# GRDC VIDEO or PODCAST TRANSCRIPT

**Title: What to do - about wheat powdery mildew**

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**Prue Adams:** This is a GRDC podcast.

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**Prue Adams:** Wheat powdery mildew is becoming increasingly difficult to manage, in part because there's widespread resistance to the available chemicals. So what to do? Hello there, I'm Prue Adams and what to do? Well, it's a complex matrix of deciding whether it's worth growing a disease resistant variety which doesn't yield so well, or go with the susceptible variety, and hope your fungicides will do the job. There is some hope on the horizon in the form of new products, but they're specific to mildew, so you'd still need to apply your other fungicides, And of course, that's an additional cost. Let's hear first from agronomist Sam Trengove, near Bute in the southern region, who's headed a GRDC investment looking at just this issue.

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**Sam Trengove:** Wheat powdery mildew is a disease of wheat, so it forms a pustule on the leaf and stem and head of the wheat and like most diseases, if it's prolific enough, it'll take the green leaf area from the crop and affect its ability to photosynthesize and fill green and will reduce yields if it's bad enough.

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**Prue Adams:** And what kind of a problem is it? And in what districts of this southern region is it a problem?

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**Sam Trengove:** Where we are right now on the northern Yorke Peninsula, it's been problematic for a good eight years probably, but it seems to be variable, and some years would be worse than others. In the last couple of years, it's been reported quite widely across most of the southern region, from Victoria through the SA Mallee and upper south east and through here and across the Eyre Peninsula as well. So it has been problematic in the last few years, which probably related to season, but also potentially the varieties that are dominant in the cropping systems at the moment as well.

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**Prue Adams:** So there have been a couple of big trials that you've done over the last three, four years, one with SAGIT in South Australia, obviously, and then the other was the GRDC investment. Can you step us through what those trials were and what the outcome was?

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**Sam Trengove:** We started with the SAGIT project in 2020. That was on the back of some problems controlling powdery mildew in the years preceding that and we'd done some resistance testing with the Centre for Crop and Disease Management, which identified that there was some resistance to strobilurins in the mildew population locally. So this was work that was focused around the northern Yorke Peninsula. We find that mildew is often more prevalent on sandy soil types, as opposed to some of the more heavier textured soils in some landscapes and that was certainly the case in that northern Yorke Peninsula region. And so the work in that project was looking at understanding the impacts of variety choice and fungicide choice, and how we can use them together to get a better outcome in terms of mildew management and I guess, quantify what sort of losses we might be incurring to powdery mildew so there were some field trials that were undertaken over two years looking at those things. And we also did a survey of grower paddocks in the region where we collected mildew and sent those samples to the Centre for Crop and Disease Management, or the CCDM for some molecular testing on looking for the mutations that confer resistance in powdery mildew to understand how widespread it was across the region. The GRDC project then built on that and took that work more widely. So we're still looking at similar things in terms of the trial work, understanding the impact of the varietal resistance and the interaction with the fungicides that we're using, but over a larger range of environments. So we're still working in the northern Yorke Peninsula. We also had trials on the Eyre Peninsula, the upper south east and north east Victoria.

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**Prue Adams:** So just looking at that GRDC investment, you're looking at the two main factors of disease resistant varieties and then fungicide use and then fungicide resistance on top of that I suppose as part of that. Was there a tipping point between the resistant varieties and fungicide use, at which point you said, okay, let's go for resistant varieties over using more fungicides?

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**Sam Trengove:** I'm not sure if we narrowed it down to, you know, here's a clear cut tipping point but certainly if you're in a region where powdery mildew has historically been an issue, then growing varieties that are rated as susceptible to very susceptible or S to VS will cause issues because they are so susceptible to the disease that it just proliferates, and it's very difficult to control. The problem has been in the time of doing those projects, was that most of the wheat varieties that were commonly being grown were in that category of S to VS and so we've got the range of categories from very susceptible as the worst varieties right up to resistant or R rated varieties and then a range of everything in between. Most of the varieties sat in that S to VS or slightly better than that. What we found is that in areas where powdery mildew is quite severe, moving from an S to VS variety to even an S or an MSS variety had a significant impact on reducing the mildew prevalence. In the S to VS varieties what we found is that with the best fungicides, we could reduce the yield loss by about 17 per cent.

