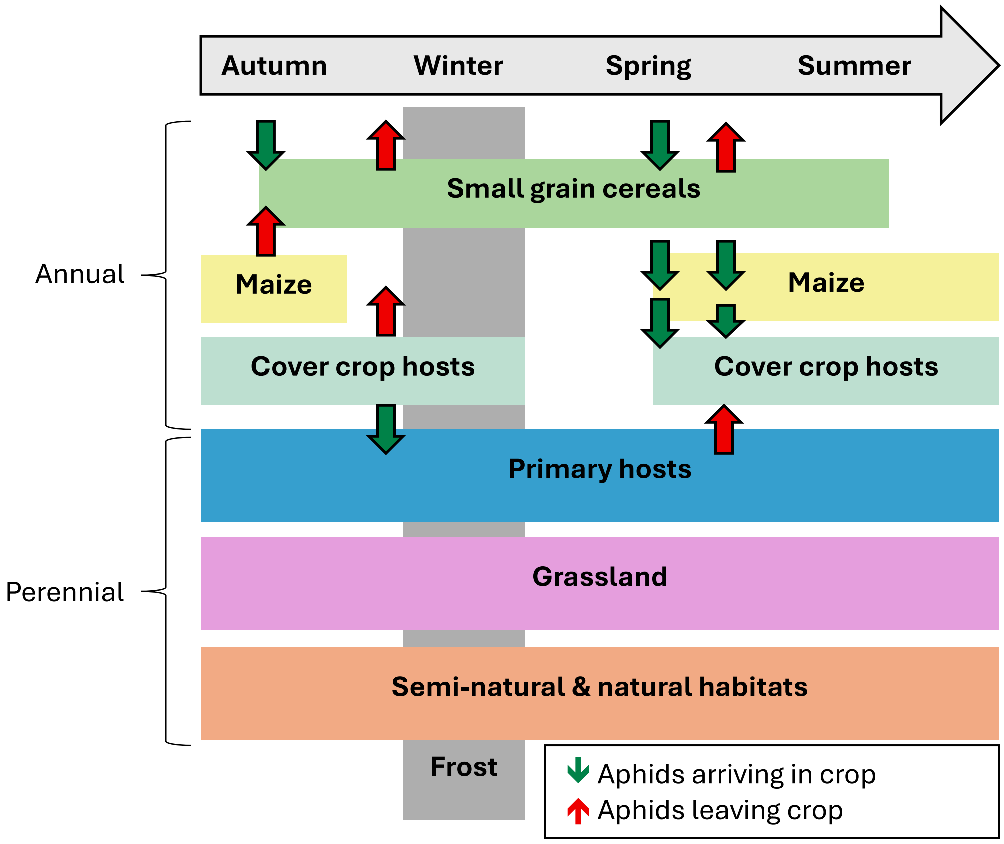

Figure 2. Overview of the hosts of cereal aphids throughout the year. At different times cereal aphids migrate from one host to another. The green arrows show when aphids enter and leave a host crop. Adapted from Van den Eynde et al. 2020.

Potentially mineralisable nitrogen (PMN): How to use it

Abie Horrocks (FAR)

Nitrogen (N) is essential for crops, but with fertiliser costs remaining high, accurately accounting for soil N supply is increasingly important. Factoring soil-supplied N into fertiliser decisions can reduce N inputs and lower costs while still achieving target yields.

Mineralisation is a natural microbial process that gradually releases plant-available N from soil organic matter. The rate of mineralisation depends on soil temperature and moisture. Because it is a natural process, it occurs regardless of how much fertiliser N is applied.

A Mineral N test measures the amount of plant-available N present in the soil at the time of sampling. In contrast, a Potentially Mineralisable Nitrogen (PMN) test estimates how much additional N may be released from soil organic matter during the growing season through mineralisation.

If you already use Mineral N test results to inform fertiliser decisions but have not included PMN, there may be opportunities to further reduce N fertiliser requirements. In a two-season irrigated wheat example, accounting for both Mineral N and PMN reduced fertiliser costs by approximately **$174-$230/ha** compared with using Mineral N alone (Table 1).

Table 1. Two seasons of irrigated wheat, with and without factoring in nitrogen soil supply.

