# GRDC VIDEO or PODCAST TRANSCRIPT

**Grow your own nitrogen: harvestable annual legume options**

[00:00:12] Hilary Sims Hi there. I'm Hilary Sims. Significant research is underway to help Western Australian farmers sustain their own on-farm nitrogen factory through growing and harvesting pasture legume seed. The harvestable annual Legume options project, or HALO, is a Western Australian agricultural research collaboration project with GRDC investment. It brings together the pasture legume breeding, agronomy and bio-economic modelling expertise of Murdoch University, Department of Primary Industries and Regional Development (DPIRD) and CSIRO. Robert Harrison is a research scientist at DPIRD and Murdoch University and he joins me now to share the latest update on this multi-faceted project. Here's Robert.

[00:00:58] Robert Harrison So we have a heap of rotational trials across Western Australia. I think there's about four this year that are in wheat. So they all had different legumes last year. And then we've got three that we set up this year where we're looking at incorporating the legume biomass to get that sort of maximum nitrogen input into your farming system. And then we also have a breeding arm as well where we're down at Manjimup trying to discover better options for the different rainfall environments for WA and we've got a different way of getting rhizobia inoculum into the farming system. And then also we're trying to get a package behind all of these new pasture legumes by putting a suite of herbicides across them because weed control is still number one on most farmers minds.

[00:01:42] Hilary Sims Robert Let's get into the nitty gritty of a few of these trials. Firstly, the Head Start inoculation trial. How did this work come about?

[00:01:51] Robert Harrison This idea actually came from a farmer in New South Wales where he had some rhizobia inoculant for legumes. So the symbiont of the legume. And he didn't want that inoculum to expire because then it waste a lot of money. So he actually inoculated his wheat with it. And then in sort of a moist conditions and then the year after sowed legume into it. So un-inoculated legume and it all nodulated so we're just trying to get some science behind that but we think that the practicalities behind this because dry sowing is on the rise for legumes obviously that stresses the symbiosis out a fair bit. So we've actually got ahead of the game and done it on a number of legumes, but inoculated the wheat with pasture legumes inoculant and then we can dry sow the pasture legume the next year. And it seems like we just need to get some better figures behind what rate you need to inoculate your wheat at. And we think it's fairly reduced from your usual levels that you have to do. And the term behind this is safricitically competent, which is great going forward. So once again, farmers can not only produce their seed on farm, they can get all their inoculum into their ground and into the system, and then it's just closing the loop of nitrogen fixation. They hardly have to rely on anyone else.

[00:03:13] Hilary Sims And green and brown manuring is an important component of this research as well. Tell me about that.

[00:03:20] Robert Harrison Well, across a heap of different rainfall environments, we've grown a suite of legumes out and we're either green or brown manuring these legumes and then also working out how to incorporate that residue into the system as well. So we need to understand which one of these combinations produces the most amount of nitrogen that's retained in the soil for those subsequent cash crops. The legumes stubble in year two does provide that sort of legume nitrogen, but it is a huge problem going forward for farmers that have a in this minimum till system. So on top of that as well, we're also looking at what this does for water retention, water use efficiency and then the subsequent weed sort of situations that occur as well. So if we could reduce a couple of summer passes with the SP as well, that would be great.

[00:04:12] Hilary Sims And earlier, you mentioned the breeding program aspect of this research. Tell me about the developments you and the team have made in this space.

[00:04:19] Robert Harrison Yeah. So we're obviously wanting to get the legumes that produce a heap of biomass of fixed nitrogen from the atmosphere, so we don't want them to be lazy fixes and just use soil nitrogen. So we're doing a bit of selection behind that. But we released Diamante bladder clover this year for low to medium rainfall environments for the fine textured sort of sand and it is a top producer in those areas. And then in the next couple of years tirgonella, which is like a medic like plant that actually retains its seed and pod on its stem. So it's easily harvested. And that's suited to the low rainfall areas as well. And then on the French serradella side, we have a light season sort of margarita replacement that is really suited to the intensive farming systems of the south west. And they're really exciting prospects going forward because of their high nitrogen fixation capacity.

[00:05:14] Hilary Sims And Robert, how is this project leading to a better understanding of nitrogen in farming systems?

[00:05:20] Robert Harrison Well, we do the traditional way of just seeing what happens to the yield and the protein in the wheat in the subsequent cereal crops after the legumes. But also we've got litter bags at each site, so we've put the legume stubble into them and then we dig them up at certain intervals throughout the season. And we've just dug one up recently for just pre-flowering time of the wheat. And that's really to understand when that nitrogen is actually getting released, so we can actually match it up with the farmer's artificial nitrogen application. So we think that the different legumes mineralise at different times and that's really good information for farmers. So in a typical season, they can understand when to put their nitrogen on.

[00:06:04] Hilary Sims What do you see as some of the barriers to uptake of pasture legumes, and how is this research working to address that?

[00:06:10] Robert Harrison Obviously we've got to get some better figures if we have sheep or if you don't have sheep in the system, we need to get some better economics behind the value of pasture legumes in that system. That's a huge barrier is money and how much money they're going to make from it. But one of the other ones is the residue flow ability. So we want to understand if we do brown or green manure these legumes on top of the ground, what's the flow ability like of the tynes going through the year after so you don't get any angry farmers ringing you up saying that they've got a heap of vines wrapped around their tynes. So we've got different systems that we're looking at as well with discs and colders on the front, but we want to make it as easy as possible for farmers to integrate pasture legumes into their farming system.

[00:06:56] Hilary Sims So, Robert, to wrap up, what are your key messages on the importance of this research and the insights gained so far?

[00:07:03] Robert Harrison Well, there's the sustainability sort of going forward that the consumers are starting to really push for a sustainable product with low carbon emissions. So going forward, if you can sort of understand the pasture legumes in your farming system to get that maximum nitrogen fixation into your ground. And also we need to understand going forward as well that if there's certain herbicides and those sort of things that might not be able to be used anymore, we would really like to know if we can sort of mow them in or spay till them in and what that does to the farming system when we need to reduce the herbicide bill on farm.

[00:07:49] Hilary Sims That was DPIRD and Murdoch University research scientist Robert Harrison. More information on this topic can be found in the description box of this podcast or online at GDRDC.com.au. I'm Hilary Sims and you've been listening to a GRDC podcast.