AUSTRALIAN GRAIN
www.ausgrain.com.au
September–October 2015

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Published by Berekua Pty. Ltd.,
40 Creek Street, Brisbane
Registered by Australia Post Publication No. PP100002295. ISSN 1449–2970.

Published bi–monthly.
Grain Yearbook published in April

FRONT COVER

Successfully growing crops in iceland is hard enough. Try living and farming close to an active volcano just to add to the challenges.
See article page 10.
(PHOTO: Olafur Eggertsson)

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Editorial... Lloyd O'Connell

WITH our fifth change in Prime Minister in as many years, and a domestic economy that seems a bit lost in the smoke from fires on both the local and international scenes, it's a welcome relief to listen to some reasoned and informed commentary on our economy's direction – and how that might impact on Australian agriculture.

The GRDC is to be congratulated for making possible a fantastic line-up of presenters at the recent northern region Farm Business Updates. A wide range of presenters gave excellent insights into many aspects of the business of farming.

The keynote Updates' speaker was the well-known and equally well credentialed economist, Saul Eslake. Saul covered a lot of fertile ground in his presentation but was able to leave his audience with a number of clear take home messages. A few of his experienced observations on what farmers need to know about the present and future shape of our economy are well worth sharing. This is particularly the case with his views on the Australian dollar, capital investment in agriculture and Free Trade Agreements.

Saul's current assessment is that the Aussie dollar is highly likely to fall further and probably into the US$0.65 range by the middle of next year. This is on the back of a strengthening greenback fueled by the probability of US interest rate rises and falling international prices for hard commodities. On balance, this is good news for Australian exporters, and as Saul opined, if you're an Australian exporter and you can't make a profit when the Aussie dollar is in the mid-60s, it's probably time to think about other ways to make money.

The low level of federal and state government enthusiasm for public infrastructure investment is also a concern. Saul sees it as very much in Australian agriculture's interests to attract both domestic and overseas investment capital. And to do this we need to improve productivity along the entire supply chain.

A lot of commentators have been barking on for a long time now about the potentially huge benefits to Australian farmers from the rapid economic growth and rising living standards of our Asian neighbours. Saul shares this optimism but he is also bemused by the fact that there is not the widespread acceptance, across the political and business spectrum, of the latest Free Trade Agreements with our major Asian trading partners. He singled out the FTA with China as an opportunity to obtain trading benefits and concessions that are not available to Europe and the US – two of our biggest competitors into this market.

There is a widespread view that the Chinese see an FTA with Australia as a 'stepping stone across a wide river'. We might be pretty foolish not to take that first step.

Here's hoping for a soft spring in your patch to help bring home a very promising national winter crop.

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What are the nitrogen benefits of chickpea and faba bean?

By David Herridge[1], Bill Manning[2] and Don McCaffery[3]

CHICKPEA and faba bean provide many benefits in cropping rotations, including the ability to fix atmospheric nitrogen (N2), resulting in more soil N for following cereal crops. The amount of nitrogen fixed is determined by how well the pulse crop grows and the level of nitrate in the soil at planting. Soil nitrate suppresses nodulation and nitrogen fixation in other words, high soil nitrate means low nitrogen fixation.

Important terminology

Before considering the nitrogen budgets of chickpea and faba bean, it is important that terms are clearly defined and understood.

- **Total nitrogen fixed –** is the nitrogen fixed in both above-ground (shoots) and below-ground (roots and nodules) biomass. With chickpea, 50 per cent of total crop nitrogen is below-ground. With faba bean, it is about 30 per cent.
- **Nitrogen (N) balance –** is the difference between nitrogen inputs to the pulse crop (nitrogen fixation + fertiliser nitrogen applied) and nitrogen outputs (nitrogen harvested in grain or hay + nitrogen volatilised [lost] from the crop and soil). The values for N balance may not have much significance for a farmer, who will be more interested in the extent to which

High soil nitrate levels mean low nitrogen fixation in pulse crops like chickpeas.

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the legume increases levels of nitrate-N in the soil that will be available for the following crop.

- **Nitrate-N benefit –** in experimental systems with pulse–cereal and cereal–cereal rotations side-by-side, the nitrate-N benefit is the extra nitrate-N available at sowing in soil that grew the pulse crop in the previous season, compared with soil that grew the cereal crop. In farmer paddocks, the nitrate-N benefit of a pulse crop is best described as the additional nitrate-N in the soil at sowing following the pulse, compared with the soil nitrate level when the pulse was sown – that is the nitrate-N increment for the 12-month period. This is how the nitrate-N benefit is calculated for the tables below.

Nitrate-N benefit for following cereals

The nitrate-N benefit from chickpea and faba bean, over a range of grain yields, is shown in Tables 1 and 2. The values in the Tables were calculated using a number of simple functions (algorithms) that were derived from extensive research in the northern grains region. The algorithms have been bundled together into an N management tool called 'NBudget', which can be used for such calculations as well as for estimating fertiliser N requirements for cereal and oilseed crops. Calculations were for a medium fertility no-till paddock, located at Moree.

For chickpea growing in the low nitrate soil, the nitrate-N benefit is consistently positive, ranging between 27 kg and 43 kg nitrate-N per hectare over the range of yields (1.0–3.5 t/ha). In the moderate nitrate soil, the nitrate-N benefit of chickpea essentially disappears.

The simple message to take from this is that chickpea should be grown in low nitrate soils so that they can fix large amounts of nitrogen, add to the soil's nitrogen fertility (balance) and, importantly for short-term productivity, increase the amount of nitrate-N in the root zone.

Faba bean is stronger at fixing nitrogen than chickpea, particularly when grown in moderate nitrate soils. Across the six yield levels, the average nitrate-N benefits were 42 kg and 18 kg N per hectare, for the low and moderate soil nitrate scenarios respectively (compared with 33 kg and –2 kg N/ha for chickpea).

Harvest index (HI) and crop biomass

For different crops, the relationship between shoot dry matter and grain yield (the Harvest Index) may vary according to season and management. In years with good winter growth, followed by a hot, dry spring, crops will produce less grain and therefore have a lower HI. Faba bean is likely to be more affected than chickpea under these conditions. Disease may also have an impact on HI as may subsoil constraints and frost and cold temperatures, particularly with chickpea. A lower than normal HI would mean a greater N balance and nitrate-N benefit for a given shoot dry matter. The calculated values in the Tables for shoot dry matter at the different levels of grain yield are reasonable estimates.

Measuring crop biomass

The most accurate way to measure crop biomass is to take a number of representative dry matter cuts (10 × 1 square metre cuts) at the stage of peak shoot dry matter. This occurs just before physiological maturity, when the pods start to yellow. Other less time-consuming methods to estimate crop biomass, such as crop density or crop height, have been found to be too unreliable, being too specific to the crop, the variety and the season.

How can this information be used?

By understanding the development of crop biomass and the factors that influence Harvest Index, better nitrogen and rotation management decisions can be made. The decision to green manure a crop needs to be weighed up against taking the crop through to grain yield and should be made in consultation with an experienced agronomist. The timing of green manuring will influence the amount of nitrogen available to the following crop.

[1]Primary Industries Innovation Centre, University of New England, Armidale.
[2]Senior Land Services Officer, North West Local Land Services, Gunnedah.
[3]Technical Specialist (Pulses & Oilseeds), DPI (Plant Systems), Orange. ■

TABLE 1: The nitrate-N benefit from chickpea grown in the Moree region of NSW

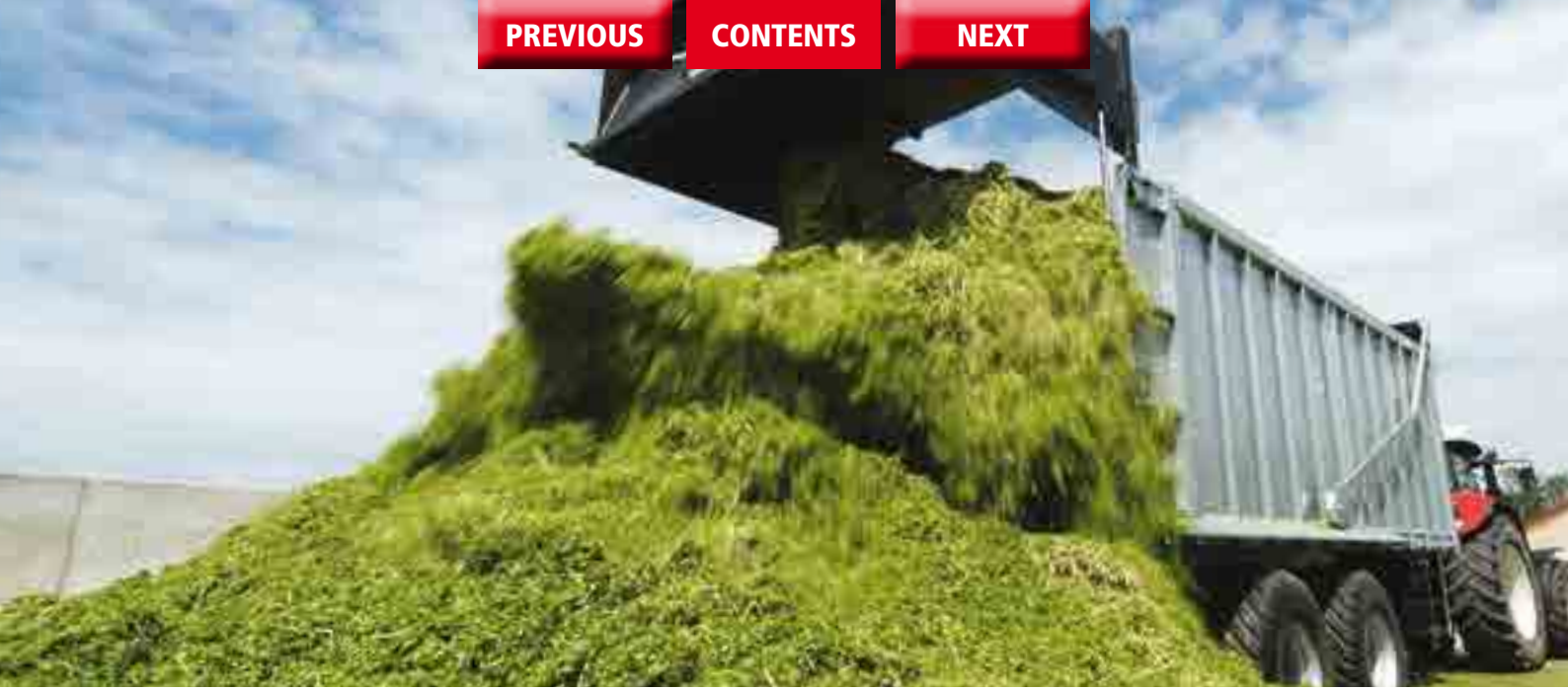
		Low soil nitrate at sowing (50 kg N/ha)			Moderate soil nitrate at sowing (100 kg N/ha)		
Grain yield (t/ha)	Shoot dry matter (t/ha)	N fixed (kg/ha)	N balance (kg/ha)[#]	Nitrate-N benefit (kg/ha)	N fixed (kg/ha)	N balance (kg/ha)[#]	Nitrate-N benefit (kg/ha)
1.0	2.7	37	1	**35**	22	–14	**16**
1.5	3.9	72	18	**28**	50	–5	**3**
2.0	5.1	110	40	**27**	80	9	**–5**
2.5	6.2	152	62	**30**	115	25	**–9**
3.0	7.2	195	88	**35**	150	43	**–10**
3.5	8.2	240	115	**43**	188	63	**–8**

[#]N balance = nitrogen fixation + fertiliser nitrogen applied.

TABLE 2: The nitrate-N benefit from faba bean grown in the Moree region of NSW

		Low soil nitrate at sowing (50 kg N/ha)			Moderate soil nitrate at sowing (100 kg N/ha)		
Grain yield (t/ha)	Shoot dry matter (t/ha)	N fixed (kg/ha)	N balance (kg/ha)[#]	Nitrate-N benefit (kg/ha)	N fixed (kg/ha)	N balance (kg/ha)[#]	Nitrate-N benefit (kg/ha)
1.0	3.1	47	9	**40**	42	4	**20**
1.5	4.2	75	18	**38**	70	12	**16**
2.0	5.2	104	29	**38**	96	21	**15**
2.5	6.1	133	40	**40**	123	30	**16**
3.0	6.9	162	50	**44**	150	37	**19**
3.5	7.5	190	58	**50**	180	48	**23**

[#]N balance = nitrogen fixation + fertiliser nitrogen applied.



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Farming in Foreign Fields...

Farming in Eyjafjallajokull's shadow: Easier said than done!

By Lindsay O'Brien

On April 14, 2010 Iceland's Mt Eyjafjalljokull erupted. Volcanic ash spewed out at the rate of 500 tonnes per second and plumed up to 15,000 metres. European air traffic was disrupted for two weeks. Thorvaldseyri farm (foreground) was covered in a 5 cm layer of ash but from adversity came opportunity for Olafur Eggertsson and his family.
(PHOTO: Olafur Eggertsson)

EYJAFJALLAJOKULL is a name pretty familiar to air travellers and news watchers around the world. It was the source of the volcanic eruption in Iceland in 2010 that grounded all air flights for two weeks across Europe and the transatlantic due to the ash cloud that it emitted.

Eyjafjalljokull, pronounced "Ah-uh-fyat-luh-yoe-kuutl-uh" means "island mountain icecap". The mountain is 1650 metres high and was formed about 800,000 years ago. It has a crater (caldera) about 2.5 km wide that was formed 800 years ago.

It's covered by a 75 square km glacial ice cap that is mostly 100 metres thick, but up to 200 metres in the caldera.

We have historical accounts of Eyjafjalljokull erupting between 1821 and 1823. During that eruption, molten lava under the ice cap heated to an estimated 10,000°C. With the resulting pressure build up from the steam and water, the ice cap lifted releasing the built up water which rushed down the side of the mountain causing local flooding and erosion on its path to the nearby Atlantic ocean.

Fast forward almost 90 years and on Wednesday April 14, 2010 the first news broke of another eruption on Eyjafjalljokull. A two km long fissure had opened up in the ice cap with the feared inevitability of a glacial flood flowing with enormous force into the Markarfjlot river system sweeping all before it.

Everything in the flood's path was in danger including farms, homes, roads, bridges, livestock and people.

The Emergency Services ordered an evacuation to a nearby school and everyone moved to safer ground, with only those who needed to feed livestock being let back in to quickly feed and care for their animals.

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The author and Icelandic farmer Olafur Eggertsson in a wheat crop on Thorvaldseyri farm in 2009. The crop – after a 14 month production cycle – went on to yield around five tonnes per hectare. (PHOTO: Lindsay O'Brien)

As well as producing a glacial flood, the volcano was emitting huge tonnages of ash, which was the cause of the disruption to air traffic. The ash was spewing out at the rate of 500 tonnes per second and plumed up to 15,000 metres into the atmosphere. The prevailing winds carried the ash into European airspace and disrupted air traffic for two weeks.

Local impacts

But what about the impact on the people who lived and farmed in the shadow of Eyjafjalljokull?

Eyjafjalljokull is located in south east Iceland in a region with a number of glaciers and geothermal and volcanic activity. It is an extremely popular destination to visit for locals and tourists because of its colourful and diverse scenery. It is also one of the richest farming areas in a country where arable land is restricted to a few coastal plains and narrow areas along some of the many fiords.

Living and farming close to a volcano that could erupt has its potential risks, but to innovators, it also has potential benefits.

Farmers around the world have a number of features in common despite the differences and challenges they face in climatic, physical, political and economic factors. One common feature is that successful farmers are great observers and move around their farms taking careful note of their crops and livestock.

Innovation – the common theme

And, critical to their viability, successful farmers around the globe are also great innovators. They constantly vary their techniques and strategies and are willing to try new things to remain environmentally and economically sustainable.

A great example of innovation is the story of the development of 'Thorvaldseyri', a farm in the south-east of Iceland that sits right under the southern-most end of Eyjafjalljokull – a successful agricultural enterprise in the shadow of the mountain, its glacier and volcano.

Thorvaldseyri is a mixed farming operation 250 hectares in size. Mixed farming is commonplace for Iceland, but what sets Thorvaldseyri apart is the mixture.

Unique mixture of farming enterprises

The Icelandic norm is to run livestock – any one or more of Icelandic sheep, cattle and horses – and all are derived from stock from the initial settlement by the Norse 10 to 11 centuries ago.

As breeding sheep and cattle have to be joined and housed over winter, the predominant activity during summer is haymaking. This is done before the autumn sheep round-up and prior to winter setting in. There has to be sufficient fodder in reserve to support sheep and cattle and their new born offspring until the spring. This means the livestock can sometimes be housed for eight months.

On Thorvaldseyri, the farming mix involves sown pastures for haymaking to support their dairy and cattle operations, but through innovation since the 1960s, also a cropping operation. About 100 hectares is dedicated to cropping made up of a mix of sown pasture for hay production and up to 50 hectares a year for cereal and oilseed production.

Operated by Olafur Eggertsson and his family since 1960, this mixed farming operation has demonstrated incredible innovation.

They produce cereals such as wheat and barley and process these on farm for human and livestock feed uses. As pioneer cereal producers, the Eggertssons spent 20 years developing the technology for reliable production. This meant machinery purchases and modifications needed for Icelandic conditions.

It also meant sourcing and trialling varieties that would grow and produce grain in the narrow window that constitutes the growing season.

As Icelandic cereal producers, the Eggertssons led the way driven by the belief it could be done and that for it to work economically, production had to be based around on-farm use supplemented by value added human food uses. Some of the processing for these end-uses had to be conducted on-farm.

The farm is located in one of the warmest coastal plains of Iceland due to proximity to the coast. The prevailing Gulf Stream and air currents mean the ocean never freezes and the winter temperatures are moderated. Despite this, over the six month or so growing season, accumulated day degrees only amount to an average of less than 900 units.

This is about two thirds of that needed for the growth of the fastest maturing spring wheats in Australia.

How to grow wheat in Iceland

Some years ago, both spring and winter wheat varieties were trialled on the farm. Over time, a production system for wheat was refined which involved the use of winter wheat varieties from Scandinavia.

To get the thermal units needed to produce a crop, the system revolved around planting as early as possible in the spring – and ideally by the end of April.

By the end of the growing season in October, a good stand of well tillered wheat existed. The crop then had to survive, in virtual dormancy, over winter. The snow would cover the wheat and provide 'insulation' from deep frosts that could injure the crop.

