# GRDC VIDEO AND PODCAST TRANSCRIPT

**Identifying and managing soilborne disease**

[00:00:12] **Prue Adams** Soilborne disease and root health in cereals and pulses often doesn't get the attention it deserves because it's quite literally out of sight, out of mind. Hello there. I'm Prue Adams. And today we're getting to the root of the problem and talking about what is happening under the sole of your boots. Understanding what a healthy root system looks like and diagnosing soilborne and root disease has been the focus of a series of national grower workshops over the past few years, made possible by a GRDC investment and collaboration with grower groups and other industry bodies. Recently, with SAGIT co-investment, sessions in the southern region have been conducted by experts from the South Australian Research and Development Institute, SARDI, the research division of the Department of Primary Industries and Regions in South Australia. I visited the Kangaroo Island Workshop, but as senior research officer with SARDI Blake Gontar points out, the problems and solutions on KI apply to other grain and pulse growing regions of Australia too.

[00:01:15] **Blake Gontar** So in cereals the main root diseases have been well established. We've got nematode diseases caused by cereal cyst nematode and then the root lesion nematodes, pratylenchus species. We have OMIC diseases caused by things like phythium and then the true fungal diseases such as rhizoctonia and take all in cereals. We also have a number of stem and crown diseases that we often associate with root diseases, so crown rot and eyespot. In pulses, this is a newly developing field. So some of those cereal pathogens also affect pulses to a lesser extent. So things like rhizoctonia, pythium, pratylenchus nematodes as well. But pulses have some of their own soilborne diseases. So we've done a lot of work over the last few years to identify the causes of root disease in pulses and found that there are a number of species such as Aphanomyces euteiches, phytophthora species and things like black root rot as well.

[00:02:15] **Prue Adams** And it seems to me from what I've been hearing today, it can be harder to determine what the problem is in pulses than it is in cereals. Why is that?

[00:02:24] **Blake Gontar** I think part of the problem is that we've been looking at cereal root diseases for a long time, so we're much more across what the symptoms are. But I also think that in pulses we just seem to get very, very similar symptoms from the various pathogens. And part of that, I think, is that once we've got a primary pathogen that's caused the issue, there are a number of other secondary pathogens or saprophytes that jump on board. And so we often just get a general blackening of the root system and it can be a lot harder to diagnose what's causing it.

[00:02:55] **Prue Adams** And there hasn't been as much research into pulses and diseases of pulses.

[00:03:00] **Blake Gontar** No this is a developing area in Australia.

[00:03:02] **Prue Adams** So we're on Kangaroo Island. So you've been doing the workshop today, but you have done them in other places in South Australia. What is specific to this region? What's interesting about this region in terms of soilborne pathogens and root disease?

[00:03:15] **Blake Gontar** So in pulses we did a lot of sampling around Australia over the last 3 to 5 years and we turned up some really interesting things that are not very common across Australia, but they're actually relatively common on Kangaroo Island. So it's a defined little area being an island that contains some of the pathogens that we're most interested in so Aphanomyces euteiches in faba beans, and then in lupin we've found a couple of phytophthora species and black root rot caused by Thielaviopsis as well as some of those other more common pathogens as well.

[00:03:49] **Prue Adams** And you surveyed in March, soil surveys, what did you come up with in terms of the pathogen load?

[00:03:55] **Blake Gontar** So around about a third of the paddocks that we surveyed had a level of disease or a pathogen that we're fairly concerned about. So that might be a low level detection of something like Phytophthora or Aphanomyces or a really high detection of something more common such as Rhizoctonia or Pythium at that level we might expect to see yield loss.

[00:04:20] **Prue Adams** For growers, what should they be doing if they want to start taking seriously what is going on below the surface with cereals and pulses?

[00:04:28] **Blake Gontar** I think the first thing to say is to be aware of poor performance and not just write it off as either frost or waterlogging or something like that. Whilst those abiotic constraints do play a role, often there's a biotic constraint, a root disease below the ground as well. So we encourage growers to go out, dig stuff up, carefully, wash it out, and then have a look to see whether the root system is healthy. And they can do that really easily by comparing to a healthy section of crop and see what the difference is. And then if they're still not sure what is going on, what's actually driving the poor health, that's when they can contact their adviser or agronomist or then on to a pathologist at SARDI.

[00:05:09] **Prue Adams** So what are some of the management options that growers can take up to avoid root disease problems in the first place, but also perhaps as a remedial thing when they do actually have a problem in the paddock.