N Decision	Year	N Fert Expense ($)	Grain Yield (t/ha)	Harvest soil min N (kg N/ha)	GHG's (kg CO2-e/ha)
Full N	2021	765	12.1	65	1,460
Full N – Mineral N	2021	709	12.0	47	1,373
Full N – Min N + PMN	2021	479	12.0	31	1,096
Full N	2022	914	12.2	50	1,459
Full N – Mineral N	2022	860	11.8	44	1,352
Full N – Min N + PMN	2022	686	11.9	33	914

Whether you are using Mineral N alone or both Mineral N and PMN, FAR's Soil Nitrogen Supply Calculator (https://www.far.org.nz/resources/soil-nitrogen-supply-calculator) and the SVS N Tool (www.svstool.co.nz) can help determine the fertiliser N required to achieve your target yield using laboratory test results (mg/kg) (Table 2). These tools account for the timing of N release and crop uptake, ensuring that only the N expected to become available during the growing season is included in fertiliser planning.

Table 2. Example laboratory report showing Mineral N and PMN concentrations.

Sample Type:		SOIL Wheat
Sample Type Code:		S154
Volume Weight	g/mL	0.88
Ammonium-N*	mg/kg	5
Nitrate-N*	mg/kg	6
Mineral N (sum)*	mg/kg	11
Hot Water Extractable Organic Nitrogen*	mg/kg	133
Potentially Mineralisable Nitrogen*	mg/kg	128
Potentially Mineralisable Nitrogen (15cm Depth)*	kg/ha	169
Dry Matter*	%	70.8
Moisture*	%	29.2
Sample temperature on arrival*	°C	4
Soil Sample Depth*†	mm	0-300

With lower than average rainfall, above average temperatures and stronger westerly winds forecast over the coming season, a critical first step is setting realistic yield targets. FAR's *Arable Extra Issue 143: N Smart* provides guidance on this process and includes videos explaining how to take a soil sample and how to use the Soil Nitrogen Supply Calculator.

Why Soil Moisture Probes Matter in a Dry Year

Chris Smith (FAR)

Key message

In a dry season, soil moisture probes provide growers with real-time information on water availability in the root zone, allowing irrigation decisions to be based on measured soil conditions rather than guesswork. A comparison of various soil moisture probe systems by FAR showed that while individual systems differ, all major systems followed similar moisture trends and can support better decision-making when correctly installed and configured.

Why probes are important

- Identify when crops are approaching moisture stress before yield is impacted.
- Avoid unnecessary irrigation and reduce water, energy and labour costs.
- Help maintain soil moisture between field capacity and stress point.
- Provide evidence for Farm Environment Plans, audits and responsible water use.
- Improve confidence in decisions during prolonged dry periods.

Why probes become more valuable in dry seasons

In dry seasons, soil moisture probes show how quickly the soil profile is drying and whether irrigation is replenishing the active root zone. That helps growers time irrigation before visible crop stress reduces yield or water-use efficiency. However, probe data still needs interpretation, especially where soil type, installation quality or sensor contact may affect readings.

What to be aware of in an El Niño

For growers using irrigation during a dry El Niño pattern, the main value of soil moisture monitoring is not just knowing whether the soil is wet or dry. It is seeing whether irrigation is keeping up with crop demand, where the root zone is being replenished, and when system capacity or weather conditions are becoming the limiting factor.

In an El Niño season, ensure that irrigation systems are serviced, test application uniformity (bucket test), that probes are installed and configured, and crop priorities are clear well before peak demand arrives. Once high evapotranspiration conditions set in, it becomes much harder to recover if soil moisture falls behind.

At the start of the season, aim to keep soil moisture in the upper part of the refill zone rather than waiting until the profile is close to the stress point. If the profile is allowed to dry too far early, irrigation capacity may not be enough to recover once evapotranspiration demand rises.

As demand increases, identify which crops and growth stages should take priority. Soil moisture probes are most useful for guiding decisions at the start and end of the irrigation season; during extreme mid-summer heat, many systems will already be running close to or at full capacity.