As the snow thawed during the following March–April, moisture was available for the crop to begin growing again.

Nitrogenous fertiliser boosted spring growth and the crop would run up to flowering and produce grain producing heads around mid July and set grain. The crop would be ready to harvest in September and October depending on summer temperatures.

Cool summers would delay harvest and result in grain having to be harvested green and at grain moisture contents around 25–28 per cent, making it unsuitable for milling and human food uses.

Regrettably, after pioneering a system for wheat production – and achieving yields around 5.0 tonnes per hectare for winter wheat over its 14 month production cycle, compared with a

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Iceland is rich in water resources. Surface and geothermal water is used to generate electricity. Waterfalls abound and the 60 metre Skogafoss (pictured) is close to Thorvaldseyri farm. (PHOTO: Lindsay O'Brien)

spring wheat yield of 1.0 to 1.5 tonnes per hectare in a six month growth cycle – the Eggertsson family has abandoned wheat production.

The combination of the short growing season, high grain moisture content and rainfall at harvest time contributed to this decision as the harvested grain was only suitable as cattle feed.

Enter barley and canola

Instead, the farm has moved to barley and canola production. Both crops can be grown reliably and barley is a preferred grain for cattle feeding.

But the philosophy that grain needs to be used for both human and livestock uses still prevails.

Using varieties sourced from Scandinavia, canola is produced and cold-pressed and used on-farm for household cooking and as biodiesel for all the plant and machinery.

A range of cosmetic products, using canola oil as a base ingredient, have also been developed.

With barley, they use a combination of Scandinavian sourced varieties, plus a very quick maturing Icelandic variety, Kria, developed by the barley breeder, Jonatan Hermannsson of the Agricultural Research Institute in Reykjavik. The barley is used for human uses where it has become a popular component of specialty breads, is used in soups and is malted for local beer production.

Use of a locally grown barley has become a marketing plus for Iceland's brewers – the barley's origin appears on the beer bottle label.

But the bulk of the barley grown by the Eggertsson family goes to support their dairy operation of about 60 milking cows as well as their 130 cow (and calf) beef enterprise.

Community leadership

Not only has the Eggertsson family been innovative agricultural producers, they have been long term community leaders with their vision for the farm to be fully self-sustainable. To this end, in 1928, Olafur's father and grandfather installed a generator which uses water from the mountain to produce all the electricity consumed on the farm.

In 1989 the Eggertssons drilled a bore to the depth of 1000 metres to get geothermal hot water and then piped this to the house and barns for domestic use and for heating.

Innovations such as these – along with the development of the unique farm enterprise mix plus value adding for human uses – has created a fully self-sustainable agricultural unit, producing everything they need for the farm, on the farm.

Adversity to opportunity

But arguably the greatest innovation has been turning the adversity of the eruption of Eyjafjalljokull into a positive for the family. Faced with having to remove a 5 cm layer of ash (about 400 tonnes) from all the farm buildings and houses – and hoping the pastures would grow again and not be killed by the ash – as well as having to restore the hot water supply pipeline and repair the hydro-generator, the adversity created by the eruption offered a new opportunity.

Surprisingly, the ash was found to have beneficial effects for plant growth and in the first year after the eruption, much less fertiliser was needed for the crops. The ash was found to be high in insoluble phosphorus, calcium and micronutrients.

Once the authorities said it was safe to travel again in the region, tourists wanted some of the ash as a souvenir.

Identifying an opportunity, this innovative family built and opened a visitor centre which details events prior to, during and after the eruption. The highlight is a 20 minute film, narrated by the family, which provides a very personal insight of the emotions felt by the family over that period. The film also shows amazing images of the eruption.

The visitor centre has proven very popular with tourists. Around 60,000 people visit the centre each year.

Around 320,000 hardy Icelandic souls live on an island about the size of Victoria located just below the Arctic Circle.

Innovation born from adversity is a feature of Iceland and its people and is wonderfully exemplified by the Eggertsson family and Thorvaldseyri farm.

Lindsay O'Brien is the Managing Director of Solheimar Pty Lt, Animal and Plant Breeders and Consultants. Lindsay and his Icelandic wife Solveig, are regular travellers to Iceland. ■

SOME COLD HARD FACTS ABOUT THE ICELANDIC FARM

- Wheat varieties: Stava and Bastian.
- Two row barley varieties: Kría, Filippa, sown with 80 kg N/ha, 20 kg/ha P and 40 kg/ha of K.
- Oil seed rape (canola) varieties: Cordelia (spring sown) and Falstav (autumn sown).

Hay production and the dairy

- Pasture areas are fertilised twice each year. A spring application of 120 kg of N/ha plus 15 kg P is done, and then for the second hay cut, 50 kg N/ha is applied with no additional P.
- The low P application rates are due to the application of 20 tonnes per hectare of slurry – manure from the cattle barns.
- Milk production is 5800–6000 litres per cow a year, with the milk quality being 4.10 per cent fat and 3.30 per cent protein. All milk is sold to the local dairy factory, Mjólkursamsalan.
- Calves are sold at 10 days old to neighbouring farmers who raise them to 18–20 months of age for beef production.

Bentleg furrow opener research

RESEARCH into the use of bentleg furrow openers at seeding has underlined their potential benefits for no-till farming systems. University of South Australia PhD student James Barr says bentleg openers, which can reduce soil throw and maximise furrow backfill, represent a new opportunity for optimising the performance of tine seeders.

The devices offer an "unprecedented ability for high-speed, low soil throw, no-till tine seeding," according to James, whose work is being funded by the GRDC, the South Australian Grain Industry Trust (SAGIT) and the University of SA.

James says soil disturbance caused by tine openers could affect the success of no-till seeding operations.

"Furrow moisture loss, weed seed germination, seeding depth variability across seed rows, crop safety and pre-emergent herbicide efficacy are issues that can be influenced by the amount of soil disturbance by tine openers.

"Excessive soil throw limits the furrow backfill, reducing soil cover over the seed, and creates ridging between adjacent seed rows, resulting in additional soil cover which increases seeding depth and potentially induces crop damage from herbicides," James said.

Higher speed seeding

In September last year, the University conducted a trial in clay-loam soil at Roseworthy (SA) to validate, in a field situation, previous findings from laboratory soil bin trials, and to investigate the potential for higher speed seeding.

A selection of straight and bentleg openers were tested, measuring draft, vertical and side forces, lateral soil throw and furrow backfill, at 8, 12 and 16 km per hour and at 120 mm operating depth.

The two straight openers used reflected the range of rake angles displayed in narrow knife points, and the two bentleg openers featured a beveled edge and differed in their shank offset values (45 mm and 95 mm).

Both bentleg openers reduced soil throw compared with the blunt face straight openers at 8 km per hour, virtually cancelling soil spill out of the furrow boundary.

At the higher speeds, the 95 mm offset bentleg opener retained its very low soil throw benefits, while the 45 mm offset bentleg design showed a sensitivity to speed, reaching similar levels of soil throw to the 53 degree rake angle opener.

Furrow backfill data showed the ability of the 95 mm offset bentleg opener to maintain maximum furrow backfill regardless of speed, while the straight openers, from a comparative baseline of 8 km per hour, significantly emptied the furrows with faster speed.

The 'furrow-emptying' feature of straight openers was strongest with the 53 degree rake angle opener. The 45 mm offset bentleg achieved significantly lower backfill at 16 km per hour only.

Overall, the 95 mm offset bentleg design was able to maintain its baseline lateral soil throw at twice the sowing speed while maintaining 100 per cent furrow backfill, according to James.

Draft force measurements indicated that the vertical knife opener required about 50 per cent more pull than the 53 degree rake angle opener, demonstrating the known beneficial effect of low rake angle on draft. This was also about twice that of bentleg openers, which were able to minimise the pulling requirement due to their 45 degree rake angle leading foot.

Under the dry conditions, the draft requirement increased with speed for all openers, with the least effect measured with the vertical knife opener.

"The field data acquired to date confirms the great potential benefits of bentleg opener designs, both in controlling soil throw (and associated crop safety), seeding depth accuracy and in minimising draft forces, compared with the existing knife and spear point technologies," James said. ■

University of SA PhD student James Barr (left) shows a bentleg furrow opener prototype to Mallala (SA) grain grower Richard Konzag.

Maintaining tractor efficiency

FARMERS stand to make substantial savings in fuel and greenhouse gas emissions in tractor operations if appropriate tractor engine and ground speeds are used and tillage depth is kept to the shallowest that is suitable for the task.

Studies by engineers from the University of Southern Queensland's National Centre for Engineering in Agriculture (NCEA) have found that the old adage of 'gear up, throttle back' still applies to modern, electronically controlled tractors.

NCEA's energy specialist, Gary Sandell said a recent trial showed that growers who 'gear up and throttle back' could save between 15 and 23 per cent of their fuel consumption and costs in tractor operations.

Gary also said that in addition to the fuel savings, the same level of reductions in greenhouse gas emissions were achieved.

All this was good news for the environment and for the Australian agricultural industry.

Heavy tillage trial

Recently, tests were conducted on the black cracking clay soils of a large irrigation farm on Queensland's Darling Downs using a 4.5-metre wide fixed-tyne ripper behind a 2010 model John Deere 8220 tractor.

The tractor had an 8.1 litre, electronically controlled and turbo charged engine and rated power of 225 kW (168 hp).

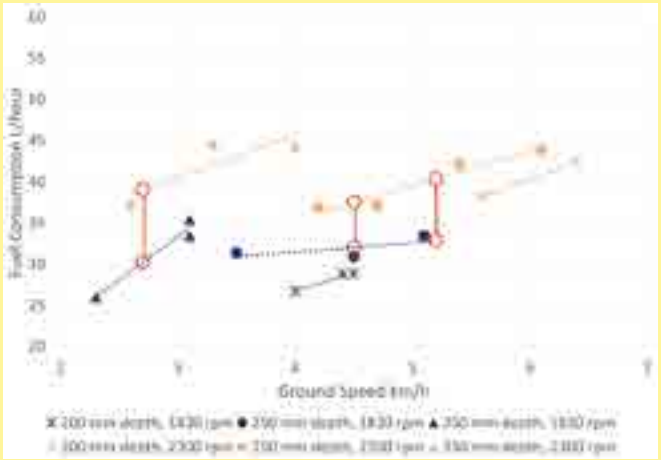
It was put through a series of tillage runs between depths of 200 and 350 mm across a range of engine speeds and gear selections to compare ground speed and fuel consumption.

Figure 1 shows the effect on hourly fuel burn rate of changing engine speed and gear selection for two ripping depths.

Two different ripping depths are shown: 350 mm (triangles) and 250 mm (solid circles). For each ripping depth, two engine speeds were tested: 2300 rpm (lighter, solid lines) and 1830 rpm (darker, dotted lines).

The tests found that reducing the tractor's engine speed from around 2300 rpm to 1830 rpm reduced fuel use by six to nine litres per hour across three selected pairs of equal ground speed and ripping depths (shown by the red circle/bar pairs in Figure 1) with an average reduction of seven litres per hour. This shows that 'throttling back' reduces fuel consumption.

FIGURE 1: Fuel use, in litres per hour, for different ground speeds, tillage depths and engine speeds



In this heavy tillage trial, Gary said that a work rate of 1.8 hectares per hour, a depth of 250 mm, shifting gears from 5th up to 7th, and throttling back the engine from 2200 to 1830 rpm, reduced fuel consumption by 6.7 litres per hour while maintaining the same ground speed and work rate.

This equated to a reduction in fuel use of 3.6 litres per hectare, which represented a reduction of 0.14 gigajoule of energy per hectare and 10 kgs per hectare less greenhouse gas emitted into the atmosphere. Because ground speed (and work rate) was mainlined, all other costs remained equal so this would have realised a saving of $3.60 per hectare for diesel at $1.00 per litre.

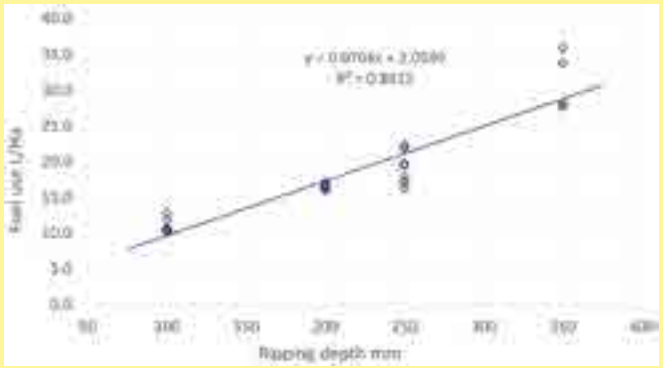
Across a farm of 1000 hectares, this represents 3600 litres of fuel per heavy tillage operation and 10 tonnes of greenhouse gas reduction.

Gary said the results highlighted that the old strategy of 'gear up, throttle back' would still significantly reduce fuel consumption in modern, electronically controlled tractor operations.

He said those savings were still definitely applicable in lighter operations, such as planting, because the same principles applied.

Figure 2 plots the litres per hectare of fuel used, for all ground speeds and engine speeds, against ripping depth.

FIGURE 2: Fuel use (L/ha) versus ripping depth



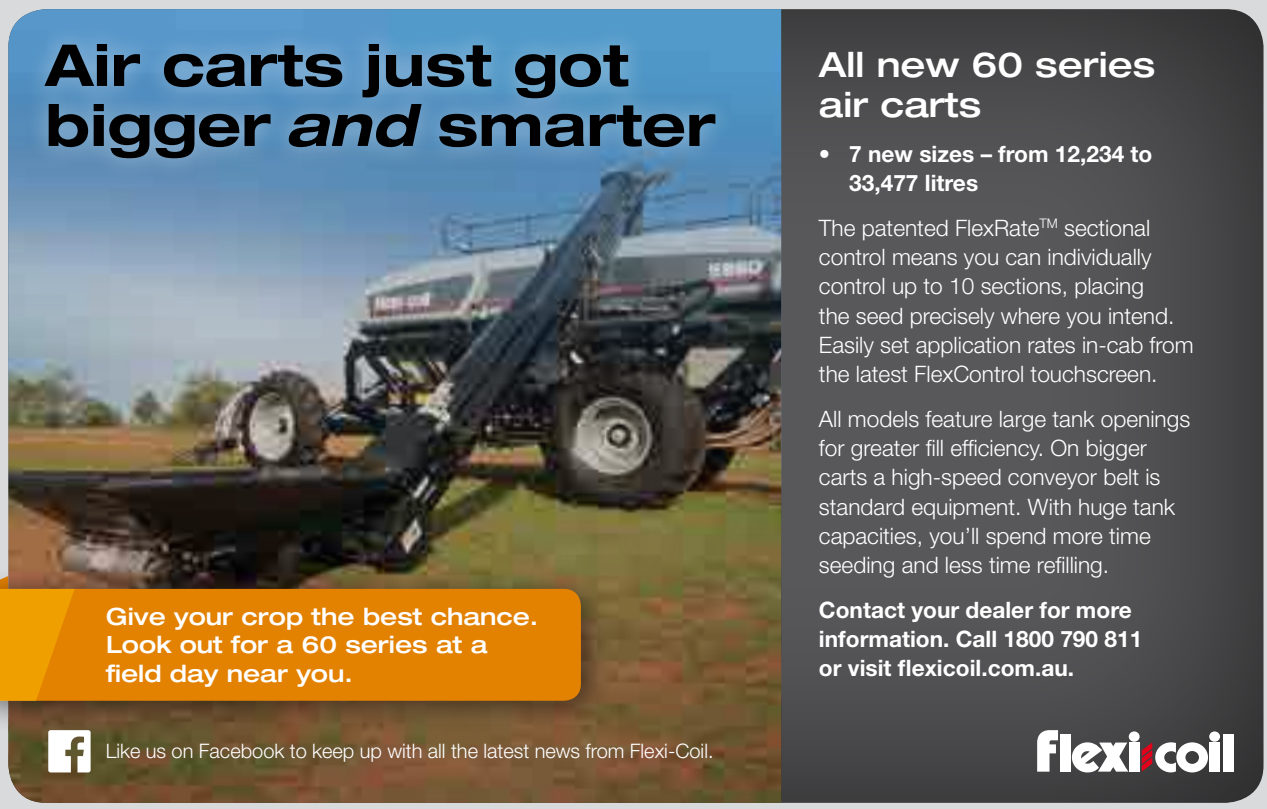
Gary said the tests also showed that for every 25 mm increase in the depth of heavy tillage, tractor fuel consumption rose by two litres per hectare (Figure 2).

"A 10 per cent reduction in energy costs and emissions per hectare is possible if your tillage depth could be reduced by 25 mm," he said.

Funding from the Commonwealth Department of Industry and Science was made available under the Energy Efficiency Information Grants scheme to the Cotton Research and Development Corporation for engineers at the National Centre for Engineering in Agriculture to complete energy measurements and analysis on Australian irrigated cotton farms.

For more information visit www.cottoninfo.com.au/energy-use-efficiency ■

Tractor engine and ground speed, and tillage depth tests, were conducted on the black cracking clay soils of a large irrigation farm on Queensland's Darling Downs using a 4.5-metre wide fixed-tyne ripper behind a 2010 model John Deere 8220 tractor.



The Fendt philosophy

By Ian M. Johnston

It is widely known that a number of tractor manufacturers are capable of tracing their company's ancestry back to the 19th century. These include John Deere, Case, Lanz, International, Marshall, Fowler, to name just a few past and present. But there is only one existent tractor firm that is able to positively chronicle its origins back as far as 1639. That firm is the now AGCO owned Fendt organisation which occupies a large industrial complex adjacent to the picturesque Bavarian town of Marktoberdorf, located south of Munich and just a short drive north of the Austrian Alpine region.

In the beginning

In 1639 a master clock maker established a workshop in a village named Oberdorf, situated in the Algean district of the Bavarian Alps. His name was Sylvester Fendt. This occurred during a period of considerable architectural enhancement, which was proliferating throughout the numerous small Alpine villages, tucked away in the steep valleys of the region. It seemed that each Stadrat (council) endeavoured to outdo its neighbour with the excellence of their churches and Rathaus (town hall). High on the agenda of importance was the necessity of having an ornate town clock with loud congenial chimes.

Accordingly, the craftsmanship of Sylvester Fendt was in much demand. His business expanded and prospered. Before long his highly decorated clocks adorned steeples and Rathaus walls throughout the countryside. On a still morning their distinctive chimes could be heard echoing from one Alpine valley to the next.

