# GRDC PODCAST TRANSCRIPT

**Title: Crop establishment essentials**

00:00:05:02 - 00:00:07:11

**Intro:** This is a GRDC podcast.

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**Sally Maguire:** Hello, I'm Sally Maguire. Both yield and performance rely heavily on good crop establishment, which is why GRDC is investing in a range of projects to determine the key factors affecting crop establishment. Getting crops established in hot, dry conditions is the focus of this research, which also looks at soil textures and deep sowing across multiple environments. I spoke to CSIRO farming systems researcher, Dr Kenton Porker, who provided an update on the current learnings and advancements in crop establishment.

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**Dr Kenton Porker:** Crop establishment for me is when the crop is fully established out of the ground, standing on its own two feet and why it's so important is that it actually aligns your whole crop life cycle with your environment. So often we think about, you know, crop establishments, how many plants or how many plants per metre squared we might have but for me, it's about the timing that your crop is out of the ground and can survive on its own two feet if you like, and no longer reliant on its seed reserves. But what that means is when that comes out of the ground, if your variety is matched to your environment in terms of its development speed, it's really the key part of the growing cycle that sets your crop up and growth thereon is really what's determining yield.

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**Sally Maguire:** So early crop establishment is preferable.

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**Dr Kenton Porker:** Yeah typically so early establishment is really what drives or equals yield potential particularly in something like canola. We know that you know in the mallee region we're talking about here around Wanaka really we want canola established before the first of May. Whereas wheat or barley is less important to have it in that early but still we're looking at a finite window that we want the crop established before cereals and by about the 10th or 15th of May to ensure that we've maximized our opportunity to get maximum yield potential.

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**Sally Maguire:** When you have something like a really dry season how does that then affect crop establishment?

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**Sally Maguire:** This is the big challenge and it's probably the big national challenge, so you think about rainfall patterns in Autumn, so we want to establish crops early, we want our crops established on time but the problem is that autumn is quite erratic in its rainfall pattern and it's also quite hot. So the big challenge is how do we reliably establish crops in drying soil seed bed profiles and often hot seed bed profiles in Autumn? So a number of projects and a number of collaborators are working on this and this big issue.

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**Sally Maguire:** Tell me about some of the investments that GRDC together with CSIRO are looking into around this?

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**Dr Kenton Porker:** Yeah, I'm involved mostly in a big national 'Canola Establishment' initiative, which is led by Andrew Fletcher from CSIRO out of WA but this has a number of collaborators nationally, all looking at more regional based issues but I but I think the big ticket items, and certainly the core trial that I'm working on here is about what's too hot, what's too dry, what's the impact of sowing depth, what's the impact of soil strength? So they are some of the big questions we're working on and alongside that, canola work here is a national 'Long Coleoptile Establishment' project led by Greg Rebetzke by CSIRO and similar wide national footprint, many collaborators working across many different soil types and while some of the questions are different, it's still about this how can we establish crops in unreliable or reduced rainfall in Autumn.

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**Sally Maguire:** So far what are some of your key learnings over the conditions and variables that you've experienced?

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**Dr Kenton Porker:** I guess we started with fundamentals, and partly because we knew there was differences between wheat, and there's differences in canola in terms of what was too dry and what was too hot to establish crops in but I think you start to see some of the big the big differences in soil texture so some of the solutions that we thought might work on sandy soils, for example, might not work on what we'd call stronger soils or heavier textured soils, particularly around sowing depth. So for something like canola, which is what I've been working a lot on, I think some of the depths that we could sow canola to on sandy soils surprised me. So we've been able to get canola established from depths more than even five centimetres in some instances on sandy soil. So that really gives us opportunity to think, well, maybe we don't have to sow canola as shallow as we previously thought on some of these sandy soils, but then when we move into more heavier textured soils, maybe we need to think about, well, how do we still make the most of these dry sowing opportunities on heavier textured soils and what that might mean across the landscape?

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**Sally Maguire:** What's some of your methodology? How are you working towards discovering how to establish crops under sort of more marginal conditions?

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**Dr Kenton Porker:** Obviously going to multiple environments, multiple soil texture contrasts but what we're doing here at Wynarka is we started at Easter time and I think if you remember over Easter here, it was really hot but that was quite deliberate and then we set up a water profile so different thresholds of water in those experiments to determine how hot does it have to be even under, in this case optimal water conditions when we irrigate these plots, how hot is it for canola to be a complete failure in terms of crop establishment? So it's really about manipulating the environment we're working in to try and work out some of these rules and thresholds. I know that might sound like it's just rules and thresholds, but our idea is to, once we understand it and understand, you know, the water amount that we need to establish a crop on and what's the impact of temperature, we might then be able to think about the solutions. Growers need to be able to use these rules reliably on their farm, and that's still a challenge. So if you look at the numbers that were coming out of grain producers SA did a really great survey - I think more than 60 per cent of growers were sowing in April, and more than 83 per cent of growers were sowing into dry seed beds. So the challenge is still, you know, in the absence of perfect forecasting and a perfect understanding of your soil water status, these decisions around reliable establishment or uncertainty around reliable establishment are still challenging question for growers.

