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cropping strategy

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Disease Management in wheat (2024)

Product choice for later season fungicide timings GS39 – 61

In this edition of inGRAINed (Issue 5) we address flag leaf sprays and their importance in disease management strategies for wheat.

Key points

Flag leaf spray applications (GS39)

- ***Typically, in the medium – high rainfall zones (M-HRZ), in seasons with good yield potential, the flag leaf spray will be the most important fungicide application for a wheat crop as it protects the two most important leaves for grain fill (flag and flag-1).***
- ***In springs where conditions turn dry during stem elongation (GS30 – 39), dry weather itself becomes an effective fungicide and is a key component to preventing upper canopy infection.***
- ***Unfortunately, it not only reduces disease pressure (lower canopy humidity) and fungicide yield response, but often yield potential as well.***
- ***This spring, monitor the crop intensively for disease between GS31 – 32 (first and second node) and flag leaf emergence (flag leaf emerged on the main stem). This should be approximately four weeks.***
- ***If it's more than four weeks, you may be spraying your first fungicide too early and therefore may require an additional fungicide to protect flag-2 and flag-3 before flag leaf, particularly when the stem elongation period is wet.***
- ***If the period is dry with very few 5mm rainfall events, then consider lower rate options, or if only rust is the threat with no sign of Septoria tritici blotch (STB), then you may not need more expensive chemistry or higher label rates.***
- ***Most importantly, be sure you know what you are spraying for. This is particularly pertinent in WA wheat crops where stripe rust and STB have not been an issue (see 2023 FAR Fungicide Fingerprinting yield results where the yield response in VIC, SA and WA are compared in disease susceptible varieties https://faraustralia.com.au/resource.)***
- ***Remember GS39 is when the flag leaf has emerged on the main stem, not when the flag has emerged on all stems; when conditions are wet and disease conducive, this is important to recognise since the delay in waiting for all the flag leaves to emerge increases disease pressure on flag-1.***

Head spray applications (GS59-61)

- ***The description head spray probably overlooks its primary purpose which is to "top up" the fungicide activity in the flag leaf when a better season for yield potential leads to greater upper crop canopy staying greener for longer (greater canopy duration).***
- ***In many scenarios outside the HRZ, this approach is not warranted as drier conditions reduce the yield response of this final spray in most LRZ and MRZ regions.***

- ***Key diseases that can flair up that warrant this input are the three rusts (stripe, leaf and stem), fusarium, and in severe infections wheat powdery mildew (WPM).***

GS39 – flag leaf emergence on the main stem (flag leaf targeted coverage of Flag & F-1)

Product choice:

Wet conditions in the four weeks up to flag leaf, susceptible varieties and or crop badly infected:

Note: If you have already used the fungicide options suggested below at earlier growth stages, look to see if you can change to different active ingredients as a sound anti resistance measure. (see Fungicide resistance five measures – inGRAINed issue 3).

Ideally, if you have used a Group 11 QoI (strobilurin – azoxystrobin and pyraclostrobin) at GS31-32. do not use QoI again at flag leaf (GS39).

Similarly, if you have used a Group 7 SDHI at GS31-32 do not use a SDHI fungicide at flag leaf.

High disease pressure:

Where disease pressure is very high in susceptible varieties, and conditions between GS31 – 39 have been conducive to disease, then better chemistry based on mixtures of DMI (Group 3 triazoles e.g. prothioconazole, epoxiconazole, cyproconazole & Mefentrifluconazole) mixed with strobilurins (QoI Group 11 – e.g. azoxystrobin or pyraclostrobin) or SDHIs (group 7 – bixafen, benzoviniflupyr) will be warranted, remembering that the protection conferred will lead to good green leaf retention during grain fill.

For stripe rust and or leaf rust as main target with STB present *- Group 3 DMI cyproconazole mixed with Group 11 QoI azoxystrobin has performed well in the HRZ (avoid excessively hot days for application). Or Group 3 epoxiconazole mixed with Group 11 QoI pyraclostrobin. For example:*

*- **Amistar Xtra** – 400 – 800ml/ha delivering Group 3 DMI cyproconazole 32 – 64g ai/ha and Group 11 QoI azoxystrobin 80 – 160g ai/ha (with rate dependent on disease pressure and variety rating).*

Note: Label states you cannot exceed 800ml/ha of Amistar Xtra in one season.

or

*- **Opera** – 500 – 1000ml/ha delivering Group 3 DMI **epoxiconazole 31.25 – 62.5g ai/ha and Group 11 QoI pyraclostrobin 42.5 – 85g ai/ha.***

Note: Label rate of 500 1000ml/ha for leaf rust control and 500ml/ha for other diseases.

or

*- **Radial** – 420-840ml/ha delivering **Group 3 DMI epoxiconazole 31.5 – 63g ai/ha and Group 11 QoI pyraclostrobin 31.5 – 63g ai/ha.***

For STB with no rust concerns either stripe or leaf rust then consider options such as:

*- **Aviator Xpro** – 300 – 500ml/ha delivering Group 3 DMI prothioconazole 45 - 75g ai/ha and Group 7 SDHI bixafen 22.5 – 37.5g ai/ha.*

Note: Mid booting label (GS45) cut off for Aviator Xpro if flag leaf sprays are delayed.