The original Fendt 1928 four hp tractor with hay mower. (IMJ archives)

For the next 200 years, successive generations of Fendts continued the tradition. The name of Fendt became synonymous with excellence.

During the 19th century the Fendt enterprise broadened its manufacturing horizons to include the production of intricate and highly artistic cast iron gates, the sales of which were aimed at the owners of country estates and urban mansions. The quality and uniqueness of the craftsmanship was exhibited at trade fairs throughout Europe. A thriving export market for the gates was established in North America, where sales flourished.

Tractors

The dawning of the 20th century brought with it a further period of expansion for Fendt. It was noted that there was an emerging and increasing demand by farmers for more efficient agricultural tools and implements. Keen to share the commercial opportunities this presented, new factory machine tools were acquired and soon a range of neoteric Fendt farm machinery entered the market.

In 1928 Johann Georg Fendt and his son Hermann, who were directly descended from Sylvester, announced the release of a cleverly designed lightweight tractor equipped with a side mounted sickle mower. Hay scything was an ongoing and tedious manual task on European farms in the spring and summer seasons. The arrival of the new Fendt tractor therefore meant that teams of manual labourers could be replaced by one tractorman who could achieve in a single day the equivalent output of a week's scything by the labourers.

The tractor was deliberately designed as a basic machine aimed at farmers with little or no previous tractor experience. The power unit was a single cylinder four hp water cooled engine, which provided sufficient energy to pull a single furrow mould board plough in soft ground.

The success of their first tractor spurred the Fendt management team to concentrate their focus on further tractor designs. In 1930 a six hp diesel powered unit named the Dieselross (Diesel Horse) was offered to European farmers.

The Company then entered a period of significant growth and in 1937 was registered under the name of Xaver Fendt and Co. The new Company re-located to a modern custom built factory at Marktoberdorf. The same year the Dieselross F18 was unveiled,

The diesel engined 1930 Dieselross. (Photo IMJ)

The 1942 charcoal burning Fendt Holzgasschlepper. (IMJ archives)

A 1953 Fendt Geratetrager Type F12 GT. (IMJ archives)

powered by a 16 hp engine and featuring an advanced designed independent power take off shaft.

In 1939 the F20, utilising a 20 hp twin cylinder diesel engine, was added to the Dieselross range. An upright radiator replaced the earlier hopper design and the tractor also featured a four speed gearbox. The F20 represented an indication of concept and profile of future Fendt tractors.

It is notable that by late 1939 the production of the Marktoberdorf plant had expanded to over 1000 tractors per annum!

But an unusual design of tractor had to be rushed into production during the dark days of World War 2. A critical shortage of diesel fuel prompted the Nazi regime to forbid the usage of diesel in agricultural tractors. In common with all other German tractor manufacturers, Fendt was obliged to install an engine capable of being powered by wood or charcoal gas.

As a result the Fendt Holzgasschlepper Type G45, equipped with a Deutz two cylinder Gasmotor developing 25 hp, became available in 1942. The odd-ball tractor performed reasonably well, despite the fact that similar gas producers fitted to cars and trucks were not noted for their reliability.

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The brilliant 1958 Fendt Farmer 2. (IMJ archives).

It is interesting to contemplate that Fendt's main competitor – Heinrich Lanz A.G. of Mannheim – owing to the Nazi doctrine, was faced with an near impossible situation. To convert a single cylinder two stroke low compression ignition engine (as distinct from a regular diesel engine) to being capable of being fuelled with charcoal gas seemed an impossible challenge. Doctor Fritz Huber, the Lanz Chief Design engineer, was placed under intolerable pressure to resolve the problem, which, it has been suggested, contributed to his early death. But his brilliance had prevailed, resulting in a charcoal gas adaption for regular Lanz Bulldog tractors.

The post war years

Following the ravages of the war, full production did not re-commence at Marktoberdorf until 1948. Now under the control of the three brothers Hermann, Xaver and Paul Fendt, the firm faced serious competition from no less than 50 opposition tractors! But owing to the excellence of the Fendt design, good market penetration was achieved. But to retain this position, by 1949 there were now no fewer than 20 different Dieselross models in the range.

In 1953 the innovative design team introduced a bold new concept tractor – the Geratetrager Type F12 GT. The unit was basically an implement frame with a rear mounted 12 hp engine. Included was a large capacious belly mounted transport box, which could be used for the cartage of a variety of farm produce. In addition there were implement mounting brackets attached to the rear, centre and front of the machine.

The philosophy behind the design of the Geratetrager was its ability to perform several cultivating applications simultaneously plus serve as a self propelled farm cart. A major advantage over traditional tractor designs, was the fact that the operator always faced his work, thus negating the tedious necessity of having to constantly swivel round to observe the performance and accuracy of whatever implement was engaged in the soil.

A second more sophisticated version of the Fendt Geratetrager was offered in 1965, featuring a 30 hp engine.

A milestone was achieved in 1961 when the 100,000th tractor came off the Marktoberdorf assembly line. It was a Fendt Farmer 2, undoubtedly one of the most attractively styled tractors of all time! (See accompanying photo.) It not only looked good, it bristled with the very latest tractor technology and was possibly Europe's most advanced tractor of the era.

There was no turning back. Fendt tractors were exported to the major farming nations around the globe. Their innovation of design seemed to know no bounds. In 1985 Fendt became the top selling tractor in Germany. In 1989 Fendt was awarded a gold medal at the prestigious SIMA Paris Show for its unique design of

The versatile mid engined 1990s Xylons at work. (IMJ archives)

Swinging Power Lift. The 1950s Geratetrager principle was reborn in the 1990s with the introduction of the Xylon range, equipped with M.A.N. 110 to 140 hp engines placed on their sides under the centre of the tractor. This layout once again permitted the attachment of front, centre and rear mounted implements.

Sylvester Fendt the clockmaker, whose imagination and enterprise was the catalyst for that which his descents would achieve, would be staggered but proud if he could but visualise the prestigious position occupied by Fendt in the tractor world of today! ■

IAN'S CLASSIC TRACTOR QUIZ

A score of 8 or above would be considered excellent and reveal an indepth knowledge of classic tractors. Five or over is still a good result. If in doubt, by applying logic, quite possibly the answer will become obvious. Or maybe even an educated guess? (Consulting Google would be cheating!) Good luck and have fun – *Ian M Johnston.*

1. In 1937 John Deere introduced the Model L, which featured a vertical two cylinder engine of which make — ***Continental, John Deere or Hercules?***
2. The International Titan of 1910 featured a single cylinder petrol engine of a whopping 1177 cubic inches capacity. Its hp rating was — ***31.6, 61.6 or 91.6?***
3. The 1958 65 hp Lanz Bulldog Model T single cylinder two stroke engine had a maximum rpm of — ***800, 1200 or 1600?***
4. The BMC Mini tractor released in 1965 was designed by — ***Harry Ferguson, Alec Issigonis or Sir John Black?***
5. The Renault 3042 introduced to Australia in the late 1940s was — ***A crawler, a two-wheel drive or a four-wheel drive?***
6. The diesel powered grey Fergy was the — ***TEA, TED or TEF?***
7. The Breda 50SD crawler with its 12 litre single cylinder engine was imported into Australia from — ***Hungary, Sweden or Italy?***
8. Chamberlain tractors were produced in — ***NSW, Victoria or WA?***
9. The David Brown 2D implement lift system was powered by — ***12 v. electrics, compressed air or hydraulics?***
10. The very first Ferguson to go into production was in the year — ***1936 , 1946 or 1956?***

See answers on page 48.

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Planting by trigger points means less staring down the barrel

By Tony and John Single, Narratigah, Coonamble

AT A GLANCE

- If we have a wet summer and our planting water trigger points are met we will plant large areas of our country to take advantage of a wet summer. In a drier summer and our planting water trigger points aren't met, we won't plant big areas and continue fallowing to the next planting opportunity – which is a summer crop – and reassess if we have enough moisture to then grow sorghum.
- The inclusion of long fallow in our rotations through utilising sorghum (enabling two crops in three years) allows us to regularly grow crops with moisture deep in our soil profiles. This means they have moisture available during grain fill. And the reduced cropping frequency allows us to minimise crown rot inoculum and root lesion nematode levels as well as reduce weed seed banks.

Tony (left) and his father John Single, testing for moisture depth in a fallow paddock on Narratigah. The fallow was earmarked for sorghum in late September 2015. But with a moisture profile of one metre (just on trigger point) in mid-September – and a strong El Niño in place – Tony has decided to hold back on planting this fallow and reassess for a later plant (in December). Other fallows on Narratigah have full moisture profiles and will be planted regardless of El Niño.

WE farm to the south-east of Coonamble in the central west plains of northern NSW. Rainfall patterns in the region are erratic but with careful management based on historic rainfall patterns and a knowledge of what our cracking clay soils are capable of, successful summer and winter crop rotations are achieved.

Our decision making in terms of cropping sequence is based on knowing our 'Planting Water Trigger Points'. That is, having knowledge of the minimum amount of soil moisture required on our farm for the odds to be in our favour at the time of planting, to generate an acceptable profit.

Another way to look at this is that we have a more informed idea of how the most profit can be derived from a given planting decision given an acceptable risk of monetary failure. In some cases, we decide not to pull the planting trigger and continue to fallow through to the next planting opportunity when we have a greater chance of growing a more viable crop. We have found that the real cost of a crop failure it is not so much the loss of dollars – it is more the loss of soil water that could have been used to grow additional grain in another season.

The trigger point system allows for flexibility in our rotations to match the variability of our rainfall patterns. We believe it maximises our returns to our cropping enterprise over the longer term while significantly reducing risk. Our yield prediction models show that when available water is at trigger point, there is a break-even between cropping now or continuing the fallow.

When soil moisture is at trigger point for a particular crop the downside risk is roughly a 20 per cent probability of economic failure – which to us is reasonable given the chance of generating acceptable profit in an average season and higher returns in a wetter year.

How the trigger point concept evolved

The planting water trigger point concept had its genesis in the mid 1980s. This was when the production of sorghum using the strip farming technique was first introduced to the district.

Our first couple of sorghum crops were disappointing due to dry summers. If we were to continue with sorghum in our farming mix we knew we needed to get a better handle on whether those first few seasons were representative of our summers or not. We looked back at our historical rainfall data and determined that the seasons were abnormally dry.

We pushed on with sorghum and the crop remains an important part of our rotation today.

This 'will we or won't we' decision making process undertaken 30 years ago, was further reinforcement that rainfall is our most limiting environmental factor in successful cropping.

And so the question arose: How do we use our variable rainfall to its maximum efficiency?

A twist on the French and Schultz approach

By applying formulas to a database of monthly rainfall records dating back to 1874, we were able to simulate various theories about cropping rotations, and how profitable these rotations would be over extended periods of time.

The underpinning baseline was recognition that our rainfall is highly variable.

The formulas we initially developed were driven from cropping records, and were developed around making the yields fit the rain that drove those yields.

We came up with a yield prediction model something similar to the French and Schultz approach first developed during the 1980s for southern Australian cropping conditions.

In the early days our approach was slightly different to French and Schultz in that we weighted plant available water in terms of whether it was stored in the ground, fell in the first half of the growing period, or the second half of the growing period.

We quickly learnt that there was little point in trying to utilise predicted water use efficiency (WUE) in such detail, as there are so many other factors at play such as disease and nutrients. But our weighted approach was very useful in determining how well a crop has utilised its water, and how to improve on it.

More recently the French and Schultz yield prediction has taken on a 'simpler' approach which is well suited to the crop models that we have developed.

The French and Schultz potential crop yield is estimated as:

WUE [kg/ha/mm] multiplied by:

(Crop water supply [mm] minus soil evaporation [mm])

In the calculation, crop water supply is an estimate of total water available to the crop. This includes soil water at planting plus in-crop rainfall minus soil water remaining at harvest.

It is this French and Schultz method that we use today. And we put a heavy reliance on the models in determining our cropping program.

Planting Water Trigger Points

The Coonamble district rainfall patterns – like many areas of the Australian grainbelt – are highly variable. And there are many environmental and marketing unknowns as we begin each season. But some of the 'knowns' at planting include:

- Starting soil moisture;
- In-season rainfall averages; and,
- Water Use Efficiency figures, allowing us to determine:

Planting Water Trigger Points (PWTP)

By calculating the PWTP we have much more flexibility in our rotations to better match the variability of our climate.

The underlying rule of thumb

Cropping in the Coonamble district is largely undertaken on the grey cracking clays. As a rule of thumb, these soils hold 15 to 17 mm of plant available water per 10 cm of wet soil depth. (Other districts and other soil types would have a different baseline rule of thumb, but the PWTP principle could still apply.)

From this information our trigger points can be established (Table 1).

TABLE 1: Planting Water Trigger Points on Narratigah

Crop	Soil moisture depth (cm)	Plant available water (mm)
Wheat	60	90
Chickpeas	60	90
Faba beans	100	150
Canola	100	150
Sorghum (single skip)	100	150

TABLE 2:

Year 1		Year 2		Year 3	
Winter	Summer	Winter	Summer	Winter	Summer	Winter
Base crop	Fallow	Fallow	Sorghum	Fallow	Fallow	Wheat

TABLE 3:

Year 1		Year 2	
Winter	Summer	Winter	Summer	Winter
Base crop	Fallow	Fallow	Fallow	Wheat

Value of long fallow and summer crops

Our experience at Narratigah is that sorghum won't produce the top end returns of other crops. But growing sorghum over summer can give us the ability to long fallow paddocks and still get two crops in three years (Table 2).

The key benefits of long fallow and sorghum:

- Long fallow = time to accumulate moisture deep into the soil profile;
- Moisture rationalisation to the crop = reduced production risk;
- Enables two consecutive winter fallows which in turn gives; and,
- Better weed, nematode and crown rot control and more nitrogen mineralisation.

Without the inclusion of a summer crop in our rotations the only way to long fallow is to grow one crop in two years (Table 3), which in a below average rainfall year can be our most profitable option. In average seasonal conditions our soil profiles will reach drained upper limit (full profile) well before wheat would be planted in Year 2 (as per Table 3).

Once the soil profile has reached drained upper limit any subsequent rainfall is wasted and leaves paddocks prone to water erosion.

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The inclusion of sorghum (Table 2) where we can grow two crops in three years is a better match to our average seasonal conditions. Sorghum gives us the option that if our trigger points are not met on short fallow winter crop, we don't have to gamble on above average winter rainfall or we are not locked into growing one crop in two years.

Estimating yield

Table 4 shows how we calculate expected yields based on starting soil moisture with median growing season rainfall for wheat and chickpea on short fallow and sorghum on long fallow.

The figures used for depth of wet profile are indicative of average seasonal rainfall conditions with good ground cover to maximise water infiltration rates in fallow. The expected yields can then be extrapolated to produce a gross margin per annum excluding fixed capital costs.

In the case of sorghum the gross margin per hectare needs to be divided by 1.5 years to allow for the long fallow.

Tables 5 and 6 show a simulated comparison between two rotations over a three year period and employ the same calculations used in Table 4. The only thing that is varied is starting soil moisture based on fallow length. The simulations are based on average rainfall throughout the three year period and assume good ground cover to maximise water infiltration rates in fallow.

Simulated rotations

District standard 'Wheat-Chickpea-Wheat' short fallow rotation (Table 5)

Under this simulation the starting soil moisture is right on the trigger points to grow wheat and chickpeas and demonstrate reasonable returns with average in-crop rainfall. A big advantage of this rotation is that with above average seasons there is the potential for a significant upside to the average gross margin per annum.

But in the same breath, with below average rainfall there is a significant downside to these returns, which is heightened by the lack of deep water and the presence of crown rot in tight cereal based rotations.

In the presence of crown rot inoculum and a tough spring, regardless of the tolerance of a variety, the water use efficiency of the wheat crops could easily fall back to 8 to 10 kg/ha/mm significantly reducing gross margins.

Long fallow wheat followed by long fallow sorghum (Table 6)

By growing long fallow sorghum followed by long fallow wheat the simulated average gross margin per annum is very similar to the district standard rotation (Table 5) – but the opportunities and risks are essentially reversed.

With long fallow and the presence of deep water, in a tough spring, the crops will be still growing into moisture through the critical stages of flowering and grain fill. With moisture available to wheat and sorghum during critical growth stages, water use efficiency could be as high as 20 kg/ha/mm.

Experience has shown, that with a full profile and minimal disease, wheat yields of 4.0 tonnes per hectare are regularly achievable on very little in-crop rainfall. The main downside of this rotation is that it doesn't have the same potential to generate top-end returns in favourable growing seasons.

For us the main message from these simulations is that we don't have all our eggs in the one basket. If it came to April–May and we had a number of paddocks with 60 cm of soil moisture, we would look at planting some paddocks to wheat or chickpea and continue the fallow to a potential sorghum crop in others.

A major constraint in our cropping system, with regular long fallow, is the reliance on herbicides to achieve season-long weed control.

TABLE 4:	Wheat	Chickpea	Sorghum
Wet profile (cm)	60	60	110
Water holding capacity (mm/10 cm profile)	15	15	17
Available water (mm)	90	90	187
In-crop rain (mm)	185	185	160
Crop available water (mm)	275	275	347
Plant water threshold (mm)	100	75	110
Water to produce grain (mm)	175	200	237
Water use efficiency (kg/mm/ha)	15	7.5	15
Yield (kg/ha)	2625	1500	3555
Farm gate price	$250	$440	$200
Income/ha	$656	$660	$711
Expense/ha	$260	$310	$310
Gross margin/ha	$396	$350	$401
Gross margin/annum	**$396**	**$350**	**$267**

TABLE 5:	Wheat	Chickpea	Wheat
Wet profile (cm)	60	60	60
Crop available water (mm)	275	275	275
Water use efficiency (kg/mm/ha)	15	7.5	15
Yield (kg/ha)	2625	1500	2625
Gross margin/ha	$396	$350	$396
Average gross margin/annum		**$381**	

TABLE 6:	Sorghum	Wheat
Wet profile (cm)	110	120
Crop available water (mm)	347	389
Water use efficiency (kg/mm/ha)	15	15
Yield (kg/ha)	3555	4335
Gross margin/ha	$401	$774
Average gross margin/annum	**$392**	

We have confirmed glyphosate resistant ryegrass and awnless barnyard grass populations on the farm. While we have a number of measures in place to deal with this issue, regular double knocking of glyphosate – followed by paraquat all year round and a zero tolerance approach to any escapes in-fallow – are our primary tools to manage glyphosate resistance.

