# GRDC PODCAST TRANSCRIPT

**Long coleoptile wheat – Deep sowing seeder set up**

[00:00:05] **Sally Maguire** This is a GRDC podcast. Hello, I'm Sally Maguire. The potential benefits that long coleoptile wheat can offer Australian growers are only matched by the size and the expertise of the team working to ensure the variety's success. GRDC is currently invested in a national research project drawing on the skills and knowledge of researchers, scientists, agronomists, breeders, industry leaders and growers. This project addresses the identified knowledge gaps around how the long coleoptile genetics will perform and the tools that growers will need. And today we're exploring the principles around seeder set up.

[00:00:50] **Jack Desbiolles** My name is Jack Desbiolles. I work at the University of South Australia. I am an agricultural research engineer and I've been involved in this project on long coleoptile wheat as a machinery specialist. The aim of my input into the project is to try and support the technical team across the different regions, particularly with the seeder issues essentially that affect the success of the seeding operation. We've done a lot of work in seeding systems and how the different configuration, different technologies are having an impact on the success of cropping. And basically in that light, this is the type of expertise I'm providing to the group.

[00:01:28] **Sally Maguire** So before we get into the specifics of long coleoptile wheat, deep sowing, seeder set up, let's talk about what are the common seeder configurations that farmers may be using at the moment.

[00:01:39] **Jack Desbiolles** Yeah. So there's really two broad classes of seeders. We talk about the tyne seeders and the disc seeders, and they all sort of operate in different ways. But one key feature of seeders that intersects well with the long coleoptile wheat is the way seeds are placed in the furrow in relation to fertiliser. Typically the systems are split into two classes, what we call single shoot systems, where seeds and fertiliser are co-located within the furrow, placed together, and either they are placed at the furrow depths, at the bottom, on undisturbed soil, or within the furrow at some depth above, and also having some tilled loosened soil, if you like, below the seed zone. So these are the single shot systems. And in contrast, the double shoots systems, where fertiliser is banded separately from the seeds within the furrow and typically, they are de-banded at the bottom of the furrow, where seeds are placed above that separated vertically, and also sometimes to the side in a side bedding configuration, or in a paired row seeding configuration. So in all of these, that separation provides safety for crop establishment in terms of fertiliser toxicity and that's has been a natural evolution of how the seeds have been modified over time. So there are some other options as well. But these are the two broad categories I guess we can see that in marginal moisture situations, in dryland situation, the research shows that placing seeds deeper into the furrow typically increases the availability of soil moisture for seed germination. That's valid on the range of soil types, and also that reduces the rate of moisture loss in that seed zone and thereby it improves the seedling establishment. So for that, some seeders will be better placed, I think, to deal with that, long coleoptile wheat seeding opportunity.

[00:03:35] **Sally Maguire** Returning to long coleoptile wheat and you did touch on a little bit there but just summarise for us, what are the key machinery challenges around deep sowing of long coleoptile wheat?

[00:03:46] **Jack Desbiolles** I guess the first thing that happens when we decide to sow deep typically is that we need to open a furrow that's deeper as well, and that means some extra requirement in tyne breakout capacity. That's the ability of the tyne to stay at the required position in the ground without hanging back, as we say. So without sort of lifting out of the ground because of soil strength, soil hardness. The result of the seeder will require extra draught as well, which essentially would mean more tractor power at the drawbar and also potentially reduced speed of operation because of the need to apply that extra power. Deep sowing basically means extra cost and likely reduced work rate for farmers. Now we see that probably not all seeders are what we call deep sowing ready that is, some will have some ability to easily upgrade the time breakout with a second spraying in the system, or potentially upgrade the whole seeding system. With that, there are other issues that farmers might face as well. So around the tracking stability of the seeder when deep furrow tilling with that, of course, the limitation in tractor power or in traction as well so essentially the tractor node being able to pull the seeder at that extra depth. From my point of view, on the machinery side of things, we probably need to consider the issues that are related to the seeders by setting the seeder to operate deep, which is essentially the intent so chasing moisture deeper into the profile, but also the accidental risk of getting deep sowing without wanting it. And this is often what happens when we operate deeper into the ground there's more soil throw and more interaction between furrows, which creates ridging, and also sometimes in soft soils in soft seedbed operation, such as following, deep ripping or following, ploughing or spading, the seeder might sink significantly more and creates accidental deep sowing beyond what we actually might seek. So all of these issues need to be managed so that when we target long coleoptile wheat deep sowing, then we don't end up going too deep as well beyond what we intend to do.

[00:06:03] **Sally Maguire** But sounds like growers shouldn't rush out and start changing their seeder set ups right now. So let's talk about the first year of this investment with deep sowing, some trials resulted in lower emergence, soil packing above the seed being too much, so can you expand on that?

