

Cereal disease management in 2020 – from famine to moving feast!

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Take home messages

- 'We're all in this together'
- Ensure you know the latest resistance ratings of cereal varieties you have sown – they change
- Back to basics – destroy the green bridge – oh well, move on from this in 2020
- Ensure correct diagnosis – not everything is disease and if not fungicides won't help
- Timing is everything – protect the top three leaves. However, with stripe rust 'flattening the curve' helps
- Prophylactic or responsive in 2020 with tight fungicide supply? Is a 2-3 week wait for product in Spring a potential consequence?
- Seek information and advice – NSW DPI pathologists are here to help ('we're all in this together')

Introduction

Gotta love 2020! Prolonged drought, bushfires/dust storms, COVID-19 global pandemic, barley tariff, wet/cold and now early development of leaf diseases (stripe rust in wheat and net blotch in barley) in winter cereal crops.

The other significant issue at play is continued concerns around the availability of fungicides throughout the season. The only thing that is certain in 2020 is that whatever I write here will likely be outdated by August when we do the webinar. Hence, I'll try and stick to the principles of disease management.

1. Know resistance levels in varieties you are sowing – they do change!

At the time of writing continuing reports of stripe rust 'hotspots' in the early sown wheat variety DS Bennett[Ⓢ] are occurring. This has been a considerable surprise to some growers and their advisers as they thought this variety was rated R to stripe rust. Well it was in 2018, but with the detection of a new pathotype (198 E16 A+ J+ 17+, '198 pathotype') in Tasmania and Victoria in 2018, the rating of DS Bennett[Ⓢ] dropped to MS in 2019 sowing guides. The 198 pathotype was detected at 4 sites in NSW, 2 in Victoria and 1 in QLD in the 2019 season with further evaluation of stripe rust reactions to this pathotype seeing DS Bennett[Ⓢ] lowered to an S rating for 2020 variety guides. Ensure you are using the latest variety ratings which are updated annually to reflect the expected reactions to new pathotypes of different pathogens if required ([Winter crop variety sowing guide 2020](#)).

The resistance within the varieties does not change, rather it is pathogen which has adapted (mutated) to overcome a resistance gene(s) within a variety. This can therefore lower the resistance rating of varieties which rely on this particular resistance gene. How far the rating drops depends on what other resistance genes are sitting in the background within individual varieties. For example, with the 198 pathotype of stripe rust, DS Bennett[Ⓢ] has fallen from R to S, Illabo[Ⓢ] has dropped from RMR to MR, whilst LRPB Kittyhawk[Ⓢ] remains unchanged at RMR. Some other big changes with

varieties to the 198 pathotype are in LRPB Trojan[Ⓢ] which drops from MRMS to MSS and some durum varieties such as DBA Lillaro[Ⓢ] and DBA Vittaro[Ⓢ] which drop from RMR to MS. Note there have also been changes in leaf rust resistance ratings in wheat to a new Lr24 pathotype. It pays to stay up to date with the latest resistance ratings.

2. Destroy the green bridge is still important – volunteers are not good!

All rusts are what is termed '*biotrophs*' which simply means they need to host in a living plant to enable them to survive between crops. With wheat rusts, volunteer wheat plants are the green bridge, if they are from a susceptible variety. Removing these volunteers and hence the green bridge, delays the onset of rust epidemics if adopted widely. However, many growers have come off the back of a few tough years and with prolonged drought we all expected to have a reduced risk from green bridge build-up of rusts.

Volunteers which emerged on December/January rains were a valuable source of much needed feed and with great growing conditions there was unfortunately not enough stock to keep on top of the growth in many situations. Unfortunately, it has been reported that the growth was so good that some growers have even attempted to hang onto some of these volunteer crops and take to harvest. This, combined with an early seasonal break in 2020 in many regions of NSW and the widespread sowing of longer season wheat varieties, has resulted in a continuous 'green ramp' since January in many areas. The need to reduce input costs has also seen a reduction in the use of seed and in-furrow fungicide treatments for stripe rust which normally provide early protection and delay the onset of stripe rust in regions when used widely. The levels of stripe rust already present in long season wheat varieties across NSW will place pressure on plantings of susceptible main season varieties (potential 'second wave'?).

Some central NSW growers have also hung onto volunteer barley crops, attempting to take them to harvest. With prolonged wet/cold weather there have been issues with getting the heads to dry down, high levels of either spot or net-form of net blotch and weeds. At least with net blotch these situations are largely confined to the paddock where the problem was created. Hence, lesson learnt for the growers. Unfortunately, this is not the case with rust as the spores from infected crops can blow 100s of kilometres. Yes, 'we're all in this together' (COVID-19 parallel 1).

3. Monitor crops and get correct diagnosis

Do not get the impression from this paper that everything that is happening in cereal crops in 2020 is related to disease. Underlying issues with nutrient, herbicides, frost and other stresses are also causing some yellowing or discolouration of leaves in 2020. Physiological spotting not related to disease occurs especially in barley every year with 2020 being no exception. However, disease has clear patterns of distribution within and between paddocks, plants and even on individual leaves. The key message is testing is available which can be as simple as texting or emailing some good quality photos to NSW DPI pathologists (contact details below). This can be a quick way of ruling disease(s) in (or out), before pulling the sprayer out of the shed. If symptoms appear consistent with disease, we can then confirm this through testing of submitted samples. Testing and correct diagnosis is important (COVID-19 parallel 2). Also remember that all diseases have what's termed a '*latent period*.' Latent periods which vary in length and are basically the delay/number of days from when the fungal pathogen infects the plant and when symptoms (i.e. lesions or pustules) are visible on leaves. Hence, infections you see in your crop now are actually related to infection events that happened in the past. For example, stripe rust has a 10-14 day latent period, so hot spots that growers are seeing in their crops now started from infection events around or more than a fortnight ago (COVID-19 parallel 3).