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**Prue Adams:** Generally, it was less than a tonne. It was about 0.7 tonne per hectare that we're losing to powdery mildew in those varieties that we could regain by fungicide use. If you had a variety with better resistance that had similar levels of yield potential, then yes, those varieties would be better being grown than the S to VS. But if you were forgoing 15 per cent yield potential to grow a more resistant variety, well your line ball as to whether you're better off to just grow the highest yielding variety and use the fungicide or grow the more resistant variety. The issue that overlays that is that powdery mildew has been identified as having resistance to fungicides and in particular, to the group 11 QoI fungicides like the strobilurin fungicides and also the group three DMI or triazole fungicides, which those two groups account for a huge proportion of the fungicide that's used to grow wheat. There's only three modes of action that are registered for wheat in Australia, up until now there has been anyway, and those two would be the most commonly used modes of action, the third being the group seven SDHIs and unfortunately, in our trial work, their activity or efficacy on powdery mildew is not overly high. So the two groups we've been most reliant on are starting to give us unreliable results in terms of control. So it's not as simple as growing the highest yielding variety that's S to VS and saying I'll spray it and control it that way, because sometimes the fungicides aren't working, so the way the resistance works with the two modes of action is different. So the Group 11 strobilurin QoI fungicides once the mutation is present in the population, it tends to get selected for quite quickly and becomes dominant and once that mutation is present, the fungicide will not work and you see complete failure of that fungicide. What we've observed in our trials is when we've used those fungicides, typically the frequency of the mutation is doubled in that season or double to triple. So for example, if we had a 10 per cent frequency here this year and we use that fungicide, then we'd be in the range of a 20 per cent resistance frequency the following year and you can see how that escalates after a few more years - you go from 20 to 40 to the whole population being resistant. The group three triazoles are different, and there's potentially a range of mutations that are involved in the resistance to the triazoles and we don't have the ability to detect all of those different mutations, but they can detect a precursor mutation, which can lead to these other ones down the track. What we know with those is that it's a creeping sort of resistance and so it's not all or nothing like it can be with the strobilurins but slowly the efficacy declines over time with repeated use, where a product that once upon a time we might have expected to give us 90 per cent control, now might give us 50 per cent or 60 per cent or 70 per cent, we don't always know where on the spectrum it will fall, but it's shifting towards less and less control out of those products and becoming less reliable so in the absence of fungicides that are functioning well, the varietal resistance importance is really high. Through those projects, we've been working on what other products might be out there, and there are some mildew specific fungicides that do exist, which up until now haven't had registrations for use in wheat in Australia. They've had registrations either overseas or registrations in other crops and fortunately there's three products there that have received a permit for use in Australia now in wheat, which will be available out until 2027. So that does give us an option.

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**Prue Adams:** So that sounds like that's going to be the best bet going forward if these others are pretty problematic?

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Yeah, so these are products that are specific to mildew. So generally, we're dealing with a disease complex where you could have septoria and stripe rust and mildew could also be part of that. So potentially likely to still need a mixture of fungicides if you have these other diseases present that control those, but these will help cover off on the mildew side of the equation. Obviously, there's an additional cost there which has to be factored in and depending on the environment that you're farming in, if it's a low yielding environment and having an additional fungicide cost might be a significant factor that lends you to thinking about attacking it in a different way so again, resistance will still be important in that equation.

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**Prue Adams:** For growers that are facing an issue or can see a potential issue in the upcoming year - it sounds like there's no clear-cut answer, really, but what would you be advising them to do?

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**Sam Trengove:** If mildew has been a frequent problem where you are farming in wheat, then moving away from these highly susceptible varieties, the S to VS varieties - it doesn't have to be a shift all the way up to resistant, but just shifting a couple of categories up to an MSS variety will make a significant impact. Then, if you are still growing an SVS variety and concerned about mildew developing in that season... I guess there are these fungicide options now that you can deploy that will give more reliable control, we believe, but it's important that they're used in a preventative way, they're not good at coming into a scenario where there's a high level of infection trying to clean that up. They sort of need to be used at an early stage of development before the mildew is built up to a high level.

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**Prue Adams:** Something you told me earlier, I think is interesting in that there is fungicide resistance in areas where growers haven't even sprayed that fungicide. So what does that tell us?