[00:06:21] **Jack Desbiolles** First statement I probably need to make is that when we deep sow probably the seeding system is likely to play a larger role in affecting crop establishment. And in that respect, one aspect of the seeding system is that furrow consolidation by the press wheel which much more likely to have a negative effect. The first year of trials have highlighted that under some conditions, crop establishment was negatively affected by deep sowing, and we think that we can potentially manage that by reviewing the threshold of furrow consolidation. So how much pressure we put on a press wheel? In a way, there are two factors that we can see that might be at play here. One of them is the strength of the furrow after the furrow is consolidated by the press wheel so how hard it is for that first shoot, coleoptile to push through the stronger soil, and also the amount of energy that's required by the coleoptile which is at that stage powered by the reserve in the seed and essentially that length of the pathway from where the seed is right up to reaching the surface, where you can access the solar energy. And that level of energy combined with the amount of strength, is really potentially what can have a major negative impact on crop establishment. That's what we think is happening there and having looked at the different technologies there, I mean, the standard seeder setup is really using a press wheel that consolidates the furrow from the top down action so we're kind of pressing the whole furrow itself. And there are other options to actually provide the main function that the press wheel is trying to achieve, which is improve the soil to seed contact for improving that moisture transfer to the seed. But we can potentially achieve that without having to consolidate the whole furrow, which then negatively affects the emergence of the seedling. That's potentially part of what the research needs to look at is some alternative technologies for seed furrow closing. There are some ideas out there among different types of seeders or planters, precision planters in particular, which specifically historically were developed for specific crops like maize, where the press wheel system or the furrow closing system is an angled pressing system which essentially combines an angle pressing to consolidate solar depths and not soil above the seeds, so that essentially is an option to look at. Pressing the seed into the furrow base, which is a technique called seed firming, is also potentially something to look at specifically so as to achieve that good source of contact without affecting that source strength above the seed. With a very basic traditional furrow closing system that's being used on most seeders these days with that top down press reduction.

[00:09:00] **Sally Maguire** I understand that be it only this second season of these trials, you're hesitant to give out that specific information to growers around seeder set up because you just don't have it yet. So what direction will the research go in?

[00:09:13] **Jack Desbiolles** Now look, at the moment, I think a key aspect of research is going to look at this issue of consolidation and how can we establish new thresholds for furrow firmness and how much pressure on the press will need to apply, and how much strength can we get away with at particular depths of placement? So we've got a number of trials that are looking at contrasting different treatments, but I think in the future we probably will need to look at alternatives and innovative ways of essentially securing germination without impact on emergence with maybe a slightly different system. So that's going to depend on what we find this year. And the trials that are implemented across the different regions will have very different scenarios in terms of moisture at seeding and follow up rainfall and soil type, which will create a range of situations that may work in different ways. So we'll learn from that. The other aspect as well is around where to place fertiliser in relation to seeds, knowing that we've got to till the furrow much deeper and then we can't really use the standard sort of deep bedding configuration that is a common baseline for many seeders. This means we may need to look at alternative style openers, and there's a range of integrated openers which have side by side bedding capability, where seeds are placed on the same sort of level but with some side lateral separation. These basically allow deep sowing of seeds without going overly deep with the depth of furrow, and that's more within range of what seeders are already delivering today by essentially creating a furrow for deep placement of fertiliser without going any deeper than this. So these integrated openers would need some evaluation - are we getting similar type of safety with side separation? Are we getting acceptable levels of soil throw? Are we going to get excessive clod size especially dry sowing situation with the opener, essentially that becomes a little bit larger than the standard knife point systems that are being used in the southern region. So all of these are questions that we need to essentially address and learn from. This season coming will actually provide quite a few answers as well. But having said that, there may be also blue sky research topics as well, whereby essentially, can we actually follow the moisture across a paddock, in situations where there are very variable depths of moisture, and can we use sensors to essentially guide the seeder depths automatically on the go, sensing moisture at seeding and following that moisture so that we go deep where we need and we don't go deep where we don't need, because we really need to look at deep sowing as an extra tool, not a replacement tool, but as an additional tool to secure more reliable crop establishment. And at the moment, deeper depths means higher costs and potentially slower operations. So if we can do that where needed only and where we can make a difference, then obviously that would be a significant advantage.

[00:12:26] **Sally Maguire** That was Jack Desbiolles, agricultural research engineer from the University of South Australia, discussing seeder set up specifically for long coleoptile wheat varieties and the four year long coleoptile wheat project, made possible with GRDC investment is being led by CSIRO along with research partners including the University of Melbourne, New South Wales Department of Primary Industries, Queensland Department of Agriculture and Fisheries, SLR Agriculture, Western Australia's Department of Primary Industries and Regional Development, the University of South Australia and EP AG Research. 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.