[00:05:22] **Blake Gontar** So the first thing that we try and get growers to understand is that there's very little you can do in crop to address a soilborne disease. So management actions have to be set in place before selling and that means knowing what's actually in the paddock. So utilising something like PredictaB where they can test the soil pre-sowing, identify the inoculum load of the main pathogens in cereals and then that gives them an opportunity to tailor a management action. And for most cereal diseases, we have management options. So that might be a seed treatment, crop rotation away from a cereal crop. Or for some diseases, we do have reasonably good levels of resistance in some of our cultivars.

[00:06:06] **Prue Adams** So you've been doing a few of these workshops now. What kind of feedback are you getting from growers in terms of them being able to get real-time advice, I suppose. Do you get good feedback from them?

[00:06:18] **Blake Gontar** Yeah, we do. I think the growers really enjoy the workshops. This is not an area that they're used to spending a lot of time looking at. Most growers are pretty comfortable with foliar diseases. They mostly know their weeds. A lot of them know a fair few of the insect problems, but most don't spend a lot of time digging plants up and looking at the roots. It is time consuming and it can be a little bit unsure. So I think they really enjoy the opportunity to bring these samples in, have them washed out, and we can talk with them about what we're actually seeing and then learning about some of the biology and management options that are available.

[00:07:00] **Prue Adams** SARDI scientist Dr liz Farquharson says the first thing to do is to understand your paddock and if you have a problem, dig up a few plants, wash them off and have a good look at the roots. So Liz, you seem to be the person to speak to about pulse root health. So what's the best time to assess nodulation and root health, do you think?

[00:07:21] **Liz Farquharson** So ideally we recommend early springs or between 10 and 12 weeks or a little bit after post emergence of the crop. That's a time when the plants have had time to establish and form nodules, the soil is still easy to dig up and plants that too large. And it's a good time to get a feel for how the crop starting off the season.

[00:07:41] **Prue Adams** And so how do growers differentiate between the disease and other issues such as pest damage and compaction and acidity and even herbicide damage?

[00:07:50] **Liz Farquharson** So there's lots of things that can affect great health, as you've just mentioned, quite a few of those. And the best thing to do, I think, is to just have a really good understanding of the whole paddock. Are they good patches and bad patches in the paddock? What's different about those? Is it soil acidity? Dig some plants up. You might feel the compaction layer when you dig, as well as observing that the roots are having trouble growing through an area. Also, just the lay of the land. You can see that you might have some waterlogging issues as well.

[00:08:18] **Prue Adams** And then what would your recommendations be to promote that healthy root system and nodulation as such?

[00:08:25] **Liz Farquharson** So certainly with pulses, one of the things we need to get right at the beginning is to get good modulation. And to do that, I guess, is two things. One is to understand if you need to inoculate. So what are the right soyabean levels in your soil at the beginning of the season? And that can be affected by the history of the paddock, whether you've grown that crop for also things like soil acidity and whether the rhizobia can persist in that soil. So one of the things we offer at SARDI through the predictive testing platform is the RNod test, which is for three groups of rhizobia. It covers the EF, which is pea, bean and len lentil and vetch rhizobia. Then groupN, which is chickpea rhizobia and GS which is lupin and serradella. And soils can be sent in early in the year, and we can measure the number of rhizobia in that soil for those three key groups of pulses and recommend whether inoculation is required or not.

[00:09:20] **Prue Adams** So what does a healthy root system actually look like?

[00:09:22] **Liz Farquharson** So for a healthy pulse root system, we're looking for a couple things. We're looking for a nice tap root and lateral roots coming out from that tap root. We wanting them to be a nice white colour with very little browning or dark staining on them. And we're also looking for good nodulation. So nodulation is usually lots of nodules off around the seed and on the tap root. And then we also looking for nodules moving out onto the lateral rates as well.

[00:09:48] **Prue Adams** And where can growers get extra information if they want it, if they want written information.

[00:09:53] **Liz Farquharson** So there's lots of information available on the GRDC website. There's a new edition of the inoculation manual called Inoculating Legumes, Practise and Science, as well as the back pocket guide for inoculating legumes.

[00:10:12] **Prue Adams** Many thanks to SARDI researchers Dr liz Farquharson and Blake Gontar for speaking to us about soilborne disease and root health. This is our GRDC podcast. I'm Prue Adams. Thanks for listening.