To achieve the double knocking in a timely manner we have increased our spraying capacity so that we can cover every hectare that we farm in seven days.

For more information contact Tony Single at tonysingle@bigpond.com ■

TO SUM UP

- Use PWTP as a rule of thumb when planning rotations. This gives you confidence not to plant when PWTP aren't met.
- Ground cover is a key profit driver as it maximises water infiltration rates in fallow.
- Summer crop is critical to using PWTP.
- Sorghum doesn't produce the highest returns but it is a crop critical to flexibility in rotations. It means we can grow better wheat crops.
- Utilising PWTP and long fallow provides great risk management while maximising long term profitability.
- Needs to be matched to rainfall, soil types and risk attitude.

NORTHERN FOCUS
COVERING NORTHERN NSW AND QUEENSLAND

The real stories behind the financial figures

By Simon Fritsch and Peter Wylie, Agripath Pty Ltd

AT A GLANCE...

- Top performers in the northern region focus on building high margin farm businesses;
- Top performers understand their environment and what it takes to generate good margins;
- Activity does not mean profitability;
- Business/farm scale is largely irrelevant; and,
- Strategic thinking is needed to drive margins.

A RECENT analysis of Agripath datasets showed that the top performing farms (the Top 20 per cent as ranked by Return on Assets Managed – ROAM) in the northern grains region achieved almost twice the profit of the average farms compared over three years.

For the larger farms in the western and central zones (of the northern region), ROAM averaged just under six per cent, while the top farms achieved a profit equal to 10 per cent ROAM.

Average profit on smaller farms in the higher rainfall areas – with higher land values – was four per cent ROAM while the Top 20 per cent achieved 7.3 per cent over the three years.

By comparison, the ABARES' surveys of farm profit showed an average return on investment of 2.2 per cent for Queensland farms growing wheat and other crops over the same period. NSW cropping farms averaged 2.7 per cent return.

In dollar terms these differences translate into as much as $440,000 per year in additional profit for an average sized farm in the Agripath dataset.

The potential to improve profit for most farms is an enormous opportunity to be explored.

Our analysis showed that farm size or area cropped was not an important factor in profitability. The Top 20 per cent of farms were generally a bit smaller than average, but with a slightly larger area of crop.

So a small part of the profit difference is the dilution of crop profits with generally lower profits from beef cattle.

RETURN ON ASSETS MANAGED (ROAM)

This is a universal measure of profit calculated as:

BUSINESS GROSS INCOME
Less
DIRECT COSTS
Less
OVERHEAD COSTS
Equals
BUSINESS OPERATING PROFIT
The operating profit divided by
BUSINESS ASSETS
gives you your business
ROAM %

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Key profit drivers for the northern grains region

There is potential to significantly improve farm profits in the northern region if farmers can fine-tune their farming systems and agronomy, and combine this with good management of machinery, labour, finance and the timeliness of operations.

The key profit drivers for grain production are:

- **Gross margin**
  - Crop selection, frequency, rotation
  - Yield – soil water storage and use
  - Price, quality and marketing costs
  - Optimum direct costs
- **Low cost business**
  - Machinery
  - Labour
  - Overheads
- **People and management**
  - Attention to detail, planning
  - Precise operations
  - Timeliness
- **Risk management**
  - Resilient farming systems
  - Managing climate risks
  - Harvest management

Gross margin is the key

Of these profit drivers gross margin is the most important. Businesses that operate on low margin are unable to create sufficient surpluses to meet overheads, interest costs and drawings. In our database analysis, these fixed costs averaged over $190 per hectare per farm business.

Successful businesses are built on a sequence of crops that consistently produce high margins. And these high margins are largely driven by crop yield.

Our analysis indicates that our Average and Top 20 per cent of farm businesses in the Namoi/Liverpool Plains area, tend to enjoy a 30 per cent increase in margin for every 10 per cent increase in crop yield (Figure 1).

Optimising direct costs, yield, marketing, low cost business model, management and risk management are all essential components that result in a high gross margin business.

Our Top 20 per cent farmers in the north regularly achieve $350 plus per hectare gross margins.

TABLE 1: Margins from a double-crop sequence compared to a long fallow

	Year 1 Chickpea double-crop	Year 2 Wheat after chickpea	Year 2 Wheat on long fallow
Yield (t/ha)	1.0	2.5	3.7
Price ($/t on-farm)	420	250	250
Gross $/ha	420	625	925
Fertiliser	24	56	70
Seed	40	34	34
Fallow sprays	24	48	60
Weeds, pests	72	15	15
Fuel and repairs	42	52	60
Harvest costs	55	50	55
Freight and misc.	53	70	88
Labour	40	52	60
Machinery costs	44	48	58
Total direct costs	394	425	500
Gross margin	**26**	**200**	**425**

Crop frequency – and the planning of crops in accordance with soil moisture – is an important part of decision making in the northern crop growing regions.

A high frequency of low yielding crops – with small margins – may be less profitable than a well-planned rotation which includes some crops grown on long fallow during the change between summer and winter cropping.

When less is more

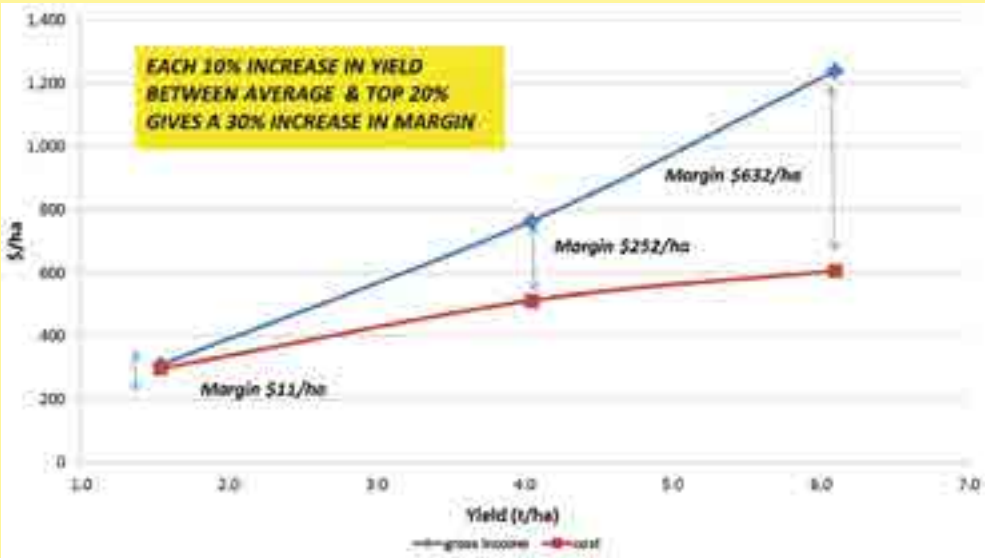
An example of less profit from double cropping when changing from a sorghum crop to a winter crop – compared to a long fallow – is shown in Table 1.

A double-crop of chickpea with a yield of 1.0 tonne per hectare followed by wheat yielding 2.5 tonnes might appear profitable, but they only have a combined margin across the two years of around $200 per hectare.

But a wheat crop on a long fallow with a yield of 3.7 tonnes per hectare, would have a margin of more than $400 per hectare (or an average of $200 per year) and could help to improve overall farm profit.

Our top performers know the implications of one year's planting decision on subsequent years – particularly with regard to plant available water.

FIGURE 1: Cropping margin versus yield, milling wheat 2012



Activity does not always mean profitability

Table 2 is a crop sequence versus gross margin example from our database of benchmark farms in higher rainfall areas. Good margins are important but too

TABLE 2: Activity does not always mean profitability

	Yr 1 chickpea double-crop	Yr 2 wheat after chickpea	Yr 2 wheat on long fallow
Starting water	42	95	190
PAW	218	249	344
Yield (t/ha)	1.2	2.7	4.3
Price ($/t on-farm)	564	240	240
Gross $/ha	677	648	1032
Total costs	426	494	627
Gross margin	251	154	405
Overhead	78	78	156
Interest	82	82	164
Profits $/ha	**91**	**-6**	**85**

much opportunity cropping can result in reduced margins, more income variability and less profit over the long term.

Profit draggers

Apart from good moisture storage, the main difference between average and top crops is the effect on yield by a number of 'profit draggers' such as disease, nematodes, weeds, low nitrogen, timeliness or harvest losses.

In combination, these factors affect yield by 20 to 30 per cent and drag down profit by around 50 to 60 per cent.

Good management requires attention to all the profit draggers, but there is also a need to put time and effort into crop selection and managing rotations, crop frequency and risks.

Cost management assists profitability on the Top 20 per cent of farms, while teamwork, labour, safety and machinery decisions are also important.

Top performers have built high gross margin based businesses. Their crop sequences are generally superior to their peers in that they make the best use of rainfall and have a good understanding of their soils' ability to store moisture.

Top performers also tend to make good crop choices and have well thought out crop sequences which address agronomic issues while reducing costs.

This is invariably matched with good people and business management skills.

What is possible?

Huge profit gains are possible by shifting your farm business from the mid-range of returns from assets managed to a Top 20 per cent performer.

For example, over the past five years in our Central West NSW benchmarking region, Average ROAM businesses have had a 4.3 per cent annual (ROAM) return. The Top 20 per cent of farms have had a 6.6 per cent annual return – a difference of 2.3 per cent.

For a business with assets under management valued at $10 million, it's a difference in annual profit of $230,000.

Agripath is currently involved in projects investigating the economics of farming in the northern region. These include:
APT00001: Economics of closing the yield gap in the Northern Grains region; and,
RDP00013: The integration of technical data and profit drivers for more informed decisions.

For more information contact Simon Fritsch at the Tamworth office of Agripath on 02 6766 9051 or Peter Wylie at Dalby on 0429 361 301. ■

When less just might be more. Our top performers tend to achieve better results by including some long-fallow into their cropping sequences.

Suntime wheat delivers early sowing option

SUNTIME AT A GLANCE...

- APH variety for late April planting in Northern NSW/QLD
- Good stem, leaf and stripe rust resistance
- Moderate tolerance and resistance to root lesion nematode (*p. thornei*)
- Good tolerance to acid soils
- Higher yield than Sunzell
- Quicker maturing than Sunzell

GRAIN growers in the northern farming zone can look forward to planting an exciting new, early-sowing variety of wheat, Suntime, that will fit the lucrative Australian Prime Hard (APH) classification.

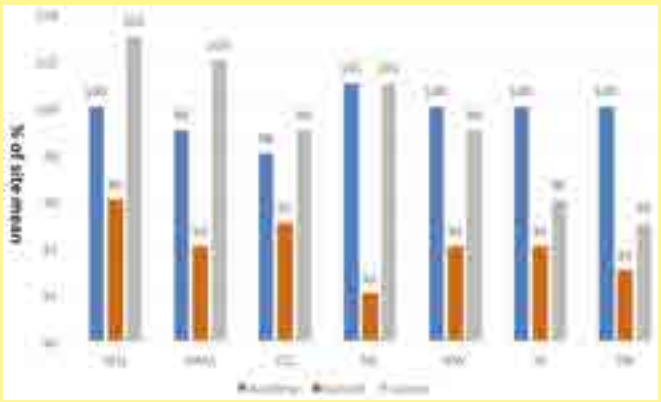
Developed by Australian Grain Technologies (AGT) at its Narrabri node in North-West NSW, Suntime will give NSW and Queensland growers an early-sowing option that offers higher yield potential and improved disease resistance.

Suntime was officially launched at the University of Sydney Plant Breeding Institute field day at Narrabri on September 9.

AGT marketing and seed production manager north, Kerrie Gleeson, said Suntime had largely been developed as a replacement for the popular AGT variety, Sunzell.

Suntime wheat is a new AGT variety suited to early sowing in NSW and Queensland.

FIGURE 1: Early sown NSW and QLD grain yield results across multi-environmental NVT trials (2010–14)



"But Suntime is a little bit quicker than Sunzell," Kerrie said. "The advantage over Sunzell is it is eligible for APH whereas Sunzell is only eligible for AH, and Suntime has proven to be significantly higher yielding than Sunzell in late April-planted trials."

"It is about delivering better yields and a better disease package. It has good stem, leaf and stripe rust resistance and moderate tolerance and moderate resistance to root lesion nematode."

In NVT trials from 2010 to 2014, Suntime consistently outperformed Sunzell in grain yield (Figure 1) and many disease resistance traits. The trials were at multi-environmental sites from Central Queensland through to North-West NSW.

Kerrie said Suntime's optimum sowing window was from April 25 to mid-May but was best suited to planting in the last week of April and first week of May in the north.

"We believe the excellent package of yield, maturity, disease resistance and APH classification should make Suntime a clear choice when picking a wheat variety for the Anzac Day planting window," he said.

A 230-hectare seed-increase block of the new variety planted this season on the Woods' family's Goondiwindi farm, Billa Billa, is up and growing well.

"We are watching it with interest. It looks magnificent," Tom Woods said. "It appears to be a genuine early variety the industry is looking for that you can plant around the end of April/early May.

"There are a lot of mid-season varieties, but we are looking for a genuine early variety and Suntime looks like it will fit that space.

"Of the varieties we are growing here now, Suntime is the longer or slower variety and looks like it will yield well. It is eligible for Prime Hard, has dark leaves and looks very good at this stage," Tom said.

Commercial quantities of Suntime seed will be available for the 2016 season through AGT affiliates and local retailers.

Visit www.agtbreeding.com.au for a list of stockists.

For further information, contact: AGT Marketing and Seed Production manager north, Kerrie Gleeson, 0427 958 259. ■

ASK AN EXPERT – WHAT'S THE BEST WAY TO PROTECT HERBICIDE TOLERANCE TECHNOLOGIES IN CROPS?

With Ian Taylor, General Manager, Cotton Research and Development Corporation

THE cotton industry has led the way in Australian agriculture in the development and adoption of varieties with herbicide tolerance traits. When Roundup Ready Flex cotton was released in Australia in 2000 it was embraced as a way to reduce costs and reduce the use of residual herbicides. Within two years 40 per cent of the Australian crop was Roundup Ready and these days it is grown on almost 100 per cent of cotton fields.

Dr Ian Taylor, CRDC general manager sees glyphosate resistant awnless barnyard grass as the first major weed to threaten the effectiveness of herbicide tolerant cotton varieties.

Dr Ian Taylor, CRDC says the industry's adoption of the herbicide tolerant technology 15 years ago revolutionised weed management and growers recognised the need to implement the Roundup Ready and Roundup Ready Flex stewardship plan to minimise the risk of glyphosate resistance in weeds.

"Roundup Ready technology has served the cotton industry well," says Ian. "Primarily it allowed growers to reduce their use of residual chemistries that can cause crop damage and potentially remain in the environment for many months after application.

"Across the whole cropping rotation there is extensive use of glyphosate and there is no doubt that glyphosate resistant weeds could find their way into cotton fields," he says. "Along with the naturally tolerant species such as feathertop Rhodes grass and sowthistle, glyphosate resistant barnyard grass in the northern cropping region is of increasing concern."

What weeds are the most challenging in cotton systems?

Short answer: Feathertop Rhodes grass, sowthistle, fleabane (conyza), barnyard grass and windmill grass.

Longer answer: Feathertop Rhodes grass, sowthistle and fleabane are naturally tolerant of glyphosate and are well-suited to the no-till farming system in the northern region. Their control relies on strategies other than glyphosate and this needs to be factored in to the weed management program. There are almost 100 confirmed cases of glyphosate resistant barnyard grass in the northern region and this weed is particularly difficult to control due to multiple germinations potentially occurring during the summer cropping season.

Are there glyphosate resistant weeds present in cotton growing regions?

Short answer: Yes. Awnless barnyard grass is of particular concern for cotton growers.

Longer answer: If uncontrolled, resistant barnyard grass will reduce the weed control effect of the Roundup Ready technology in cotton crops. The adoption of other treatments to supplement the Roundup Ready program, such as increased use of residual herbicides and strategic cultivation, is essential. This is an example where one weed has the potential to greatly reduce the value of the herbicide tolerance traits in a crop.

Roundup Ready Flex cotton has provided growers with a very useful weed control tool for the past 15 years but even robust technologies require the support of a diverse weed control program.

What are some strategies that have proven successful in treating glyphosate survivors?

Short answer: Double-knock always and sometimes a spring tickle.

Longer answer: Double-knock treatments involve using two herbicides – or a herbicide and non-herbicide tactic – on the same generation of weeds. The traditional glyphosate followed by paraquat is one option but others include using a knock-down + residual herbicide or knock-down + cultivation. A spring tickle will initiate weed germination prior to planting without sacrificing soil moisture. ■

HOW TO ASK A WEEDSMART QUESTION

Ask your questions about genetic research that is helping to manage herbicide resistant weeds using WeedSmart Innovations Facebook page *https://www.facebook.com/pages/WeedSmart-Innovations/354441941389122,* Twitter @WeedSmartAU or the WeedSmart website *http://www.weedsmart.org.au/category/aska- weedsmart-expert/*

'Weedsmart' is an industry-led initiative that aims to enhance on-farm practices and promote the long term, sustainable use of herbicides in Australian agriculture.

Northern canola production hits new milestone

CANOLA production information in New South Wales and Queensland reached a new milestone recently with the release of the first northern-specific agronomic information to help growers bolster crop yields and returns.

The Grains Research and Development Corporation (GRDC) Canola GrowNote (www.grdc.com.au/GrowNotes) was officially launched at the Commonwealth Bank AgQuip Field Days by GRDC northern panel chair James Clark who said it offered several innovative new features to improve navigation and cater for a variety of learning styles.

A new feature is the inclusion of frequently asked questions that focus on key production issues and link through to answers in the main body of the GrowNote as well as the use of graphics to illustrate management strategies and link through to new information.

Increasing popularity in the north

The launch of the Canola GrowNote reflects the rapidly escalating popularity of canola within northern cropping rotations as growers strive to maximise farm gross margins and implement effective disease, weed, pest and soil management strategies.

"Until now northern growers have largely relied on southern-based canola research for management recommendations," James said.

"The Canola GrowNote is the latest in the series which is a fantastic catch-all for existing and new knowledge about productive and profitable cropping in northern Australia."

GRDC northern panel chair James Clark said the Canola GrowNote offered several innovative new features to improve navigation and cater for a variety of learning styles.

Recent canola trial work conducted by the GRDC-funded Grower Solutions Groups Grain Orana Alliance (GOA) and Northern Grower Alliance (NGA) is included in the new Canola GrowNote such as projects on sulfur recommendations for northern canola crops and the comparison between windrowing and direct heading.