When evapotranspiration is high, irrigation applications need to be large enough to replace meaningful water in the active root zone. Very small applications may provide limited benefit if evaporation, canopy interception, wind drift or a rapidly drying profile prevent enough water from reaching the crop roots.

In addition, application rate matters. Slower applications give water more time to infiltrate and can reduce runoff or uneven wetting, especially on heavier soils or where surface sealing, slope, or wheel-track compaction limits infiltration.

In very dry clay soils, capacitance probes can give poorer data if cracking or shrinkage reduces contact between the sensor and the surrounding soil. Treat sudden or unusual readings with caution, check them against rainfall, irrigation and crop observations, and consider correctly calibrated neutron probe measurements where fixed in-ground sensors are compromised.

Operational management is equally important, particularly where irrigation systems are operating continuously during extended dry periods. If a pivot is running continuously, avoid watering the same areas at the same time of day on every cycle. Staggering timing, rather than operating strictly on 24-hour intervals, helps reduce repeated irrigation during the hottest or windiest part of the day.

Wind risk also needs to be managed. El Niño conditions typically increase the likelihood of stronger and more frequent southwesterly to northwesterly winds in New Zealand, so irrigators should be parked safely during shutdowns or restrictions to reduce damage risk. If an irrigator is put out of action during a dry period, crop risk increases quickly, and replacement parts may become harder to secure if damage is widespread.

Five practical recommendations

1. Install probes early so they can bed in and capture seasonal trends.
2. Use supplier support to ensure field capacity and stress points are correctly set.
3. Avoid making decisions based on single moisture readings. Look for trends over 2 to 3 weeks to better understand how soil water levels are changing over time.
4. Review probe data alongside rainfall, irrigation and crop observations.
5. Use seasonal reports to review irrigation performance and identify opportunities for improvement.

Sources: FAR Moisture Monitoring Project 2023/24 and 2024/25 technical reports; NIWA / Earth Sciences New Zealand, El Niño 2026: What you need to know.

Useful link: NIWA / Earth Sciences New Zealand — El Niño 2026: What you need to know: https://niwa.co.nz/news/el-nino-2026-what-you-need-know or scan the QR code.

Water Stress Effects in White Clover Seed Crops

Fiona Anderson (FAR)

Why avoiding moisture stress in white clover is important

- When moderate water stress is present in spring until peak flowering, fewer leaves are produced and flower-bearing stolons can be reduced by 20-30%.
- Pre-flowering drought limits flower production, with full irrigation once flowering begins until harvest unable to restore the flower population to its original potential.
- Severe short-term soil moisture deficits result in lower leaf area and abortion of florets or whole flowers due to insufficient resource supply within the plant.
- Persistent drought stress can reduce flower numbers by 40-45% and 10-30 fewer seeds per flower head. Individually this seems small, but the effects add up over a large area and can lead to 30-50% lower seed yield in moisture stressed crops.

Irrigation strategy

- Effects of water stress on seed yield can be avoided by irrigating the crop in appropriate doses (e.g. 20-25mm in a Templeton silt loam) to maintain soil moisture above wilting point without exceeding 50% of available water capacity (AWC).
- When irrigation is used to maintain soil moisture below 50% AWC, seed yield can increase by 1 kg seed per mm applied (from nil irrigation up to optimum). Beyond optimum, every mm applied becomes detrimental to seed yield.
- Consistently irrigating beyond 50% may favour vegetative growth, which can reduce seed yield by growing a bulky canopy which can shade emerging flower buds, leading to their abortion.

Spring management of ryegrass seed crops

Richard Chynoweth (MRB), Fiona Anderson and Sean Weith (FAR)

SEED INDUSTRY RESEARCH CENTRE

Key points

- To maximise seed yield, achieve a minimum seed head population of 1,200 heads/m² for Italian ryegrass and 1,800 heads/m² for perennial ryegrass.
- Maintain a green, actively photosynthesising canopy through effective fungicide and irrigation management.
- Match nitrogen inputs to soil mineral nitrogen (N) supply and yield potential.
- Excessive early N can increase crop bulk and lodging risk, potentially reducing seed yield.
- Optimise plant growth regulator (PGR) rates according to crop bulk, closing date and cultivar.
- Every day lodging is delayed through strategic grazing, nitrogen management and PGR application can significantly increase seed yield.