*If conditions are drier up to flag leaf and the risk of STB is reduced, and **stripe rust then becomes the main threat** then consider:*

*- **Elatus Ace** – 500ml/ha delivering propiconazole 125g ai/ha and benzovindiflupyr 20g ai/ha.*

If WPM is the dominant disease consider one of the three permitted mildewcides – metrafenone (label up to GS59), quinoxyfen or proquinazid. These products are not broad spectrum, so if other diseases are present, they will need to be used in combination with another product.

If conditions are dry and/or more resistant varieties grown or scenarios where diseases such as rust and STB are not present:

Where the season turns dry leading up to flag leaf, with an outlook of the same for the rest of the season, then higher label rates will not be warranted, and lower label rates of mixtures or straight DMIs (epoxiconazole or tebuconazole and prothioconazole e.g Prosaro) could be considered. With more resistant cultivars always take a reference observation from the crop itself to justify why and what you are spraying for.

***E.g. Opus125** at **250** – 500ml/ha based on epoxiconazole 31 – 62.5g for lower disease pressure scenarios where rust is still the main target*

***Prosaro420** at 150 – 300ml/ha – delivering two Group 3 DMIs in mixture, prothioconazole 31 – 62.5g ai/ha mixed with tebuconazole 31 – 62.5g ai/ha for low levels of rust and STB.*

Note: Take care to read the label as regards requirements for adjuvant use with these fungicides.

GS59-61 – head emergence – first flower on the main stem

Of course, 2022 saw the widespread use of these head emergence timed sprays due to continued disease pressure and stripe rust infection of the head. We continually have to remind ourselves however that "2022 was the exception, not the rule". The third head wash spray became an established part of disease management strategies in 2022, however for many regions and varieties it is not typically warranted. In the HRZ there is more justification for this application provided that conditions post flag leaf remain conducive for disease, if they don't then the application may not be warranted, even in the HRZ.

Timing and Product choice:

With product choice be mindful of harvest withholding periods and label growth stage cut offs. In addition, there may be far less need for persistence of effect, therefore lower label rates and generally less expenditure is warranted, unless the target is visible stem rust, or you are targeting fusarium head blight.

If stripe rust in the head is being targeted, it is important to apply fungicide before the head starts to flower.

No later than GS59 – E.g. Opus125 at **250 – 500ml/ha** based on epoxiconazole 31 – 62.5g ai/ha has a label cut off at GS59, but would be an excellent Group 3 DMI for stripe rust control in the head as well as later season leaf rust. Do not overlook late season leaf rust if low levels have been present all spring and the disease is evident in a susceptible variety. In comparison, tebuconazole, e.g. Folicur would cover stripe rust although its curative activity may be weaker, however it would be less effective against leaf rust.

Targeting Fusarium can compromise stripe rust control in the head since it's important that the timing occurs at early flowering, therefore unless the crop is at very high risk of fusarium head blight e.g. Durum wheat or wheat after grain maize, then it is more important to target other diseases.

Note: When using products containing epoxiconazole be aware that different generic sources of this fungicide have different loadings of the active ingredient that effects the label rates, e.g. Opus125 contains 125g/L whereas Soprano 500 contains 500g/L. Please check label rates.

Fungicide fingerprinting

FAR Australia initiated independent testing of fungicides in 2022 with work expanding for 2024 to include barley. The following table illustrates the grain yield response to different two-spray fungicide programmes versus untreated using FAR control treatments, and to date unregistered experimental fungicide strategies. The main diseases featured in Table 2 trials were as follows:

Gnarwarre, Victoria – Leaf rust and Septoria tritici blotch *cv Revenue*

Millicent, SA – Stripe rust and Septoria tritici blotch *cv DS Bennett*

Frankland, WA – low levels of Stagonospora and Yellow leaf spot *cv Scepter*

The FAR Australia control treatments were designed to be AFREN compliant and set out to only use a single strobilurin (QoI – Group 11) and SDHI (Group 7).