One stop shop

The aim of the GrowNote is to be a dynamic 'one stop shop' document for northern canola trial results and up-to-date industry best practice recommendations on pre-plant planning and paddock preparation, sowing practices, crop nutrition, fertiliser, weed control, disease and pest management, harvest and storage practices, environmental issues and marketing.

GrowNotes modules complement the specialist advisory services already offered by local agronomists and consultants by reinforcing industry best-practice advice across the production spectrum and providing hundreds of hypertext links for further reading on specific issues.

The release of the Canola GrowNote follows the successful release of the barley, sorghum, sunflower, faba beans, wheat, barley, durum, chickpea, maize and peanuts modules which are being extensively used by growers and agronomists across the northern cropping region. ■

Seeding investment produces 'extraordinary efficiencies'

DAVID Brownhill has only ever purchased three winter crop seeding machines in his 25 years of farming, so it's fair to say he's quite particular about the technology he invests in. David and his brother, Gordon, own Merrilong Pastoral Company, a 6500 hectare mixed cropping and livestock enterprise in the Liverpool Plains region in north west New South Wales.

Of the 6500 hectares, the Brownhills grow summer and winter crops, with 1500 hectares under irrigation and 1400 hectares dedicated to grazing cattle.

The brothers are big advocates of no-till cropping, having employed the practice since 1995, with the entire property now devoted to controlled traffic.

Built their own

Their early interest in no-till farming meant there was limited available machinery specifically designed for the method, so David and Gordon developed their own – the Ground Hound zero-till planter.

The Ground Hound served them well for sowing their winter crops, until they purchased an NDF disc planter, but they have recently upgraded to a Morris 9 series granular cart with input control technology (ICT) and an 18 metre (60 foot) RAZR disc drill.

This is the first season they have used the Morris system for sowing their winter program, which includes three main types of wheat (bread, impala and durum), as well as chickpeas and barley on an opportunity basis.

Summer crops include sorghum and cotton.

"I've only ever purchased three winter crop machines in my life," David said.

"This time we wanted to go wider, but we were also looking for simple operation.

"The whole farm has been controlled traffic since 2002, on a

Nick Beer, Brendan Lee and David Brownhill, Merrilong Pastoral Company, with the Morris 9 series granular cart featuring input control technology (ICT) and 18 metre (60 foot) RAZR disc drill. The Brownhill's put the set-up to work at seeding on their property this season. David said it delivered extraordinary efficiencies.

Pictured is the excellent crop germination on the Brownhill's property sown with the Morris system.

nine metre (30 ft) system. All the wheel spacings on the tractors are just over three metres (120 inches).

"We've got 18 centre pivots so we end up with point runs, which means we end up with overlaps.

"We've also got large, long blocks here. Our largest field is nearly six kilometres long in one direction and because of our old 9–27 metres system, on the edge of the fields we sometimes have to overlap by 4.5 to 9 metres. That's why the ICT was attractive."

ICT to eliminate overlap

The ICT system is designed to eliminate overlap and works via GPS and the Topcon X30 controller. The Morris carts use the gear drive system for the metering wheels to quickly engage or disengage, allowing instantaneous shut-off.

"We trialled the Morris last year with the ICT. Jeremy Matthews from WJ Matthews at Moree brought a machine down and we did about 300 hectares with it and we were impressed," David said.

Following the trial, the Brownhills ordered their own Morris 9 series with ICT and RAZR disc drill in October last year and in April it was put to work to sow 1600 hectares of wheat.

David and Merrilong's farm manager, Nick Beer, both agreed the upgrade had been well worth the investment, particularly with the ICT removing overlap and the extra working width translating to an increase in efficiency.

Seed in wet conditions

They also highlighted the RAZR's ability to create minimal ground disturbance. They were the only farmers within a 50 km radius who were able to continue seeding during wet conditions.

There have been a few adjustments made to the drill and David said they worked with WJ Matthews and McIntosh Distribution to replace the seed boots with some better suited to the property's heavy clay soils.

"We're pretty happy at this stage," David said.

"While I haven't worked out the exact figures yet, I would think the ICT has already paid for itself and the ease of management of being able to control it from the cab is a big advantage.

Extraordinary efficiencies

"The efficiencies for us have just been extraordinary. We've expanded our farm significantly over the past few years, so doubling our width has really made a difference.

"We ran demos on our farm with the RAZR disc drill and it was mind-blowing. For the cost of the machine compared with more robust models that are meant to go through more stubble, this machine does very well.

"That's our biggest problem – sowing back into the sorghum stubble, which can be up to 800 mm high.

"The way the RAZR works with the hydraulic accumulator and the pivoting point in the centre, so the weight is evenly distributed through the wheel at the front and the press wheel – is very clever."

Nick spent more time operating the system and he said, overall, he was impressed, particularly how much faster seeding was.

"The ICT was great. We saved a lot of seed in the headland on the point runs," Nick said.

"The twin tanks on the air cart are very good. We were able to do 80–100 hectares per load and we only had to fill up twice a day, which only took 20 minutes.

"With our previous system we would get 50 hectares per load, so compared to that it's much more efficient." ■

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ASK AN EXPERT – IS CROP ROTATION AN ECONOMIC OPTION FOR MANAGING WEEDS?

With Tony Swan, Senior Experimental Scientist, CSIRO Agriculture

WHILE wheat is the dominant commodity in Australia's grain production systems, sowing consecutive wheat crops results in reduced production and profitability due to the effects of diseases, pests, weeds and declining nutrition. Adding a broadleaf break crop to the cropping sequence helps keep wheat profitable in a sustainable cropping system.

Tony Swan is convinced that break cropping is the best way to reduce weed numbers and improve soil health while maintaining profit across the rotation.

Tony Swan, CSIRO says their five-year GRDC funded project illustrated that adding at least one break crop, and preferably two, to the crop rotation was beneficial for weed control and nitrogen management, and can be as profitable or more profitable than continuous wheat. A series of experiments were established to challenge the idea that break crops are risky and not profitable.

"Many farmers in south-east Australia are sceptical about growing break crops such as pulses and canola," says Tony. "The problem is, once high populations of herbicide resistant annual ryegrass become apparent, the profitability of continuous wheat significantly reduces.

"Rotations that include a break crop in paddocks with high populations of resistant annual ryegrass were more profitable than continuous wheat and had significantly less ryegrass numbers after three years, provided all the available tactics were used to reduce germination and prevent seed set," he says. "Our experiments demonstrated that it is cheaper and more effective to control ryegrass using one of the many break crop options than attempting to achieve control in wheat using expensive herbicides."

What break crop options did you trial?

Short answer: RR canola, TT canola, lupins for grain, field peas for brown manure, fallow and wheat cut for hay.

Longer answer: The combination of a fallow or break crop in year one followed by a second break crop in year two resulted in the greatest reduction in annual ryegrass seed bank population and panicle number after three years. This sequence was significantly more profitable than continuous wheat, but not as profitable as a RR canola – wheat (high input) – wheat rotation.

What was the most effective option in a weedy situation?

Short answer: A two-year break crop option.

Longer answer: The double break rotations of lupins grown for grain followed by RR canola, or RR canola followed by wheat

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A two-year break crop can break the weed cycle without breaking the bank.

cut for hay provided a very high level of weed control while also generating high average annual three-year gross margins of $790 per hectare per year and $834 per hectare per year, respectively.

This compared to the most profitable three-year sequence of RR canola followed by wheat (high input)–wheat of $883 per hectare per year. But this sequence did not achieve the same reduction in annual ryegrass and grass herbicides cost over $140 per hectare in the wheat crops.

Sequences that included fallow or brown manures followed by RR canola were extremely effective at reducing the annual ryegrass seed bank but were not as profitable as continuous cropping.

Where herbicide resistant annual ryegrass is a major problem, an alternate three year sequence of wheat-hay (sprayed afterwards) in year one, pulse-grain (spray topped) in year two, and RR canola in year three can be profitable and also reduce the seed bank to extremely low levels.

What is the key recommendation from this trial work for annual ryegrass control?

Short answer: Two consecutive years of total annual ryegrass control using break crops and implementing all available weed seed control options.

Longer answer: Break crops work and can be profitable. Two or more years of effective ryegrass control using break crops and other management options including strongly competitive crops, rotating herbicide groups, pre and post emergent timing and prevention of seed set using crop topping, hay making and brown manuring along with fallow management and harvest weed seed control are all recommended. ■

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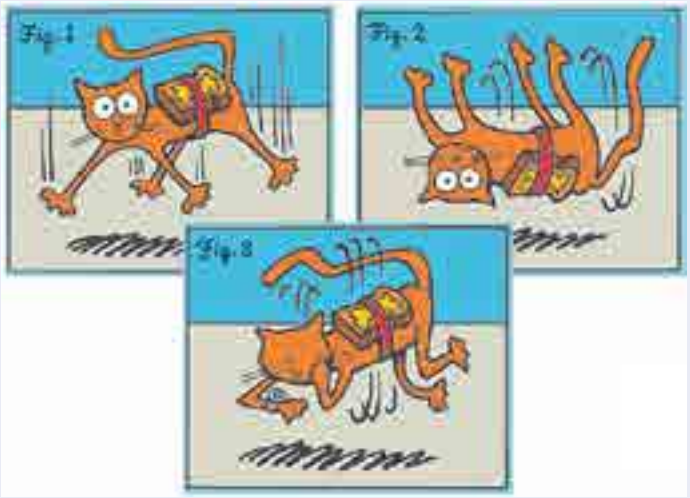
AHRI **insight...**

Early flowering wild radish paradox

IF you drop a piece of toast, it will land butter side down (the likelihood of this is proportional to the price of the carpet). If you drop a cat, it always lands on its feet. But if you strap a piece of toast to the back of a cat, butter side up, and drop the cat – now that is a paradox.



If we adopt harvest weed seed control to get on top of the wild radish seed bank, could we paradoxically select for early flowering and early shedding wild radish that can avoid harvest weed seed control, and create another problem?

Weeds can adapt to whatever we throw at them, not just herbicides. AHRI research by Dr Michael Ashworth found that after five generations of selecting for early flowering wild radish, the time to first flower was halved. Early flowering selection reduced the time from emergence to flowering from 59 days to 29 days.

So why has harvest weed seed control been so successful at smashing the wild radish seed bank in the field?

Firstly, the early flowering radish in this study weren't competitive. They were short, stunted plants that weighed in at one fifth the weight of the control plants. Secondly (and more importantly) harvest weed seed control is used in combination with a range of other weed control practices, namely herbicides, crop competition, crop topping and so on.

The most important thing to do in weed control is to get as many hits at the weed as possible.

Harvest weed seed control, if practiced in isolation, will likely fail, but when used in conjunction with other weed control practices, it is a very powerful and effective tool.

Every time we present information to grain growers the question is always asked, "If we practice harvest weed seed control (HWSC) every year will we select for early shedding weeds?"

This is a great question and we are always on the lookout for evidence of this phenomenon. Fortunately, we have not seen any

TABLE 1: Summary of growth habit of wild radish selected for early or late flowering compared to the control

	Selected for early flowering (5 generations)	Control Yuna wild radish (WARR 7)	Selected for late flowering (3 generations)
Days to first flower	29	59	114
Growing Degree Days (°C d) to first flower*	344°C d	634°C d	1314°C d
Height of first flower at flower initiation	33 cm	88 cm	141 cm
Individual plant biomass at first flower	4 g	22 g	46 g

*Growing degree days (GDD) is a measure of the sum of the mean temperature each day

solid evidence of this in the field and previous field studies have failed to identify the problem.

Mike Ashworth recently completed his PhD at AHRI with GRDC support (he's now based at Curtin University), undertaking a number of evolutionary biology studies in wild radish. One such study looked at selecting for early or late flowering radish.

Mike started with 1300 individual wild radish plants growing in pots. He selected the first one per cent of plants to flower and the last one per cent of plants to flower. He then forced these to cross with one another using the 'bee stick' technique. This involves finding a dead bee, attaching it to a stick, and using it to randomly cross pollinate plants. All in the name of science!

Four more generations of early flowering radish were selected in this way and two more generations of late flowering radish, each time taking the earliest or latest 10 per cent of plants to initiate flowering.

A picture is worth a thousand words

The wild radish plant on the right (photo opposite) is from four selections of early flowering compared to the control on the left. The early flowering selections were short, prostrate, and lacked vigour, weighing just 4 g per plant compared to 22 g for the control plants.

Table 1 gives a summary of the data from this research.

Mike Ashworth – weed researcher and skilled 'bee stick' exponent.

Control (left) and early flowering wild radish selections.

Normal wild radish takes about 600°C days to reach flower initiation. This is why we see flowering radish after about 20 days in summer when the average of the max and min temperatures can be 30°C. This study also selected for late flowering radish which accumulates a lot of biomass before flower initiation.

Goldilocks

This experiment was guaranteed to produce the result it did because it forced the enriching of early and late flowering genes. In the field, there are real penalties to either early flowering or late flowering. It is the 'Goldilocks' phenomenon. Wild radish has evolved to flower not too early, not too late, just right. Flowering too early will sacrifice plant vigour and flowering too late will risk the ability to set seed.

This doesn't mean it can't happen in the field as we use more harvest weed seed control, BUT we emphasise that there are big ecological prices to pay for earliness or lateness.

On the front foot

This research is part of a proactive AHRI strategy to evaluate the robustness of HWSC. We know that any practice can fail if over-used. Studies such as this help us fully understand the potential for evolution to occur to HWSC and how to minimise it.

To sum up

Everything we do to control weeds has a consequence and can cause evolutionary changes. To give us the best chance of limiting unwanted evolution of our weeds we must hit the weeds with as many different tools as possible – DIVERSITY – and minimise the seed bank at all costs.

Please don't go strapping pieces of buttered toast to any unsuspecting cats – but do continue with harvest weed seed control. It's one of the best tools we have. ■

AHRI **insight continued...**

Hand weeding wild radish: Is it viable?

HAND weeding paddocks on huge grain farms might seem unthinkable. But the use of backpacker labour to weed wild radish could be viable where weeds are at extremely low levels, and this is the focus of new research in the Northern Agricultural Region of WA.

The Grains Research and Development Corporation's (GRDC) Regional Cropping Solutions Network (RCSN) in the Geraldton port zone has initiated the short-term project which is being led by Peter Newman, of Planfarm.

Peter, who is also the Australian Herbicide Resistance Initiative's (AHRI) communications leader, said years of excellent weed management meant some growers had reduced wild radish numbers to fewer than 10 plants per hectare.

"Their weed densities are particularly low this season because they achieved a good knockdown on radish prior to seeding crops, and there was little follow up rain in May to germinate more weeds," he said.

"These growers don't want to undo their hard work by allowing the few remaining wild radish plants to set seed, but blanket spraying the whole paddock with herbicides is very expensive.

"We want to calculate the cost and practicality of hand weeding these paddocks to see if it is viable."

Peter said trials at three Mullewa sites were assessing the efficacy of hand weeding wild radish using backpacker labour and developing costings for a range of wild radish densities.

"When a grower is assessing a crop for spraying, he needs to know if hand weeding is a viable alternative, so we are attempting to develop a threshold for hand weeding based on counting weeds as we drive through the paddock," he said.

Excellent weed management means some WA growers have reduced wild radish numbers to fewer than 10 plants per hectare.

The trial sites

- A paddock with about three wild radish plants per hectare where integrated weed management (IWM) techniques, including narrow windrow burning, have been implemented for more than a decade.
- A paddock with about three radish plants per hectare where mouldboard ploughing was introduced three years ago and chaff carts and other weed management tools have long been used.
- A paddock with about 40 radish plants per hectare which until 10 years ago had always grown pasture and traditionally has had very low wild radish numbers.

Peter said the success of many northern (WA) grainbelt growers in achieving low weed numbers reflected their determination to prevent this weed – resistant to many herbicides – from setting seed.

"These growers – farming in 'wild radish heartland' – have changed their mindset so they don't let any weeds survive and have a long-term plan to reduce the weed seed bank using a combination of chemical, cultural and mechanical methods," he said.

"It is a real success story – 10 years ago we thought that wild radish would smash cropping in this area, but instead we've smashed wild radish."

Information about sustainable integrated weed management (IWM) practices is available at the AHRI website www.ahri.uwa.edu.au.

For information on herbicide sustainability, visit the WeedSmart information hub at www.weedsmart.org.au. It outlines a 10-point plan – including information on testing for resistance – to help you win the battle against weeds.

Useful information is also available in the Integrated Weed Management in Australian cropping systems manual, available at www.grdc.com.au/miniIWMM.

Information including case studies about harvest weed seed control (HWSC) is available in the GRDC RCSN booklet The Effectiveness of on-farm methods of weed seed collection at harvest time at www.grdc.com.au/CaseStudy-WeedSeedHarvest-Albany. ■

All-round attack needed to combat damaging wheat disease

CEREAL disease authorities are calling for a whole-of-industry approach to manage and reduce the impact of Septoria tritici blotch (STB). The stubble-borne wheat disease is of major concern to growers in the high rainfall zones of South-East South Australia, southern Victoria and Tasmania.

Dr Andrew Milgate, a research scientist with the New South Wales Department of Primary Industries (NSW DPI), says STB is a triple threat in that it is able to rapidly overcome host resistance, it has evolving fungicide resistance and its spores can travel long distances.

"These features make it a disease which requires a whole-of-industry response through integrated disease management," said Andrew, whose research into cereal diseases is funded in partnership by NSW DPI and the Grains Research and Development Corporation (GRDC).

Speaking at recent GRDC grains research Updates and Septoria technical workshops in the southern cropping region, Andrew said the presence of mutations in the CYP51 gene – known to cause changes to sensitivity to triazole fungicides – had been confirmed in Victoria, South Australia and Tasmania.

Why resistance has emerged

He said several factors had most likely brought about the selection of fungicide resistance in the Australian STB population.

"Firstly it is the expansion of intensive wheat production in the high rainfall zones as these environments provide ideal cool and wet conditions for STB to survive and thrive.

"The increasing adoption of stubble retention in farming systems has also provided the pathogen with the ability to survive from one season to the next in large population sizes.

"The widespread adoption of cheap fungicides to counter wheat stripe rust epidemics in the early 2000s is another factor.

"The collision of these factors all occurring in the same decade created an environment which has led to the evolution of fungicide resistance with the Australian STB population."

Not all triazoles are affected by resistance in STB in the same way, and strobilurin resistance has not yet been detected.