Grazing and crop closing

Grazing is an important management tool for controlling crop biomass, encouraging tillering and reducing lodging risk before crop closure.

- Grazing removes biomass, stimulates tiller development through increased light penetration to basal buds, and can help delay lodging.
- Grazing helps to even out crop development and condense the flowering period, although this effect may be reduced if crops are closed late.
- Maintain seed crops at a short height through rotational grazing or set stocking. Avoid severe ("crash") grazing during spring, particularly in newer cultivars.
- Where crops are closed through silage harvesting:
    - Cut high (>8 cm) to avoid excessive removal of stem material.
    - Close crops approximately 10 days earlier than would be the case with grazing.
    - Be conservative with cultivars with newer genetics.

- For perennial ryegrass:
    - Close crops at approximately GS 30-31 when the average growing point is at, or close to, ground level.
    - For 'Grasslands Nui', closing typically occurs between 1st and 5th October.
    - **Avoid removing large numbers of reproductive growing points.**

- For Italian and annual ryegrasses:
    - Closing commonly occurs at GS 31 between 20th and 30th October.
    - Aim to remove a proportion of reproductive growing points to encourage additional seed head production.

Application of nitrogen fertiliser for ryegrass seed crops

Objectives of N application

- Nitrogen (N) is applied during spring to increase seed head numbers, canopy growth, and dry matter production, which can contribute to higher seed yield potential.
- However, excessive N at or before crop closing can increase canopy growth and lead to earlier lodging.
- Provided crops are not severely N deficient, the timing of N application is generally less important than maintaining adequate N supply.
- Where lodging risk is a concern, it is often preferable to delay a portion of the N programme until around trinexapac-ethyl (TE; Moddus®Evo) application timing.

Recommended N application rates

A general guide for post-closing nitrogen applications is:

- **Perennial ryegrass:** Applied N (kg/ha) = 175 − Mineral N (0-30 cm)

- **Italian ryegrass:** Applied N (kg/ha) = 150 − Mineral N (0-30 cm)

Note: Mineral N should be measured from 0-30 cm soil depth at crop closing.

Practical N management considerations throughout the season

- Early spring N promotes biomass production for grazing opportunities, seed head development and, potentially, lodging risk.
- Late N applications help maintain canopy greenness and photosynthetic activity during the reproductive period.
- Silage harvesting can remove substantial quantities of N applied earlier in the season. For example, 4,000 kg DM/ha of silage containing 2.5% N removes approximately 100 kg N/ha.
- Consider delaying a portion of N applications until after PGR timing to help reduce lodging risk.
- Crop N uptake commonly exceeds fertiliser nitrogen inputs. Seed and straw together frequently contain between 175 and 220 kg N/ha.

Interactions with crop closing and PGR use

- During spring and summer, most N is taken up within three weeks of application.
- N applied for grazing is recycled, while silage removes N from the system.
- Early closing and N fertiliser increases biomass at GS 32 and therefore increases the appropriate PGR rates.
- Save money on N fertiliser and spend it on PGR.

Economic considerations

The economic optimum application rate is influenced by the N response curve, N price and seed price (see Figure 1).

- Average N mineralised in these experiments was 60 kg N/ha. Thus, only consider reducing applied N rates if PMN test results are larger than 60 kg N/ha.
- Agrotain additive to urea (SustaiN®/ N-Protect®) increased seed yield 6% (average of 11 trials) compared with urea alone.

Other grasses:

- **Browntop N inputs.** Apply spring N at ~190 kg N/ha to achieve 215-230 kg N/ha total supply (soil mineral N + fertiliser)
- **Cocksfoot spring N.** Apply Spring N at ~ 110 kg N/ha to achieve 150-185 kg N/ha total supply (soil mineral N + fertiliser)

N-cap for grazed seed crops: The synthetic N-cap of 190 kg N/ha/year (based on a 1 July to 30 June year) was introduced in the National Environmental Standards for Freshwater in 2021. The N cap applies only when animals are grazing the crop, and N applied from closing to harvest is excluded from the N cap rules.

