Lyn Abbott and Louise Barton of UWA, Liam Ryan of DAFWA, Nikki Dumbrell of WANTFA and Guy Boggs from the Wheatbelt NRM at the Long-term Cropping Systems and Soils Day in September.

Cara Allan from UWA is assessing the effects of no-till farming systems on wheat leaf and root disease as well as insect populations.

Long-term Cropping Systems and Soils Day

LAUREN CELENZA, WANTFA EXTENSION MANAGER

Around 50 people came to the Long-term Cropping Systems and Soils Day last year, which for the first time was a separate event from the main Spring Field Day. The day began with a soils and carbon workshop with some of the State's leading soil researchers and ended with a field walk looking at some of the research at the Long-term site.

Storing water an important part of long-term cropping systems

Yvette Oliver from CSIRO spoke about the ins and outs of soil health and how to measure it.

Yvette asked growers if they knew the yield potential of their soils while highlighting the importance of knowing your soil moisture before making decisions on when and what to sow and fertilise.

'If you know your yield potential, it can help you with forward selling. If you are not reaching your yield potential there might be a soil constraint,' she said.

Yvette said that yield prediction tools like Yield Prophet® were a good way to use paddock management, soil and rainfall data to predict yield.

CSIRO are looking at how sensitive different crop varieties are to soil constraints.

'By understanding the lower limit of different crops, you can know what to sow, when and where,' Yvette said.

Improving soil structure is also very important to maximising crop potential. Yvette said sodicity and acidity were common problems in WA with 70 per cent of our topsoils acidic (pH less than 5.5).

Another factor affecting soil moisture was groundcover with evaporation and erosion detrimental to croppers in medium to low rainfall areas.

Overall, Yvette said storing and keeping water was an important part of long-term cropping systems, and to do this, growers needed to consider less tillage, more stubble cover and better winter and summer weed management.

CSIRO's Yvette Oliver soil sampling at the WANTFA Long-term site.
PHOTO: LAUREN CELENZA.

Link between increased carbon and efficiency

WANTFA Extension Officer Nikki Dumbrell spoke about Carbon Farming and how different management strategies could reduce emissions while improving farm productivity.

Nikki believes there is a link between increased carbon management and farming efficiency.

'With proper grazing management and things like perennial pastures you can reduce emissions and increase feed efficiency of livestock,' she said.

Other ways of increasing carbon and reducing emissions while improving productivity include controlled traffic, variable rate technology, stubble retention, and soil amendments.

'Using variable rate technology and applying inputs appropriately so they are not wasted and emitted as CO_2 also saves on the cost of inputs,' Nikki said.

Increasing soil organic carbon possible

DAFWA's Liam Ryan spoke about Soil Organic Carbon (SOC), how it can be improved and why such improvement should be a goal.

'How much of an increase in SOC is possible?' Liam asked.

'SOC takes time to accumulate and soil amendments can assist but most of them are not economical when you consider how much compost is needed in a broadacre system.'

Liam said there was potential to change SOC by utilising pastures, green manures, stubble retention, fertilisers and minimum tillage.

'Residue breakdown rates vary depending on rainfall over summer,' he said.

Are you already a carbon farmer?

UWA researcher Louise Barton spoke about nitrous oxide emissions and how WA farmers are already low emitters.

'The occurrence of nitrous oxide emissions in WA is somewhat of a good news story,' she said.

Louise said people often talk about farmers and greenhouse gas emissions which can get people worried.

'I'm not worried about NO_2 emissions of grain growers in WA because of our free draining soils, low inputs and medium rainfall,' she said.

> 'If you are farming in ways that are going to improve yield, reduce soil constraints and improve efficiency then you are already a carbon farmer.'

Louise added that NO_2 emissions were wasted nitrogen not going into the crop so by improving nitrogen use efficiency, grain growers would be reducing emissions.

What happens to NO_2 emissions when we increase SOC? According to Louise, not enough to worry about.

'When we do a carbon footprint on an agricultural product, we need to look at carbon stored, NO_2 emission etc, increasing SOC increases emissions by 130 g which is not much on the scale. Increasing SOC in WA is likely to increase crop yield and quality and NO_2 emissions but not enough to worry about.'

Long-term project uncovering benefits of no-till systems

With the Long-term Cropping Systems trials WANTFA, UWA and CSIRO are looking at how they can improve the no-till system which is currently widely used in WA. The trial has been running now for eight years.

'To the purists the current no-till system that most WA growers are using is not considered a perfect no-till system,' UWA's Dr Ken Flower said.

The trial looks at high residue cropping systems compared to the current no-till system with different rotations ranging from diverse rotations to continuous wheat and permanent pasture.

The diverse rotation consists of a cereal followed by a legume and then a brassica.

Ken said they were also looking at soil improvement and the drought risk mitigation aspects of diverse no-till systems.

'We are hoping that the soil will improve with diverse rotations and no-till, it's supposed to be the best scenario for improving soils' he said. 'We are also hoping to quantify the effects of windrow burning and tillage. In the 'high residue' treatments, half of the plot is windrow burned and the other half has fully retained residue. In the maximum profit treatment, which is closest to current no-till systems, the whole plot is windrow burnt with one half tilled. This treatment also has a fallow once every three years. We want to identify the factors that drive down soil carbon.'

Before the most recent harvest, yield data seemed to be similar over the treatments, keeping in mind it had been pretty dry in many of those years. Ken said it was interesting that, after seven years, wheat in the continuous rotation was yielding similarly to that in the diverse rotation.

However, last year (2014), after good early rainfall, the continuous wheat was not looking as good as it was in the diverse rotation.

'We are definitely picking up more disease in the continuous wheat. Weeds are reasonably under control but they are starting to build up more in the monoculture wheat and other continuous cereals, however, the legume component of the diverse rotation is a weak spot as well,' Ken said

Long-term Project Manager Neil Cordingley said rainfall has had a big effect on overall yields and results.

'The average rainfall for the area is 350 mm annually, however, over the past eight years of the trial only two years have reached that average,' he said.

Although cereal yield differences were not significant across the treatments, Neil said higher yields did follow break crops.

'Last year we did see higher yield in high residue plots,' he said. 'The biggest difference was in the barley treatment, where the current no-till system (maximum profit) with low residue had 3 t/ha compared to 4 t/ha in the high residue treatment seeded with a disc.

'Seeding with discs resulted in a lot less moisture stress through June last year.

'We had a dry summer in 2014 but a reasonable start to the season.'

info **For the latest results please see page 173.**

ABOVE: Nathan Craig from UWA is looking at nitrogen dynamics under no-till comparing continuous wheat to a legume:canola:wheat rotation.

BELOW: Long-term Cropping Systems Project Manager Neil Cordingley.

The Long-term trial is a collaboration between WANTFA, CSIRO and UWA with other aspects such as disease and insect pressure and nitrogen efficiency being investigated.