STB belongs to a special class of pathogens known as hemibiotrophs, and spends between 14 and 21 days of its life living inside wheat leaves without causing visible symptoms. The pathogen then transitions to causing visible disease symptoms which are necrotic lesions in which the characteristic black fruiting structures are observed.

Cultural controls

Andrew said integrated disease management involving cultural practices, varieties and fungicides was needed to combat STB.

A number of cultural practices can be used to decrease the amount of inoculum and as a result reduce disease pressure within a crop:

- Infected stubble is the major source of disease within a crop so not sowing wheat on wheat removes the immediate sources of infection;
- If sowing wheat on wheat cannot be avoided, removal of wheat stubble before sowing of the next crop by grazing, baling, incorporating and/or burning should be considered; and,
- Delayed sowing has been shown to reduce the rate of infection early in the season due to avoiding spore showers released from the stubble, but this needs to be balanced with yield penalties associated with later sowing times.

The choice of variety can have a major impact on disease development within a crop:

- The more resistant a variety is, the better the expected disease control, and the need for fungicides is lessened; and,
- There are STB disease ratings available for NSW, Victoria and South Australia. Because of regional differences in the performance of some varieties, caution must be used when choosing a variety for Tasmania using ratings from other regions.

Current advice about fungicide selection and spray timings is based on the most economical options to reduce the yield impact of the disease. But, according to Andrew, these strategies have not been developed in the context of how best to reduce the risk of fungicide resistance.

He said early disease control was important in lowering the population size and this could be achieved through a fertiliser or seed-applied fungicide, in addition to foliar fungicides. "This early control can also reduce the need for follow-up foliar fungicide applications."

New strategy needed

Andrew said that developing a better understanding of mutations in the CYP51 gene which lead to fungicide resistance would assist in formulation of strategies to hopefully delay further erosion of fungicide efficacies.

"Our goal now is to develop a strategy that will enable us to sustain the effectiveness of triazole fungicides in combination with different modes of action such as strobilurins while at the same time achieve good disease management."

The current advice is not to use an active ingredient from the same fungicide resistance group more than once in a growing season on the same crop.

Andrew said growers and advisers must follow label directions for the application of all products and the relevant state regulations pertaining to the usage of fungicides. ■

Cereal disease authorities are calling for a whole-of-industry approach to manage and reduce the impact of Septoria tritici blotch. (Photo: A Milgate)

Micro managing nutrients for higher yields

By GRDC western regional panel deputy chairman, Dr Mike Ewing

MONITORING crops for micronutrient levels could be a valuable strategy to set up optimal yields in future years, especially where lime has recently been applied. Western Australian research is showing that increased lime use is affecting micronutrient concentrations in crop plants and changing the residual value of these nutrients on acid soils.

To assess the micronutrient status of cereal crops, samples of flag leaves are the best bet for tissue testing analysis.

Researchers Ross Brennan and Craig Scanlan, from the Grains Research and Development Corporation's (GRDC) More Profit from Crop Nutrition (MPCN) program, say tissue testing will be particularly beneficial where:

- Lime has been applied in recent years on soils that were low or marginal for manganese (Mn) and zinc (Zn);
- Soils have been deficient in micronutrients and no micronutrients have been applied for 15 years or more; or,
- Mn has not been applied on forest gravel areas.

GRDC western regional panel deputy chairman Mike Ewing says WA trials supported by the GRDC highlight the importance of tissue testing for micronutrients to maintain adequate levels for optimal grain production.

Plant requirements for micronutrients

Plant requirements for micronutrients are affected by a range of factors, mainly crop species/variety and nitrogen (N) supply.

Previous WA research into the residual effects of copper (Cu), Zn, Mn and molybdenum (Mo) fertilisers, mainly for the cereal phase of the cropping rotation, has recommended relatively long periods between re-application of these micronutrients.

This has increased the probability that concentrations in crop plant tissue (whole shoots or youngest emerged leaves) are not being adequately monitored, potentially leading to situations where levels are low enough to limit grain production.

Ross, of the Department of Agriculture and Food WA (DAFWA), says the MPCN team is also finding that liming on acid soils reduces Cu, Zn and Mn concentrations but increases Mo in crop plants and can change the residual value of micronutrients.

He says at early stages of crop growth, and right up to flowering, Cu can be sprayed to improve pollination in an otherwise Cu-deficient cereal crop.

Trials set up through the GRDC-funded 'WA Micronutrient: West' project in 2014 showed foliar applications were not as effective as soil-applied Cu, so it is still important to follow-up with a soil application for next year's crops.

Ross says it is now too late to use foliar sprays to address Zn and Mn deficiencies for this year's grain production in WA.

But he stresses that tissue testing the crop can provide a good indication of micronutrient requirements for the next year.

Planning for 2016

Ross says, when planning for 2016, growers should note that early season foliar sprays and liquid micronutrients have proved to be highly effective in correcting micronutrient deficiencies.

He says foliar application of micronutrients provides an immediate response where a deficiency has been observed (with visual symptoms) or diagnosed by plant analysis.

If a crop is diagnosed as deficient after seeding, the optimum time to apply foliar sprays depends on the particular micronutrient.

Ross says, although micronutrient applications to young crops will have some wastage – as a portion of the spray will be applied to the soil rather than the plant leaves, correction of the deficiency is usually required early in plant growth.

This will provide better potential for reaching optimal grain yield than sprays applied later in the crop cycle.

Ross has recently updated the MyCrop website to assist with diagnosing micronutrient deficiencies. This information hub also outlines the recommended minimum plant micronutrient levels from tissue sampling for cereal, pulse and canola crops at various growth stages.

Other useful resources outlining micronutrient sampling guidelines and critical levels to help with deficiency diagnosis, analysis and decision-making include:

- **GRDC's Micronutrients Fact Sheet at: www.grdc.com.au/GRDC-FS-CropNutrition-Micronutrients**
- **GRDC's Wheat GrowNote at: www.grdc.com.au/GrowNotes**
- **International Plant Nutrition Institute (IPNI) Nutrient Deficiency Images Application (App): http://www.ipni.net/article/IPNI-3273**

Maize adds diversity and dollars for Riverina farming operation

WITH demand strong and export opportunities on the rise, maize could be the next winner for Australian farmers. Featured on the farmdiversity.com.au website, the well-known food staple is consumed by billions of people world-wide. This offers Australian growers an attractive diversification opportunity and a chance to tap into a high demand market.

The Maize Association of Australia CEO, Liz Mann said unlike other field crops that are potentially climate sensitive, maize can be grown Australia-wide.

"Maize production is unique compared to other field crops in Australia because it has the widest geographical spread; growing from tropical North Queensland, down to Victoria and Tasmania, and across to the Northern Territory and the southern regions of Western Australia," Liz said.

"Its hardiness and its potential for higher returns in comparison to some other traditionally grown crops makes it a perfect addition for those who are thinking of branching out and diversifying from their current cycle of crops."

Southern NSW farmer John Bruce decided to diversify his cropping operations almost two years ago, adding maize to his existing crops.

While the additional crop helps boost his income, the decision to diversify into maize was influenced by his access to water, the need to maximise his land assets better and access to reliable local markets.

"They call maize the recipe crop because it's very easy to grow, but it is critical that it's planted properly," John said. "It doesn't compensate like other crops so if you don't have good crop emergence because of poor sowing techniques or other factors you are costing yourself yield."

He said while returns can vary, growers should be able to – at a minimum – double the money they invested in growing the crop.

John and Sarah Bruce with daughters Lexie and Molly. Maize is a valuable rotation crop adding more diversity to their Riverina farming operation.

"We grow our maize on flood irrigation so it is quite labour intensive as opposed to rice which we also grow, but it is a very 'feel-good' crop and the return on investment is very good," John said.

He said the new addition of maize compliments his current cycle of crops with only a slight overlap come harvest time when it's time to sow the winter crops.

"I now have to employ someone during the busy April–May period but it's definitely worth it," he said. "More fingers in the pie reduce the financial risk – but you need to do your homework and find out what will work for you.

"It's important to take the time to plant maize properly and make sure your numbers stack up. If you can't make it work on paper there's a good chance it won't work in the paddock – but get the figures right and maize is a great addition to winter crops." ■

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Putting IT corn to the test

AUSTRALIAN farmers are increasingly looking to Clearfield technology to play a role in crop improvement. They already grow large acreages of Clearfield canola and wheat, while Clearfield corn and barley is growing in popularity.

The system is based on varieties bred with imidazolinone tolerance (IT), which allows use of Intervix in canola, wheat and barley, and Lightning in corn, the registered BASF products for use within the Clearfield system.

It allows for in-crop treatment of both broadleaf and grass weeds, and is classed as non-GM.

Ben Dennis, manager of Wagga Wagga grain trading business Dennis Trading, is seeing the potential of the Clearfield crops to clean up paddocks and glean high yields, planting IT corn for the first time in the 2014–15 season.

"The main reason for using IT was for a corn-on-corn option for better weed control," Ben said.

"I grew a conventional corn in 2013–14 and I didn't want volunteers taking away nutrients from the following corn, as it's somewhat expensive to grow."

The 50 hectares of PAC 607IT, planted in the first week of October (2014), also acted as a supplementary crop – bulking up the business' stock of the important feed ration.

"We have 10,000 tonnes of storage available and aim for 1500 tonnes of that to be corn, so by us growing it, we don't have to buy in as much.

"We're able to use our connections in the dairy industry to sell feed corn into this market."

Hands-on business

Ben runs Dennis Trading with wife Katie and parents Rodney and Michelle, servicing the Wagga region from their main depot, as well as from their second depot at Rannock.

Their principal business activities include bulk purchase, storage and sale of various grains including wheat, barley, pulses, bulk fertiliser, lime and gypsum.

Dennis Trading manager Ben Dennis (left) and Landmark Wagga Wagga agronomist Will Haines are new fans of IT corn.

They also have 200 hectares of irrigated land at the site for cropping and provide bulk haulage of grain, hay, fertiliser and milk.

Ben said he relied on his agronomist to pair the farm with suitable varieties.

"All I want in a season is a high yielding, mid to short season variety to capitalise on the feed market, as there's a lot of opportunity in the area."

Landmark Wagga Wagga agronomist Will Haines, who services the business, said last season's experiment with IT corn went well.

"Ben ended up with 13 tonnes per hectare, which was about the average for the area.

"I advised him to go with 607IT because he went back-to-back corn fields, so we wanted to put a stop to volunteers. That Group B chemistry also took care of the nutgrass."

Will said Dennis Trading had barley and oats in for the winter crop, and will make a decision on the summer crop soon. ■

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Few surprises on global wheat scene

Profarmer AUSTRALIA
www.profarmer.com.au September 15, 2015

THERE were few surprises with the mid-September release of the USDA's world agricultural supply and demand estimates (WASDE report) as the market had largely taken positions based on what they expected the USDA numbers to show.

With many northern hemisphere 2015–16 harvests wrapping up, the wheat crop in that hemisphere is largely known and the outlook is for an increase in global stocks relative to use this season.

The world wheat balance sheet is building a comfortable 'buffer' which is acting to reduce the market's sensitivity to potentially negative news.

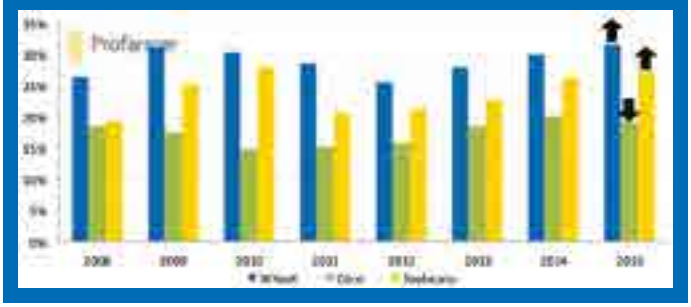
Corn stocks – on the other hand – are expected to contract this season with smaller crops globally and some production concerns in parts of the world (for example, dry conditions in Europe and Black Sea regions). This uncertainty has provided some spillover support to wheat over recent weeks as wheat can be substituted for corn in many feed rations.

Soybean stocks to use are also expected to relax this season.

The global picture remains one of sufficient supply and stock rebuilding and this continues to weigh on grain values.

But there are still some unknowns with northern hemisphere soybean and corn harvests in their early days.

World stocks to use



The USDA increased their world wheat production forecast by 5.0 million tonnes (mt) to 732 mt on the back of increases to EU and Black Sea production prospects. This was offset in part by increased consumption with more wheat expected to be used in feed rations at the expense of corn.

Total US wheat use increased but exports decreased as the US crop continues to struggle to find demand given the current strength of the US dollar. The ongoing battle of US wheat export sales continues to weigh on CBOT wheat values.

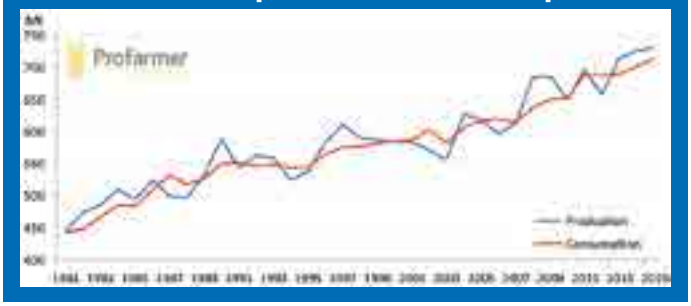
Although US exports were lower, global exports are actually expected to increase, indicating the US export challenge isn't because the demand isn't there, but because US product just isn't competitive.

Global appetite for wheat

As we head into the time of year when attention heats up on the Aussie crop, assuming we have the right product for the market, all signs indicate there is appetite globally for wheat. Although global production is expected to increase year on year, so too is consumption of wheat.

One crop which is in decline year on year (and month on month according to USDA numbers) is corn. In the September WASDE the USDA revised corn production lower than the market expected which supported both wheat and corn values.

World wheat production v consumption



Ongoing dry conditions in the EU also contributed to the 7.5 mt reduction to global corn production – now it is estimated at 978 mt. This has taken total global corn production nearly 30 mt lower year on year. Last year's mammoth US and South American crops mean carry-in stocks will make up for some of the reductions to production.

Nonetheless, corn stocks to use are expected to tighten year

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on year. US corn stocks are also expected to contract this season due to the smaller crop.

Soybean surprise

The USDA's soybean numbers also surprised the market, but not in a good way – US production estimates increased where the market was expecting a reduction.

The market still feels the USDA numbers are overdone, given current crop condition ratings this year versus last, the adjustment to yield is not thought to have been enough.

Whilst the USDA increased Canadian and EU canola crop estimates in the September report, year on year stocks are forecast to tighten sharply. Smaller plantings globally and poor expected yield results in Canada and the EU continue to weigh on production prospects.

World canola stocks to use

Globally, rapeseed consumption is expected to outstrip production this season, resulting in the tightening of stocks. Stocks to use are expected to reach their lowest level since the early 2000s. ■

PULSE NEWS

■ Todd Krahe, Wimpak

Pulse growers in the Wimmera and Mallee, in most cases, are still reluctant to forward contract pulses as the threat of a dry, hot finish to the season is still a very real possibility.

Lentils

Lentil markets have softened but still remain well above historical averages for this time of year. Harvest is nearing completion in Canada and the pressure to ship product promptly has been dragging their prices down, in turn softening our local prices as buyers compare product and price from all origins.

Larger varieties such as Flash and Jumbo are still achieving prices around $1000 per tonne delivered Wimmera and $1055 delivered Adelaide, while smaller Nipper type (including the now widely grown Hurricane variety) are trading at a discount of approximately $60 per tonne.

Chickpeas

Chickpea demand had slowed slightly by mid September, but as with lentils, prices were still historically high. Demand for new crop shipments has now spilled into January, which is welcome news for Victorian growers who struggle to meet delivery for November/December shipments.

Local Wimmera prices are currently around $720 to $740 per tonne Wimmera and $840 delivered Adelaide depending on time of harvest.

International buyers are also starting to show interest in new crop Kabuli type chickpeas.

Field peas

Field peas had gone off the radar slightly by mid September with international buyers reluctant to show firm bids for current crop shipments.

Shipments of Canadian peas have been at record high volumes since harvest commenced there, giving buyers cheaper options than our expected prices.

It must be emphasised that Kaspa type varieties are by far the easiest to market when targeting exporters/packers. International consumers have taken a liking to our Kaspa type peas and as such now attract a premium over Dun type peas.

Beans

Beans have fallen harder than other pulses recently. International demand has decreased as other origins are offering cheaper product.

Egyptian buyers will pay a premium for Australian faba beans over other origins, but the increasing price spread was becoming impossible to justify.

Currently, prices are around $330 to $350 per tonne delivered in the Wimmera area for No1 grade Fiesta and $430 delivered Adelaide.

Looking good for another big crop

By Australian Bureau of Agricultural and Resource Economics and Sciences

FAVOURABLE seasonal conditions in most cropping regions in Australia during winter have resulted in improved prospects for 2015–16 winter crop production. Winter rainfall in New South Wales was above average, and Western Australia and South Australia had timely rainfall events. But conditions were drier than average in all major cropping regions in Victoria during winter.

The outlook for spring rainfall is favourable for most cropping regions in Australia. In its latest three-month rainfall outlook (September to November 2015), issued on August 27, the Bureau of Meteorology forecast that wetter than average conditions were likely in most cropping regions in NSW, Victoria, SA and WA. Close to average spring rainfall is likely in most cropping regions in Queensland.

As a result of the generally favourable seasonal conditions over winter and the favourable outlook for spring rainfall, forecast winter national crop production in 2015–16 has been revised up from the ABARES June 2015 forecast. Forecast state production has been revised up for all states but Victoria is expected to be below average.

Total winter crop production is forecast to rise by eight per cent in 2015–16 to 41.4 million tonnes, largely as a result of forecast production increases in WA and NSW. Winter crop production is expected to rise in Queensland and Victoria but remain largely unchanged in SA.