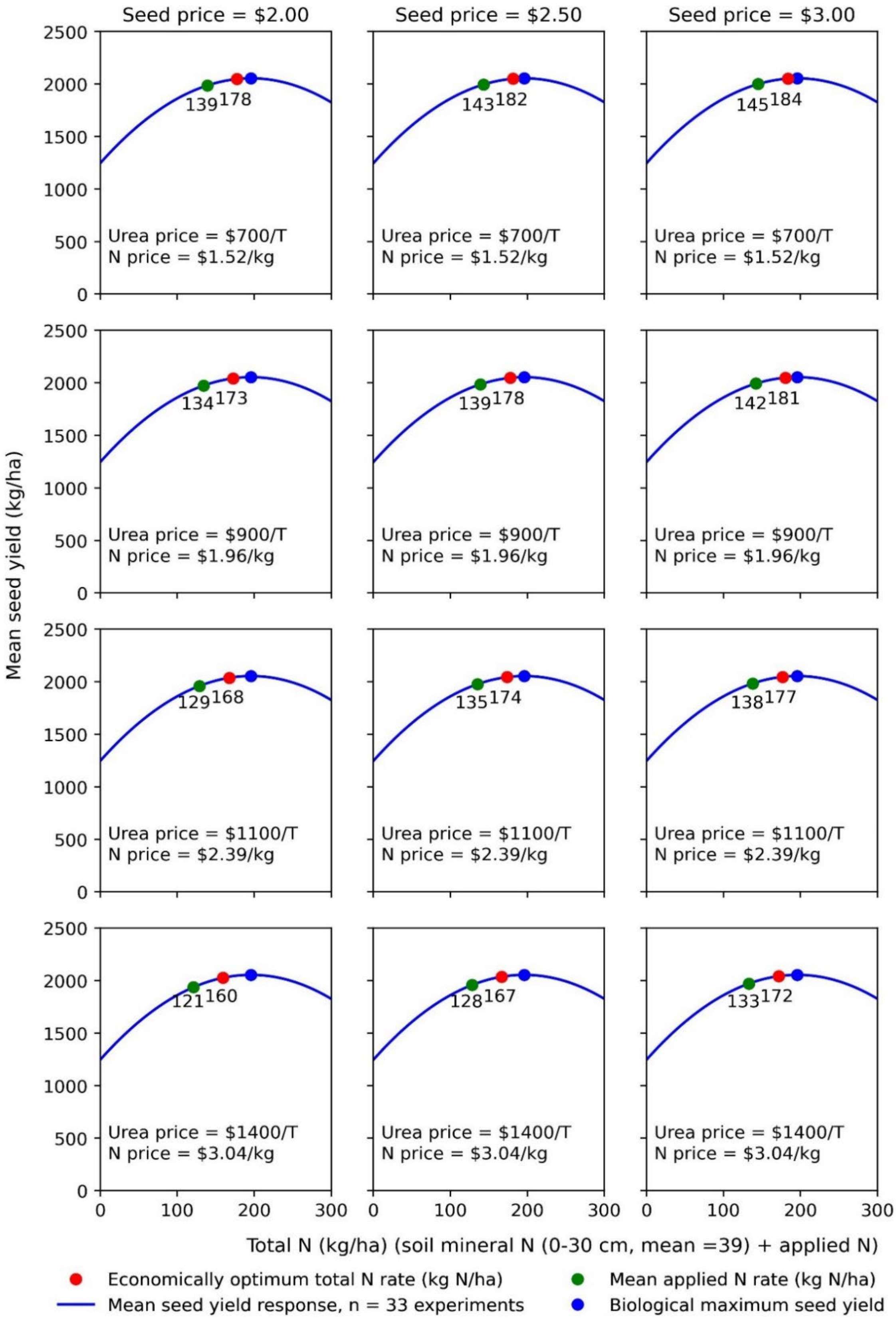

Figure 1. Perennial ryegrass (*Lolium perenne*) seed yield response to total nitrogen supply (Soil mineral N + applied), data represents the mean of 33 experiments. Data is plotted with the economically optimum total N rate (●) and the mean optimum applied N rate (●) assuming a soil mineral N test of 39 kg N/ha for 12 combinations of seed and fertiliser pricing. **Note:** application cost not included.