4. Fungicide management – timing is everything

Fungicide application does not increase yield, rather it protects yield potential. Not all varieties will need extra protection from in-crop fungicide application if they have an adequate level of resistance to the disease of interest. For example, wheat varieties rated MR or better for stripe rust do not require fungicide management even though they may still show some infections at the seedling stage. The only caveat here is that we have seen some varieties (e.g. Suntop[Ⓢ] and Lancer[Ⓢ]) take a bit more stripe rust when under high levels of background nitrogen nutrition which realistically only drops their rating by one category. That is, they DO NOT become ‘suckers’ under high N.

When it comes to protecting yield potential from development of leaf diseases in cereals it is the top three leaves (flag, flag-1 and flag-2) that need to be kept green for as long as possible. This is because these leaves intercept the most sunlight to drive grain filling and hence yield. In most barley varieties the flag leaf is smaller compared with wheat so the flag-1 is generally a bit more important with barley, but the surface area of the flag leaf sheath is big in barley and as such, is an important solar panel to protect. However, irrespective of exactly which of these three leaves do the heavy lifting, they all need to be protected in susceptible varieties if under disease pressure and weather conditions conducive to disease development are expected.

The flag-2 leaf is fully emerged at GS32 whilst the flag leaf is fully emerged at GS39. This is why a two spray strategy at GS32 followed by GS39 is effective in susceptible wheat varieties. This could equally be an up-front (seed or in-furrow) treatment followed by an in-crop spray at GS39. In barley, a two spray timing would be at ~GS32 and 49, with the latter spray timed to protect the flag leaf sheath. Leaves that are not emerged at the time of fungicide application are not protected as there is no systemic movement of foliar fungicides into new growth. Hence, early in-crop application prior to GS30-32 are questionable especially with ‘necrotrophic’ leaf diseases (e.g. yellow spot in wheat or net-blotches in barley) as leaves that emerge after foliar fungicide application are unprotected and exposed to continued infection from ongoing ascospore release from wheat or barley stubble, respectively within the paddock. The situation is more complicated with rusts such as stripe rust because, depending on coverage, a foliar fungicide application within an infected crop can eliminate the disease from a paddock. This can be to an extent that a new infection event from outside the paddock or successive cycles of the pathogen are required for the rust to build back up to damaging levels. That is, you have essentially flattened the curve of the stripe rust epidemic (COVID-19 parallel 4).

5. Prophylactic or responsive in 2020?

All fungicides have stronger preventative than curative activity against leaf diseases. This means that they are generally most effective when applied prior to or early in disease development rather than once the disease has established in a crop. Once lesions or pustules have developed on infected leaves and green leaf area has been lost, it cannot be restored by application of a foliar fungicide.

With tight fungicide supplies, prophylactic applications, if not warranted, could potentially leave growers short in spring when protection of key leaves is required and when spraying is most likely to provide maximum economic return. If the season remains wet and temperatures warm, which decreases the latent period for many leaf diseases, a 2-3 week wait for product in late winter - early spring could cause significant angst. Timing is everything with a foliar application at GS39 in late-winter - spring likely to be the best time to ‘flatten the curve’ on a leaf disease epidemic. If spraying crops prior to GS30, unless justified (i.e. stripe rust evident in MRMS or lower variety), then first consider the potential implications for your ability to hit a well-timed foliar fungicide application around GS39. ‘Cheap insurance’ in 2020 may be better addressed by keeping product in the shed for a targeted maximum benefit application at around GS39 (or possibly later in barley), rather than by a more questionable earlier prophylactic application. This situation could vary considerably between growers and change during the course of the season. Ensure you are talking with suppliers now before using up what you have on hand.

Conclusions

It is great to be having a relatively wet start to the winter cropping season across much of NSW and hopefully this continues. Consequently, leaf diseases are more likely to be more prevalent in wheat and barley crops than over the past three seasons. This may be the first experience for some newer agronomists in managing leaf diseases whilst the rest of us are drawing on medium-term memory. Be aware that some things have invariably changed during this time. Do not assume that the resistance levels in your wheat varieties are the same as three years ago, as new pathotypes of rust pathogens have developed and potentially distributed widely across NSW. Make sure you are using the latest resistance ratings and manage crops appropriately based on this.

Stay calm. Panicked decisions are not always the best decisions. Remember any disease you are seeing in your crops are from infection events that occurred 1-2 weeks ago so why do you need to spray in the next 5 minutes? Ensure you have the correct diagnosis as using up tight fungicide stocks on physiological, nutritional, environmental or herbicide related symptoms in leaves wastes product and may leave you short for spring when a timely fungicide application is more likely to have maximum economic benefit.

Remember 'we're all in this together' and NSW DPI pathologists are here to help.

Useful resources

[Winter crop variety sowing guide 2020. NSW DPI](#)

Agronomists and NSW DPI pathologists but never be shy to get a second opinion.

Useless resources

'Chicken little' old mate down the pub (if allowed) who is a little excited and full of 'information'. Two weeks in isolation suggested.

Glossy product brochures which claim one product is 'significantly' better than another. Yes, some actives have stronger activity than others but don't let it become a distraction. None of them can restore green leaf area if you have to wait 2-3 weeks to get them in the middle of an epidemic. Research shows that if you apply a registered product for the target leaf disease then timing is generally as or more important than product choice.

Tweets from world leaders.

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