TABLE 1: Australian winter and summer crop production and area

	Area ('000 ha)			Production (kt)		
	2013–14	2014–15	2015–16	2013–14	2014–15	2015–16
Winter						
Wheat	12,613	13,810	13,793	25,303	23,666	25,284
Barley	3814	3836	3996	9174	8014	8623
Canola	2721	2712	2347	3832	3464	3149
Chickpeas	508	425	662	629	555	990
Faba beans	152	164	259	328	284	419
Field peas	245	237	235	342	290	288
Lentils	170	189	213	254	242	321
Lupins	387	443	487	626	549	735
Oats	715	683	808	1255	1087	1409
Triticale	80	126	106	126	225	181
Summer						
Sorghum	532	651	651	1282	2104	2029
Cottonseed	392	202	214	1252	636	665
Cotton lint	392	202	214	885	450	470
Rice	75	71	66	819	724	655
Corn	52	67	66	390	389	406
Soybeans	31	27	31	62	54	63
Sunflower	26	24	23	31	30	29

Note: The crop year refers to crops planted during the 12 months to March 31.
Sources: ABARES; Australian Bureau of Statistics; Pulse Australia

Oats production is forecast to increase by 30 per cent.

For the major winter crops, wheat production is forecast to increase by seven per cent in 2015–16 to 25.3 mt and barley by eight per cent to 8.6 mt. In contrast, canola production is forecast to fall by nine per cent to around 3.1 mt, driven by an estimated 13 per cent fall in planted area (Table 1).

Among other crops, production of oats and pulses is forecast to increase in 2015–16 because of an estimated increase in planted area and generally higher forecast yields. Oats production is forecast to increase by 30 per cent to 1.4 mt and chickpeas by 78 per cent to 990,000 tonnes, reflecting very high chickpea prices at planting time.

Summer crops

The area planted to summer crops in 2015–16 is forecast to increase by one per cent to around 1.1 million hectares, reflecting a forecast increase in area planted to cotton. Total summer crop production is forecast to fall by two per cent to 3.9 mt, reflecting an assumed fall in average yields from 2014–15.

August rainfall was average to above average in most major summer cropping regions in northern NSW and southern Queensland. This rainfall increased the level of upper layer soil moisture, which is important for crop planting and establishment.

Area planted to grain sorghum is forecast to be largely unchanged in 2015–16 at 651,000 hectares. This reflects an outlook for average spring rainfall in growing regions. Assuming a return to average yields, production is forecast to fall by four per cent to 2.0 mt.

Area planted to cotton is forecast to increase by six per cent in 2015–16 to 214,000 hectares in response to expected favourable returns from growing cotton, compared with alternative crops. Australian cotton production is forecast to rise by four per cent to 470,000 tonnes of cotton lint and 665,000 tonnes of cottonseed.

The average storage level of public irrigation dams serving cotton growing regions was around 37 per cent of capacity on August 21, similar to the level at the same time in 2014.

Area planted to rice is forecast to fall by seven per cent in 2015–16 to 66,000 hectares, reflecting an expected fall in supply of water available for irrigating rice. Production is forecast to decline by 10 per cent to around 655,000 tonnes. ■

Quality and safety drive opportunities for grains and oils

AUSTRALIA'S reputation for quality products, underpinned by world's best practice safety and traceability systems, are helping open up new market opportunities for wheat and canola oil in Taiwan.

Over the past six months, trade initiatives and information seminars supported by Austrade have showcased Australian excellence in wheat and canola oil and emphasised the food standards and regulations that ensure the safety of Australian produce.

A recent initiative was the Australian Wheat Quality Seminar in Taipei organised with the Australian Export Grains Innovation Centre (AEGIC), to capitalise on Taiwan's increasing demand for premium-quality wheat for high-end products.

Martin Walsh, Austrade's Senior Trade Commissioner for Taipei, said the seminar attracted more than 50 Taiwanese buyers, millers and processors.

"They were given an overview of the Australian wheat industry, with a focus on production and end-use and providing a snapshot of 2014–15 wheat quality.

"With Australia currently the second largest supplier of wheat to Taiwan, behind the US, this initiative was an opportunity to illustrate the versatility and quality of Australian wheat to the Taiwanese processing industry," said Martin.

"There are approximately 21 flour mills in Taiwan, providing many new opportunities for Australian wheat varieties that can meet the growing needs of the Taiwanese population," Martin added.

Taiwan has a population of more than 23 million and consumes up to 56 kgs of wheat flour per person. It is a large producer and consumer of a wide range of noodles, which are ideally suited to Australian wheat varieties.

Martin said Australian wheat flour is predominantly used in Chinese noodles and steam buns. There has also been an increase in the popularity and demand for European-style breads and bakery products, which presents additional opportunities.

Martin said there are also opportunities for Australian exporters of canola oil and non-genetic modified (GM) products.

Austrade, together with the Australian Renderers Association and Australian Oilseeds Federation, also conducted the Australian Tallow and Canola Oil Food Safety Workshop. The workshop introduced Australia's food safety standards and regulations, as well as industry information on tallow and canola oil products after Taiwan faced problems from using recycled oil in 2014.

As Australia is the number one tallow supplier to Taiwan, the seminar helped address any confusion and misunderstanding of Australian tallow classification, production procedures and food safety controls.

Taiwan recently adopted a stricter product labelling regulation on genetic modified products. The demand for non-GM ingredients became greater due to this change. Given the majority of Australian-manufactured canola oil is non-GM canola, this may present opportunities for Australian canola oil products to expand into the Taiwanese market.

Contact Austrade on 13 28 78 or info@austrade.gov.au for more information about these business opportunities and exporting to Taiwan. ■

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Doha's dead end

By Ben Conner, Deputy Director of Policy – US Wheat Associates

SINCE 2001, trade negotiators around the world have been trying to reach an agreement to lower tariffs through World Trade Organization (WTO) negotiations known as the Doha Round. USW supports the goals of the Doha Round, because it would make US wheat more affordable to many of our export customers.

But to date there has been no indication that those goals will be realised. Instead, many countries have approached the talks with limited ambitions or expected much in return for little input. The July 31, 2015, deadline for a new negotiating plan passed with no results.

Part of the challenge is the difference between what are known as 'bound' and 'applied' tariffs in WTO terminology.

Bound tariffs are what countries agreed to as a maximum tariff rate on a particular product.

Applied tariffs are the tariff levels actually applied to products in a given year, though the applied level cannot exceed the bound level.

The discussions in the Doha Round have only considered cutting bound tariff levels, but these are often much higher than the applied tariff. For example, Kuwait has a wheat bound tariff of 100 per cent, but for the past three years has not applied any duty on imported wheat. If a Doha Agreement were to cut bound tariff levels by 90 per cent, that tariff level in Kuwait would still be much higher than the current duty-free rate.

Overall, there would be very few countries in the latest Doha negotiating document that would be obliged to grant significant additional market access for wheat.

Link between farm support and tariffs

In addition to the lack of meaningful market access, the latest Doha negotiating document – dating back to 2008 and often referred to as 'Rev 4' – would require the US to substantially reduce its ceiling on domestic support for US farmers. If there is to be a balanced Doha Agreement, any reduction in US farm support would have to be accompanied by reductions in tariff walls that other countries use to support their farmers.

Again, very few countries have been willing to do that.

A major shift has occurred since 2008, in that many countries using tariff barriers to protect their farmers are now also providing substantially higher farm subsidies. Several countries, including the world's two largest wheat producers (India and China), are blatantly violating their current WTO commitments on farm subsidies.

Entrenched argument

This is a simplified view of the dilemma that trade negotiators face, but it reflects one of the most entrenched arguments of the Doha Round. It is why negotiators missed the July 31 deadline for a new work program, and why it is virtually impossible for the discussions this fall in Geneva to produce any significant breakthroughs that resemble the original goals of the Doha Round.

The best approach would be for WTO members to agree at the Nairobi Ministerial in December this year to recalibrate expectations to match current realities ■

OPPORTUNITY FOR SOFT WHEATS

By Stephanie Bryant-Erdmann, USW Market Analyst

Over the past 15 years, Kansas City Board of Trade (KCBT) hard red winter (HRW) wheat futures prices averaged US$0.35 per bushel over CBOT soft red winter (SRW) futures. But recently, the gap between CBOT and KCBT narrowed and then flipped in the nearby September contracts due to bullish fundamental supply and demand factors affecting the SRW marketplace.

Traditional thinking may consider SRW as a 'commodity' wheat category, instead of a functional ingredient. SRW works well as a lower cost, blending wheat, so countries with government wheat purchase programs and subsidised foodstuff production – notably Egypt, which bought 3 million tonnes (mt) of SRW in the 2007–08 marketing year – used to dominate US SRW imports.

Today, the growing global middle class is demanding more dietary variety. Euromonitor reports that pastry and cake consumption is growing at a rate of about 3 per cent per year.

Biscuit and cracker production is also increasing as processors respond to changing demographics and the resulting retail and export sales opportunities for these product lines. To meet demand, they are turning to SRW, as well as soft white (SW) wheat.

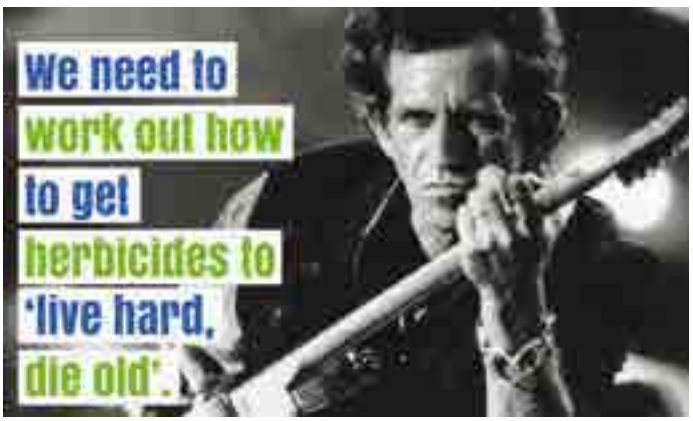
Similar to SW, SRW has low protein content, a soft endosperm and weak gluten that is well suited to the production of these products. Mexico, home to Bimbo, the world's largest baked goods company, and an increasing number of wheat food snack companies, has imported an average of 1.14 mt of SRW over the past five years. Similarly, Colombia, with two of the largest cookie and cracker companies in Latin America, increased total SRW imports by 37 per cent from marketing year 2013–14 to 2014–15.

This increased demand for the unique characteristics of SRW – along with potential supply issues foreseen by the global market in 2015–16 – indicates why SRW futures prices recently topped HRW futures.

AHRI **insight...**

Keith Richards, not Jimi Hendrix

THE old rock star adage is 'live hard, die young'. Keith Richards, on the other hand, has somehow managed to buck the trend and live hard, (and will) die old. How Keith has lived so long will go down as one of the world's great unsolved mysteries.



Many herbicides are living hard, dying young.

We need to work out how to get herbicides to live hard, die old.

Back in 2006, Prof Pat Tranel and others from the University of Illinois were investigating the first reports of glyphosate resistant waterhemp in the US. As they travelled around they saw completely weed free fields, while other fields had glyphosate resistant waterhemp exploding out of the top of the crop.

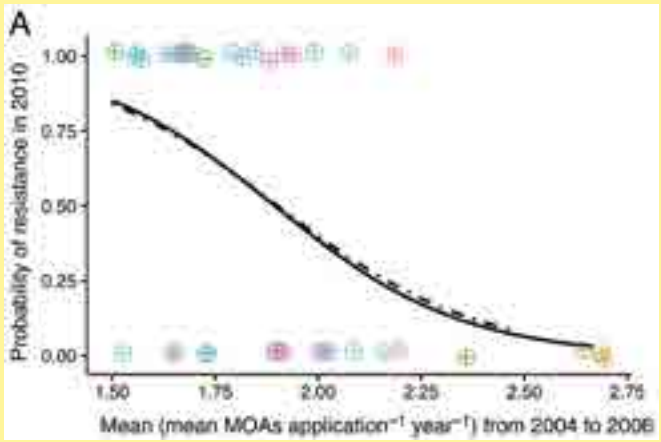
Fast forward to 2010 and these same researchers set out to discover why. They worked with a local spray contractor who provided them with nearly 500 site years of data from 105 fields. They looked at everything from environment, to soil, to landscape and management.

They found that the difference was due to management, specifically, growers that have used full rates of herbicides in mixes. Growers that used 2.5 herbicide modes of action (MOAs) on average per application were 83 times less likely to have glyphosate resistance than growers that had mixed 1.5 MOAs on average. They concluded that mixing herbicides is better than rotating between them to prevent herbicide resistance.

Pat summed it up perfectly by saying 'rotating herbicides buys you time, mixing buys you shots'. Using herbicides in mixes at full rates may be the key for herbicides to 'live hard, die old'.


Professor Pat Tranel.

FIGURE 1: The more MOAs, the less the resistance



Mixing is where it's at

Figure 1 says it all. Pat and his team reviewed herbicide application from 2004 to 2006 and then did glyphosate resistance tests in 2010. The probability of resistance in these fields declined sharply as more products were added to the tank. (MOA = mode of action = herbicide group).

Rotating buys you time, mixing buys you shots

If you have a herbicide where resistance typically evolves after five shots, then using it every second year will buy you some time, but resistance will still happen after five shots over 10 years. If there were big fitness penalties, then rotating may buy some shots, but most cases of resistance don't come with big fitness penalties.

Mixing this herbicide with other herbicides, all at full rates, is likely to buy some extra shots of the herbicide (Figure 2).

Why does this work?

Essentially, it's very rare for a single weed to be resistant to two herbicides before herbicide selection. If a weed gains a random mutation that gives resistance to a herbicide, and it is sprayed with two herbicides, at full rates, it will die and not set seed.

Mixing and rotating buys you time and shots, so why not combine the two and get the best of both worlds.

What is an effective mix?

We use a lot of herbicide mixes in Australia, but many of them do not include all of the herbicides at full rates. In many cases, crop safety and herbicide labels do not allow us to use all products in the mix at full rates. But there are plenty of examples where we can use mixes of herbicides at full rates and we owe it to ourselves to do so whenever practical.

A good herbicide mix is:

- Two or more herbicides;
- Each at full rates for the target weed;
- There is no resistance to any of the herbicides in the mix;
- No antagonism between herbicides;

FIGURE 2: Dose rate and resistance

- Physically compatible; and it's,
- Safe to the crop.

Tank mix or in sequence?

This study from the US focuses on tank mixes, but Pat Tranel commented to us that it doesn't all have to happen in the same tank and it doesn't all have to be about herbicides. Growers should ask themselves how many hits they can get at a single weed species in a given year. The double knock technique is the perfect example. We need to use the double knock approach in all forms of weed control – not just with knockdown herbicides.

Achilles heel of herbicide mixes

The waterhemp in this study has a resistance mechanism that is specific to glyphosate called gene amplification. Other resistance mechanisms for other herbicides can give cross resistance to a number of herbicides, for example metabolic resistance through P450 enzymes (this does not apply to glyphosate).

This is a threat to the mixing strategy as a single weed may be resistant to multiple herbicides. This is one reason why it's essential to not rely on herbicides alone.

Is mixing the complete answer?

The researchers in this study also concluded that herbicide mixing is not a universal panacea. It's not a permanent solution to the problem, but it will delay the evolution of resistance.

Does this mean that we have had it wrong all of these years by recommending herbicide rotation? No. Herbicide rotation is still a good idea, but perhaps we need to put more emphasis on mixes of products at full rates.

Mix and rotate is the answer, but not the entire answer. We need to team it up with non-herbicide tools as well.

About waterhemp

Waterhemp is a big, competitive weed that sets a lot of seed. Here are a few waterhemp facts:

- Member of the pigweed family *Amaranthus tuberculatus*.
- Known as the worst weed in Illinois and other western states.
- C4 plant so it grows fast in hot, wet conditions.
- It is dioecious – that is, some plants are male, others are female. This is great for transfer of resistant genes.
- Can set up to 1 million seeds per plant.
- Has evolved resistance to many groups of herbicide and multiple resistance in a single plant is common.
- And we think ryegrass is a problem!

TO SUM UP

US growers have created the world's biggest herbicide resistance problem by abandoning all other forms of weed control in favour of using just glyphosate. This is the rock star equivalent of dying in your twenties.

This research shows that mixing herbicides is better than simply rotating between herbicides from year to year. We can go one better, and hit the weeds with more knocks that don't come in a drum.

We need to think Keith Richards – not Jimi Hendrix. ■

Waterhemp is widely regarded as the worst weed in the US midwest. (PHOTO: Robin R Buckallew)

Identifying tiny wasps with the click of a mouse

By Jan Suszkiw, Agricultural Research Service – USDA

AT A GLANCE

- A new key-based system for identifying parasitic wasps has been developed.
- The system should help identify wasps with potential as biocontrol agents.
- It standardises description of Cynipoidea wasps in the Afrotropical Region.
- The system offers latest available information on 306 species and 54 genera.

DETERMINING the identity of parasitic wasps – some measuring less than a millimetre long – can be a time-consuming process that includes comparing their features to descriptions in published works and disparate specimen collections. And correct identification is critical, as these parasitic wasps lay their eggs inside other insect species, killing the host insect in the process. As a result, these wasps are used extensively, worldwide, to control pest insect populations in agriculture.

Now, making such identifications could begin with the click of a mouse.

An international team of researchers has published a new, online document called a 'monograph' that will make it easier

A new online resource, coauthored by an ARS scientist, will make it easier to identify and study parasitic wasps, such as this Angustocorpa wasp from South Africa (about 2.5 mm long). (Photo by Matt Buffington)

This Didyctium wasp is found worldwide (about 2.5 mm long). (Photo by Matt Buffington)

A light microscope image of a wasp species of Afrostilba (about 2.5 mm long). Members of this group are parasitoids of leaf-mining flies (Agromyzidae). (Photo by Matt Buffington)

A light microscope image of a wasp species of Leptopilina (about 2.5 mm long). Species in North America are being evaluated for biological control of spotted wing Drosophila flies. (Photo by Matt Buffington)

to identify and study wasps belonging to a group called the Cynipoidea. While these wasps are common worldwide, the monograph focuses on species from the Afrotropical Region. This vast area, encompassing all of Africa south of the Sahara Desert, as well as the southern Arabian Peninsula, Madagascar, and surrounding islands, is ripe for entomological discovery.

The monograph uses pairs of interactive, image-based identification keys – including those of wing shape, body segmentation, and other characteristics – to help users navigate to the correct genus or species of the wasp of interest, along with available biological, geographic, and other information about the insect, including locations of existing specimens.

"These wasps are critical components of natural and agricultural ecosystems, attacking the larval stages of pest flies, such leaf-mining flies and fruit flies," says Matt Buffington, a team member and entomologist at the ARS Systematic Entomology Laboratory in Washington, DC. "With this monograph now published, for the first time, these wasps of agricultural importance will be reliably identified by researchers worldwide."