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**Sally Maguire:** So would you say that at this time you've got any sort of information that you'd like growers to take away?

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**Dr Kenton Porker:** I think on sandy soils now, like we've got some really good numbers. I think if we get six millimetres of rain over a period or two days, there is an opportunity there for canola to germinate, emerge and establish. So that's a pretty good rule. Say, for example, if you've got a paddock of sandy soil or a lighter textured and your crop hasn't emerged, that can then be a bit of a diagnosis text. You know, what was the issues in my system that led to poor establishment across that field? So it's more of a diagnostic tool. And what that means is you can actually use that role to look at your system and say, well, if I receive this six to 10mm of rain and my canola crop didn't establish, what was it that caused that - was it I was going to shallow and it dried out too quick? Did I have non wetting soil? Did I have poor depth control? So it can be useful as a tool to think about how you can improve your system and I also think we're getting to a point in more heavy textured soils where we can say look, or maybe you need to think about a 10 to 15 ml rain event over two days to, let's say, call it an establishment opportunity for canola. So that's one thing and so in depth, I think we've shown that too shallow is probably more risky than slightly deeper sowing in sandy soils so we've typically thought that canola should be sown shallow but I think some of our research is showing actually if you're sowing early in Autumn when it's hot, the soil temperature can be five to 10 degrees actually hotter than the air temperature. So you don't want your little canola seed exposed to those hot surface temperatures when they're trying to emerge in these challenging autumn conditions. So there's tweaks to the system. I don't think there's any brilliant solution yet, but I think we're giving growers more confidence. For me, that's probably the important thing. You know, there's not a lot of canola grown in the Mallee, but if we can establish a crop even on five to 10mm of rainfall, that takes the opportunity to sow canola to probably a 50 per cent of seasons, as opposed to what we thought it might have been only a one in three-year event. So I think if we can give growers more confidence and I think the innovation solutions will come. So the project is still running and there's many things that we're working on.

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**Sally Maguire:** So you referenced earlier Long Coleoptile Wheat and then spoke about sowing deep then. So what are some of the considerations or limitations for when you do sow deep?

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**Dr Kenton Porker:** What was really a really a great story at Wynarka on the sandy soils, was that we actually established Long Coleoptile Wheats sown deep in the absence of any autumn rainfall. So that meant that there was moisture at depth, so around 10 to 12 centimetres there was enough moisture to germinate a crop. And once we got the seed into that moisture was able to germinate and emerge without any additional rainfall in the Autumn. So that's a really great story. The fact that, you know, growers are willing to invest in summer spraying and conserve their out-of-season rainfall, and it opens up opportunities to be able to sow deeper than we currently probably have been in our cereal crops. The challenges have come that often our seeders might not be set up for that so there's a whole range of questions about, you know, if you're deep sow where does the fertiliser go? And it's also - it's hard on the machinery so how do we actually physically sow that deep at scale when we've got, you know, varying soil types across our farm, and I don't think we've really worked out the true impact of, let's say, soil strength and the pressure set up. How heavy should we pack the soil above the seed, particularly when we get to some of these heavier textured soils, because we could actually make it more risky sowing deeper into those situations.

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**Sally Maguire:** Given all the challenges and different variables that you are working with, what ultimately are you working toward, I guess? What's the goal? What's the objective?

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**Dr Kenton Porker:** For me like, I think it's still a really good outcome to say, how can we make the most of these small rain events in Autumn? So if we get a five mil rain event, what is the innovation? What is the farming system have to look like to make sure that we can still reliably establish a crop on smaller amounts of rainfall than we currently are? And it doesn't have to be a big shift so even if we can move that dial a little bit towards establishing crops on less rainfall, I think that's a great success. Yeah, sure Long Coleoptile is one tool in doing that, it's from a different mechanism, but also in canola, giving growers the confidence to really sow and try and establish on lower rainfall events.

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**Sally Maguire:** And you mentioned there's quite a few different investments going on, but tell me about what the future looks like for what you're working on and collectively the investments towards getting an outcome.

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**Dr Kenton Porker:** We have to pull together a lot of the national data. We're not at that point yet, but particularly around soil strength so a lot of us worked on the press wheel or the seeder set up for our different crops in both canola and wheat. So once we establish some benchmarks, let's say that there's some thresholds that a grower could go out into the field and make a little pocket penetrometer into the ground and say, okay, cool, my seeder is set up the right way to make sure I have the highest chance of success from deeper sowing on my soil type. So there'll be some really good rules of thumb come out of this season, and then thinking about where the fertilizer goes, there'll be some really good rules of thumb following on from that work. And then I think even some more confidence in the depth thresholds that we can have for canola across different textures. So I think there'll be some really solid, both lab and field data to say, look, if you see a forecast of greater than 30 degrees, here's the chance of a failure in canola, for example, or some of these things. It's really about better understanding the seed bed conditions at the time of sowing.

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**Sally Maguire:** That was CSIRO farming systems researcher Dr Kenton Porker talking about crop establishment. More information on this topic can be found in the description box below or online at grdc.com.au I'm Sally Maguire. This has been a GRDC podcast. Thanks for listening.