Treatments	Application A – GS31	Application B – GS39
Untreated	Untreated	Untreated
FAR Control 1	Prosaro 300ml/ha	Opus 500ml/ha
FAR Control 2	Prosaro 300ml/ha	Radial 840ml/ha
FAR Control 3	Opus 500ml/ha	Aviator Xpro 420ml/ha

For active ingredient contents see product choice section

Table 1. Influence of fungicide application on grain yield (t/ha) at three FAR Australia fungicide fingerprinting trials in Victoria, SA & WA – FAR Australia Crop Technology Centres 2023.

	Site, cultivar & Grain Yield (t/ha)							
	VIC HRZ Gnarwarre Revenue		SA HRZ Millicent DS Bennett		WA HRZ Frankland Scepter		Mean	
Fungicide Treatment	t/ha		t/ha		t/ha		(t/ha, %)	
Untreated	4.09	d	4.29	f	4.30	-	**4.30**	**100**
Far Control 1	5.24	c	7.17	abc	4.22	-	**5.54**	**129**
Far Control 2	5.74	abc	7.07	bc	4.34	-	**5.72**	**133**
Far Control 3	5.69	abc	7.13	abc	4.43	-	**5.75**	**134**
Experimental strategy 1	5.78	ab	7.62	a	4.53	-	**5.98**	**139**
Experimental strategy 2	5.87	ab	7.05	bc	4.57	-	**5.83**	**136**
Experimental strategy 3	5.73	abc	7.07	bc	4.57	-	**5.79**	**135**
Experimental strategy 4	5.94	a	6.73	cd	-	-	-	-
Experimental strategy 5	5.37	bc	6.01	e	4.64	-	**5.34**	**124**
Experimental strategy 6	5.57	abc	6.95	bcd	4.85	-	**5.79**	**135**
Experimental strategy 7	5.72	abc	7.09	bc	4.46	-	**5.76**	**134**
Experimental strategy 8	5.63	abc	6.51	de	4.40	-	**5.51**	**128**
Experimental strategy 9	5.69	abc	7.44	ab	4.61	-	**5.91**	**138**
Experimental strategy 10	5.69	abc	7.43	ab	4.48	-	**5.87**	**137**

Experimental strategy 11	5.60	abc	6.85	cd	4.84	-	**5.76**	**134**
Untreated	4.33	d	4.46	f	-	-		
Means	5.48		6.68		4.51			
LSD	0.52		0.51		ns			
P Val	<0.001		<0.001		0.240			
CV	6.64		5.37		7.07			

** WA treatments for experimental treatments 1-4 had different treatment components to the two eastern states trials*

Key points

- *Fungicide strategies based on including SDHI or strobilurins (QoI) at flag leaf showed their greatest advantages (although not significant) over the DMI only strategy (Prosaro GS31 & Opus GS39) where STB was most severe (Gnarwarre).*
- *Where stripe rust was most significant (Millicent) there was no obvious yield advantage to the inclusion of strobilurin or SDHI. This is most likely because epoxiconazole is particularly strong on stripe rust.*
- *Fungicide strategies were not statistically superior to the untreated in the HRZ WA site at Frankland River.*

Fungicide resistance considerations

It is not illegal to apply two SDHIs in wheat crops or two QoIs, but since these fungicides are at generally higher risk of resistance development, it is preferable to consider only using one per season. It's also important to note that you cannot apply two applications of SDHI back-to-back in wheat crops.

It's important to remember that one of the primary drivers of fungicide resistance in the pathogen is the number of fungicide applications it is subjected to (i.e. increased number of fungicide applications increases the selection pressure or the period the pathogen population is exposed to the fungicide, thus killing sensitive strains and allowing resistant strains to increase in the population).

Note that the earlier you start spraying foliar fungicides, particularly before the start of stem elongation, the more fungicides you are likely to apply in a season of good yield potential with conducive conditions for disease. So, if you are spraying foliar fungicides during the tillering stage, ensure to go through the justification of what you are spraying for, and the value of the leaves you are protecting, since in such scenarios you will commit yourself to more fungicide applications when they may not be necessary.

This cropping strategy is offered by Field Applied Research (FAR) Australia solely to provide information. While all due care has been taken in compiling the information, FAR Australia and employees take no responsibility for any person relying on the information and disclaims all liability for any errors or omissions in the publication.

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It would also like to acknowledge the support of industry manufacturers for entries into Fungicide Fingerprinting trials. These are FAR Australia's independent research evaluations where control treatments are funded by FAR Australia.

If you are interested in independently testing your fungicide strategies in our network of Fungicide Fingerprinting trials, then please get in touch with FAR Australia for a prospectus or download a copy here https://faraustralia.com.au/wp-content/uploads/2024/08/Fungicide-Fingerprinting-brochure_FINAL.pdf