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**Sam Trengove:** It tells us that the disease is moving in the environment and when its moving, resistance is also moving. So the first detections of strobilurin resistance or the Group 11 resistance is from Victoria in 2016. Locally here, we first detected it in 2019 but through our both the SAGIT and GRDC projects, we did these extensive field surveys collecting mildew from the paddock and sending it to CCDM for testing and in the GRDC component of that, that stretched from Victoria across to the Eyre Peninsula, with close to a couple of hundred paddocks tested across that range. And what we found was that in Victoria in the east, there's quite high prevalence of the Group 11 resistance, where 60 to 100 per cent of the population has that mutation. You go all the way to the western edge of where we tested over on the Eyre Peninsula - the resistance does exist over there, but it's at a much lower frequency and the paddocks over there range from zero per cent mutation to the worst might be 50 per cent, with most of them less than 10 per cent of that mutation. But then there's this gradient from Victoria in the east to Eyre Peninsula in the west, and you've got areas like the Mallee in between, which historically have a low fungicide use history, and particularly of the strobilurin type fungicides, which have probably been considered more of a higher cost and premium fungicide, very low use of a fungicide like that and yet out there we find that quite a few paddocks have 30 to 40 per cent mutation frequency of this fungicide, which it's likely that they've never used or might have used once or twice in their history and yet it's there. And what we read into that is that it's not through their local selection of that resistance, but it's actually moved from another region and they've got that resistance via airborne dispersal and so it's not just a case of how I manage my paddocks affects the resistance that I have to deal with. It's a communal issue where we're dealing with airborne dispersal, and it spreads across the landscape.

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**Prue Adams:** Next, I'm speaking with Nick Poole, managing director of Field Applied Research, or FAR Australia. The GRDC investment he's involved with is investigating controls for wheat powdery mildew in the northern region. In your view, what is the management strategy growers should employ to mitigate wheat powdery mildew?

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**Nick Poole:** I'd start by actually saying that the grower needs to ask yourself some questions regarding this disease before he entertains what strategy he's going to employ. The first and it's very important is to actually say, is this a disease that you get every year? Because if it is, then you can start building in an appropriate strategy - if it's not, then it may send you in a different route as regards your strategy. So the first thing to recognise is that the fungicides we use to control other diseases in cereals are less effective against wheat powdery mildew. So unless that disease is problematic to you, then you probably don't need to worry as much. If this is something that you get every year as a disease, then it may be that you have to consider some of the new permitted mildewcides. So there's a fork in the road where you have to say, is this something I get every year, or is it something that is an occasional disease because its control has to be considered in conjunction with the control of a complex of diseases.

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**Prue Adams:** Common advice is to rotate fungicides but how difficult is that when there is broad resistance to the chemicals that are available?

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**Nick Poole:** It is very difficult to rotate fungicides when you only have three fungicide modes of action outside of these new permitted mildewcides. So the important thing to recognise is - it's easy for us to say rotate the foliar fungicide modes of action. But actually that's easier said than done, particularly when you bear in mind that those three modes of action are themselves perhaps powdery mildew would not be considered their real strengths in terms of control.

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**Prue Adams:** It's a bit of a dilemma, isn't it?

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**Nick Poole:** Yes, it is a dilemma for growers and their advisors because the new permitted mildewcides that have an approval up until, I think, May 2027 actually are very specific to mildew control, so they won't control a range of other diseases. They're very specific to powdery mildew and they're also essentially protectant fungicides, which means that once you have a huge issue with the disease in the parts of the crop you wish to protect, then it means they're not as effective. So there's a number of angles here. First of all, we have to identify whether the variety that we're using and the region in which we farm suffers majorly from wheat powdery mildew. If it doesn't, then we might be able to endure perhaps suboptimal levels of control of wheat powdery mildew with those existing three modes of action, which we've used for many years. The QoIs, the SDHIs and the DMIs. But if it's a major issue in susceptible varieties and we encounter it every year, then we need to bite the bullet because we're going to have to add these products that are very mildew specific to those existing three modes of action, and that's what makes it both expensive and a dilemma.

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**Prue Adams:** You're a member of AFREN, the Australian Fungicide Resistance Extension Network. How can growers get value from the information that comes from that network?

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**Nick Poole:** I think most importantly, they can be referring to the resources from the AFREN website, which at the moment is developing a GIS tool that will hopefully in the future, be able to tell individual growers and advisors what the prevalence of resistance in their region actually is. And not just a wheat powdery mildew, but other diseases. And so looking for those resources, looking for what the regional resistance is, will become a key part of strategies going forward.

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**Nick Poole:** And then if you're encountering major problems with this disease on a regular basis, it's at that stage that we've now got these permitted mildew asides as part of our fungicide armoury.

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**Prue Adams:** Many thanks to Nick Poole from FAR Australia and Sam Trengove from Trengove Consulting Pty Ltd. This has been a GRDC podcast, I’m Prue Adams. Thanks for listening.