Plant Growth Regulator Trinexapac-ethyl (Moddus® Evo and other generic TE products)

- **Trinexapac-ethyl (TE) rate is critical.** Every day's delay in the crop reaching 50% lodging adds 23 to 40+ kg seed/ha.
- **Moddus® Evo and Optimus® are the only TE product registered for use at rates higher than 200 g TE/ha (800 mL/ha).** They have a label rate of 400 g TE/ha (2.3 L/ha of Optimus® 175 EC) and 600 g TE (2.4 L/ha Moddus® Evo).
- **Early flowering perennial ('Grasslands Nui' 0 to+14 days) and turf type ryegrass.** One application at GS 32 at 1.6 L/ha (400 g TE/ha), unless early closing or higher fertility conditions which may require increased rates.
- **Late flowering perennial forage type ('Grasslands Nui' >+14 days) ryegrass**. Split application 2 or 3 times TE alone or TE + CCC (chlormequat – Cycocel®). 0.8 L/ha TE + 2 L/ha CCC starting 5 to 7 days after closing (Table 1). Optimum TE is higher (1.9-2.4 L/ha) compared with lower bulk crops.

Table 1. Machine-dressed seed yield (MD SY) (average across two closing dates) for perennial ryegrass (*Lolium perenne*) cv. 'Base' (+22) after different TE Moddus®Evo PGR treatments, at Leeston, in the 2016-17 season.

Trinexapac-ethyl (L/ha)	Machine dressed seed yield (kg/ha)	*
nil	1240	e
0.8	1890	d
1.6	2220	c
2.4	2380	bc
3.2	2370	bc
2.4 (Split x2)	2560	b
2.4 (Split x3)	2840	a
LSD (α=0.05)	268	
P value	**<0.001**	

***Note: different letters denote treatments with statistically different seed yields**

- **Annual ryegrass** - Optimum 1.2 to 1.6 L/ha: Late closed (end October-early Nov) no advantage with split, but earlier closed (mid-October) showed an advantage with a triple split (see Table 2 -2017/18 trial with cv 'Hogan' triple split application 3 x 0.8 L/ha TE).
- **Turf -** Optimum 1.2 L/ha for four cultivars (2 NZ & 2 Danish), increased rates required under early closing or higher fertility conditions.

Other grasses/considerations

- **Tall fescue -** 300 g/ha (1.2 L/ha) TE resulted in a 350% seed yield increase (in 2011/12). In earlier closed bulky crops, there can be a seed yield advantage using Cycocel®-CCC (1.5 L/ha) + TE at 1.2 L/ha) followed by TE at 1.2 L/ha.
- **Cocksfoot** - Cycocel®-CCC (1 L/ha) + TE (0.4 L/ha) is applied twice (GS 32 and GS 38/39) (seed yield response was 50 to 130% in 4 trials).

- **Fungicide with PGR**. ⅓ to ½ full label rate added for GS 32 application. Trials that have compared different fungicide types suggest no difference between using DeMethylation Inhibitor (DMI), Succinate DeHydrogenase Inhibitors (SDHI) or Quinone outside inhibitor (QoI) (Strobilurins) fungicides with the PGR.
- **Wild oat control**. Need 12 days between wild oat spray and TE application.

Table 2. Machine-dressed seed yield (MD SY) of annual ryegrass (*Lolium multiflorum*) cv 'Hogan' following Moddus®Evo plant growth regulator treatments, at Tinwald in the 2017-18 season.

Treatment	Date and growth stage of crop at time of PGR (L/ha) treatment			MD SY (kg/ha)
	16.11.17	**27.11.17**	**4.12.17**	
	GS 31	**GS 32**	**GS 33**	
1	Nil	Nil	Nil	1270
2	-	0.8	-	2550
3	-	1.2	-	2830
4	-	1.6	-	3330
5	-	2.4	-	3130
6	1.2	1.2	-	2830
7		1.2	1.2	2950
8	0.8	0.8	0.8	2960
9	0.8	0.8	-	2940
			LSD (p=0.05)	297
			P value	<0.001

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- **Diversifing Weed Control**
- **Protecting Herbicide Performance**
- **Sharing Knowledge**

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