In the Afrotropical region, the superfamily Cynipoidea is represented by 306 described species and 54 genera, but there are hundreds more species yet to be described, adds Matt, who coauthored a paper describing the monograph in the April 2015 issue of the journal ZooKeys.

The resource, which brings together all that's currently known about the Afrotropical members of this wasp superfamily "under one roof," will make it easier to identify and categorise new species as they're discovered. It will also broaden scientific understanding of their taxonomic associations and biological diversity.

Biological control

One important use could be the identification of wasp species having potential as biological control agents, such as those that parasitise crop-damaging flies or that form galls in the tissues of invasive weeds.

Historically, the identification of cynipoid wasps has been rather piecemeal. Some specimens that were collected were not cross-checked with existing repositories of the wasps, or closely related species went ignored entirely, leading to a spotty taxonomic effort. So, Matt and colleagues decided to pool their resources and expertise in conducting an exhaustive search and reexamination of specimens obtained from field sites and museum collections around the world.

"There are few regional keys to identification in the world that are useful, and we generated the first such key for the Afrotropical Region, with long-term plans to have keys such as these made available to other parts of the world over the next 10 years," said Matt, who collaborated with Simon van Noort of the Natural History Department at the Iziko South African Museum and Mattias Forshage, with the Swedish Museum of Natural History.

The final product resulting from this long-term initiative will provide an unparalleled comprehensive identification resource to a diverse array of economically and agriculturally significant wasp, bee, and ant species in the Afrotropical region and elsewhere, adds Simon.

Additional information:
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Systemic Entomology Laboratory, MRC-168. NMNH PO Box 37012. WASHINGTON DC, 20013.

■

Cover cropping brings multiple benefits

IN just six years, Victorian farmer David Cook has gone from a tyne-based seeding system and burning stubbles to full stubble retention with a dedicated no-till disc seeder.

But David was convinced he could evolve his system further, so he used a 2013 Nuffield Scholarship to investigate cover cropping, opportunistic summer crops and fertiliser use efficiency.


David Cook.

The Shepparton farmer says there was plenty of incentive for his research, including increasing organic carbon levels, improving soil health, better utilisation of fertiliser and integrated weed control.

"Cover cropping can improve soil health by aiming to grow as much ground cover in the non-crop phase of the rotation as possible, which for the majority of Australian farmers is at least 30 per cent of the year," David says.

Also, from a strategic point of view, where we're getting incidents of ryegrass resistance we can use summer crops and cover crops to try and combat that problem."

The Nuffield Australia scholarship program consists of the Global Focus Program, comprising six weeks of group travel touring the powerhouses of world agriculture, before scholars drill down into their individual research for a further 10 weeks.

Cover crops reduce knockdown use

David started his travels by heading to Switzerland, Germany, France and the UK, where he found innovators using cover crops with their existing rotations to almost eliminate knockdown herbicide use.

"One of the more innovative people I met was AgriGeneve agronomist Nicolas Courtois in Switzerland, who has been playing around with companion cropping. This involves different crops being sown together with the aim of harvesting one or more.

One combination Nicolas has trialled is planting buckwheat, canola and red clover straight after wheat harvest (July), with the aim over the following 14 months being to harvest buckwheat in late autumn (November), canola the following summer (July) and red clover in autumn (October) the year after the buckwheat – so three harvests from one seeding.

While Nicolas admits there are some difficulties in achieving this, it is being done by one farmer in France at a commercial level," David explains.

David then travelled across the Atlantic to the US and Canada to have a look at how their systems work, with interesting results.

"They've mixed their cover crops and diverse rotations with no-till systems, with the ultimate aim of increasing organic carbon levels to give them more options in the crops they use," he says.

David says while back at home in Shepparton they have already introduced the no-till seeding system, there's still much to be done.

"I guess I look at it like climbing a ladder – the benefits are going to accrue as we take our different steps – the first being the no-till system, the second step is full stubble retention, the third is the implementation of a controlled traffic farming (CTF) system to minimise soil compaction, which is the stage I have been at since 2009.

"The fourth step is trying to achieve close to permanent ground cover using whatever means possible, and the final step, dare I say, is looking at reintroducing livestock into the system," he explains.

Livestock and organic farming

While bringing livestock into a no-till CTF system might seem counter productive, David says his over-riding goal is to develop a system that builds organic carbon.

"I guess the main thing is you can't implement any of the strategies alone – the maximum benefit accrues when you apply them all in a system together, a strategy highlighted by a number of farmers I visited in the US.

"The livestock, through nutrient cycling, are probably going to accelerate any gains we can make," he says.

Summer crop opportunity

David has already worked for some time on developing the summer cropping component of the system, having first sowed an opportunistic summer crop trial back in 2009.

"Since then we've had a couple of wet summers where we've had millet as a cover crop, which has ended up being harvested as a commercial crop.

"Last summer (2014–15), we actually dedicated some land to summer crops (safflower and grain sorghum) after a wet autumn resulted in some paddocks not being sown – the safflower yield was disappointing at 0.7 tonne per hectare, but the sorghum was encouraging at 1.7 tonnes per hectare," he says.

In January 2015, David sowed 80 hectares of replicated cover crop mixes after rain in January, comprising a mix of summer species.

"I planted corn, sorghum, millet, sunflower, cowpea and soybean with winter wheat, winter canola and faba beans, with the aim to compare the yield of the following crop to our standard summer-sprayed stubble.

"I have also sown 40 hectares of autumn cover crops (rye, barley, oats, vetch, tillage radish and faba beans), which will then go back into a spring crop, probably sunflowers at this stage, which could be a useful strategy where we are starting to get some ryegrass resistance," David explains. ■

A $30,000 bursary is provided to Nuffield Scholars to study a topic of interest to themselves and of benefit to industry over a two-year period, which includes a six-week group trip and a further 10 weeks of individual travel and research.

David's scholarship was supported by the William Buckland Foundation.

Nuffield Australia provides opportunities to Australian primary producers and managers between the ages of 28 and 40 to travel the globe investigating a research topic important to them and Australian agriculture.

GRDC moves towards a greater regional presence

By Stuart Kearns, Executive Manager, Regional Grower Services – GRDC

THE Grains Research and Development Corporation (GRDC) recently commenced a comprehensive program to better equip the corporation to meet the changing needs of those we serve – Australian grain growers and the wider community. This focus on improvement will see more of our expenditure going directly into research, development, extension and commercialisation.

The GRDC is changing because:

- There has been significant growth in the industry from $8.5 billion in 2009–10 to $15.5 billion in 2013–14.
- State departments and our other traditional research partners are reducing their role in R, D and E, due to declining budgets.
- The private sector is playing an increasingly important role in grains innovations.
- Grains research is becoming progressively global.
- There are evolving industry and government issues and agenda that need to be carefully considered and taken into account (Industry Owned Company, relocation, Representative Organisations).
- There is still a general lack of awareness about what the GRDC does and the value that the GRDC brings to industry and the broader community.
- The GRDC no longer has a minor role in the Australian grains industry. The GRDC is growing in significance and influence, and as such we are expected to play a greater leadership role. The changes that we are implementing will grow our already substantial rural footprint. In 2014–15 the GRDC invested more than $196 million in grains related research. Much of this investment directly supports researchers, advisers and grower groups based in regional locations.

New regional HQs

As a consequence, the GRDC has decided to establish a number of regional headquarters, each led by a general manager charged with developing and implementing a regional strategy that coordinates investments in the medium (three to eight years) and short (one to three years) timeframes.

This new model will recognise the great diversity in environmental factors, farming systems and grower demogaphics across the country and deliver better coordination and tailored benefits to growers at the regional and local levels.

Our plan will establish four offices.

- The North will be served by offices in Toowoomba and Dubbo.
- In the South, we will be based at Roseworthy, although initially Adelaide; and,
- In the West, we already have an established office in Perth, but with the intent to move to Northam.

Under this plan, while achieving a significant transfer of focus and function to the regions, the GRDC will maintain a central office in Canberra to manage the more longer-term and more strategic research investments (eight plus years away from delivery) that serve all grain growing regions of Australia, which are best managed centrally with strong international interactions and collaboration. This will avoid any disruption to the capacity to administer key research programs currently underway and our ongoing capacity to attract and retain the brightest and best technical and professional people while our regional capacity grows.

It will also maintain the current close proximity to industry bodies, policy makers, and the Department, as well as key research partners such as CSIRO, the Australian National University and other RDCs.

Staff changes

A number of redundancies were announced in mid-June. The GRDC is in the process of recruiting staff to fill new positions in the regional offices as well as some in Canberra.

While the process is underway, we have some months to go before our restructure is complete and our new regional offices are open and fully functioning. We anticipate having this finalised by early 2016.

The corporation has made and will continue to make changes that we believe will significantly improve the GRDC, our ability to deliver and to position us and the industry well for the future.

The GRDC is also undertaking a significant review of our investment process and the systems we use to manage it, which will enable the corporation and our research partners to deliver even greater research outcomes.

For more information please see www.grdc.com.au

Seek out the science when making decisions

MANY producers are bombarded with vendors making great claims about their products. But how can growers tell if it's the real deal or snake-oil? Graminus Consulting director Jim Virgona, a former academic at Charles Sturt University and based at Wagga, says growers should ensure they are looking for evidence when assessing a product or service.

"A grower cannot be expected to analyse research papers for every decision they make, but they should apply a critical eye to claims presented to them," he said.

As an example of dubious claims, a study in 2002 on 28 commercially available liquid fertilisers on a range of crops gave a mean response in yield of zero, with variation consistent with probability theory – meaning that statistically there was no evidence to prove any of the products improved yield at all.

"Growers should apply four criteria to a claim – is it plausible, verifiable, applicable and economical?" Jim asks.

To determine if something being sold to you is the 'real deal', growers should look for supporting evidence. Not for profit agencies such as the GRDC are a good starting point.

Is it plausible?

Jim says nearly every choice or product in grain growing has pros and cons. Growers who are being sold something that is supposed to give a great benefit with no downside should ask questions about the claims.

Is it verifiable?

Often sensationalist claims have no good science backing them up so if growers hear a big claim, they should ask for the data behind it. Is it from a reputable organisation or funded by someone with self-interest?

"Find out if there is current knowledge based upon well designed and repeatable experiments, surveys or other scientifically acceptable approach. Growers should also be able to access the details of the work, not only be assured that it exists."

Is it applicable?

"Is the new technology considered in the context of the farming system? Have any flow-on effects been considered in the application of the technology?" Jim said.

Is it economical?

Growers can assess the economics of a new product by considering the verified benefits, compared to the cost to confirm if there is a positive cost benefit, and do some research to determine if it is the cheapest option.

Ask an expert

The best way to find out if something being sold is the 'real deal' is to look to a not-for-profit group, like the GRDC, which has access to the nation's best agricultural research and development, or an indepdendent advisor.

These organisations and advisers have no vested interest and have the scientific knowledge to see through any 'pseudo-science'. To access the GRDCs knowledge, growers can go online, search the GRDC website for that topic, ask the GRDC on social media, or contact a researcher directly through eXtensionAUS.

eXtensionAUS is a pilot network providing research-based resources online as well as an 'ask an expert' service from some of the country's foremost agricultural scientists. The service is currently active for field crop diseases and crop nutrition.

More Information: Jim Virgona, 0431 137 144, jim@graminus.com.au

Useful Resources:
http://www.extensionaus.com.au/ask-an-expert/
www.grdc.com.au/search ■

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Applying an artificial film to wheat can reduce water losses

FARMERS in climates where late-season drought occurs frequently may be able to increase wheat yield, according to research from The University of Western Australia. Researchers investigated the use of film-forming antitranspirants – which are emulsions of wax or latex that reduce water loss through transpiration – by forming a thin film on foliage.


Araz Abdullah.

Araz Abdullah, a northern Iraqi student from UWA's School of Plant Biology and Institute of Agriculture, conducted the research as part of his Master of Science (Agriculture) studies at UWA.

"The research showed that by applying the film-forming antitranspirants during booting – the most drought-sensitive stage in wheat development – the adverse effects of late-season drought on wheat growth and yield were alleviated," Araz said.

Two experiments were conducted in a temperature-controlled glasshouse at UWA to compare well-watered and water deficit watering treatments, with antitranspirants sprayed before booting, before flowering was complete, or not at all.

Improved grain yield outweighed limitations

Grain yield was improved in drought-stressed plants where the antitranspirants had been applied prior to the boot stage.

UWA Supervisor and Project leader, Professor Kadambot Siddique, said the application of film-forming antitranspirants could restrict photosynthesis and limit growth, but that the new research showed that reducing water loss during booting in wheat development outweighed any photosynthetic limitations.

"The current research showed the antitranspirant application at the booting stage increased grain yield in drought-stressed wheat plants by increasing grain set and this outweighed any photosynthetic limitations," Siddique said.

"Antitranspirant application may have a significant positive impact on crop yields and priority should be given to testing the wider applicability of these results, especially under field conditions in rainfed environments."

The findings from this research were published in a paper entitled "Film antitranspirants increase yield in drought stressed wheat plants by maintaining high grain number" in Agricultural Water Management.

The research is a part of Araz's Master of Science studies supported by the Australian Centre for International Agricultural Research (ACIAR) in collaboration with UWA and the International Centre for Agricultural Research in the Dry Areas (ICARDA).

For more information: Please contact Professor Kadambot Siddique – UWA Institute of Agriculture, 08 6488 7012 – kadambot.siddique@uwa.edu.au ■

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Perten INSTRUMENTS

Accessing equipment data from any device

AGRICULTURAL machinery provider Case IH has unveiled a new data system giving farmers real-time access to farm equipment information – including location, diagnostics, agronomic data, and fuel and engine statistics as they would see in the field – from web-enabled devices such as computers, smartphones and tablets.

Bruce Healy, Case IH Country Brand Leader said, "AFS Connect takes our Advanced Farming Systems to a whole new level of connectivity, giving farmers real time access to and control of their data, and the ability to share it with others.

"The AFS Connect dashboard is bold, crisp and easy to read, giving a clear display of machine health parameters such as engine speed, hydraulics, oil temperature, fuel level and more.

"Farmers can monitor anything that uses power, from farming machines to road vehicles, allowing them to quickly identify and troubleshoot breakdowns, monitor progress in real time and send messages to equipment operators.

"Plus, farmers now have the option of sharing equipment data directly with their machinery dealer specialist to get immediate diagnostics and troubleshooting support, without needing to get them onsite.

"Simplicity is the key to efficiency, and this system is simply a delight to use," says Bruce.

Case IH has also recently launched other new technology advancements, including the new range of more powerful and portable irrigation power units, and premium fuel efficient Genset engines by sister company FPT Industrial.

"Case IH works closely with FPT in using innovative technology and design to make engines more efficient, higher performing, and improving flexibility – and of course they are customised for Australian needs and conditions," said Bruce. ■

Broadacre spraying equipment specialists

CROPLANDS spraying equipment are top performers within the Australian broadacre trailed market. Their robust chassis, superior boom stability and straightforward operating systems put them in a class above the rest. Integral to providing a quality and reliable product, is the feedback Croplands receives from farmers and machinery dealers.

Croplands are the leaders in Optical Spot Spray Technology with their innovative WEEDit trailed sprayer. The WEEDit technology is proven to assist Australian broadacre farmers achieve substantial chemical savings, improve water retention, delay the onset of herbicide resistance and lower weed seed banks.

Contour following boom

Croplands have combined WEEDit near infrared sensors, with their own specifically engineered contour following boom and an easy-to-use in-cab monitor for the smartest broadacre application system on the market today. WEEDit's auto-calibration ensures optimum performance is maintained, even in the most challenging conditions.

Jock McNeil, cropping manager at Smimac Farming has been a WEEDit owner since 2009 and has experienced the many efficiencies this technology has to offer.

"With nearly five years of relentless summer weed spraying and stopping seed set, the farm performance has, and still is improving. We are now storing moisture, retaining nutrients and lowering disease levels in our soil which has increased production significantly," Jock said.

Increasing demand for larger sprayer capacity

The Croplands Pegasus 8000 litre trailed sprayer is designed to cater for the increasing demand for larger sprayer capacity. This impressive machine was specially designed for large scale farming, with boom sizes available in 30, 33 and 36 metres.

Ten years of solid development has ensured that the steel construction of the Pegasus boom can handle the tough Australian conditions and massive workloads they endure.

The Pegasus is also available with 5000 and 6000 litre tanks, and boom sizes ranging from 24 to 36 metres.

Croplands' 4000 and 3000 litre Pinto offers Pegasus styling with its own practicality. Its boom sizes range from 16 to 24 metres with high quality suspension for a cushioned boom ride.

A central control panel has been designed for both machines to make operation easier. All controls for filters, flushing, chemical induction and hand washing are included on the control panel and clearly marked for quick, easily accessible operation.

It has large single wheels fitted to a heavy duty axle for less compaction and crop damage. The height adjustable hitch and swivel eye drawbar enables optimum weight distribution and balance. ■

New air cart to set a new standard

FLEXI-COIL'S innovative new 60 series air carts set a new standard in seeding and application accuracy, productivity and efficiency. The new air carts will be in Australia for demonstrations in 2016 and available for seeding in 2017.

Flexi-Coil Australia brand leader Steve Mulder says the new 60 series air carts were designed from the ground up and they replace the Flexi-Coil 40 and 50 series. They are ideal for broadacre farmers growing cereals, legumes and oil seeds.

"Flexi-Coil is an industry leader and this new air cart maintains the company's tradition of being at the forefront of product development. It's the next big thing and is years ahead of our competitors' air carts."

The Flexi-Coil 60 series offers seven air carts, with capacities ranging from 12,234 litres to 33,477 litres. They set a new standard for accurate, reliable air seeding and include a number of patent-pending features.

Innovative features

Among the innovative features of the new series is the FlexRate sectional control, which allows you to individually control up to 10 sections of the implement. FlexRate gives greater application accuracy than ever before and eliminates double applications of seed and fertiliser.

Each metering system is operated by an independent patented, 24-volt electric drive motor with integrated controls. Fertiliser and seed can be applied in single-shoot or double-shoot application with the FlexRate modular metering system.

The 5860 air cart is 5.62 metres wide and has four tanks, including an 881 litre small seeds tank. It comes with standard bin level and tank pressure sensors with alarms, and four in-tank and rear-view cameras.

A fast-fill conveyor with remote control and a pneumatic fill system for the small seed tank ensure quick, efficient filling.

"The remote controlled conveyor works extremely well. It is user friendly and makes filling quick and easy, so you get maximum productivity out of it," Steve says. ■

Flexi-Coil brand leader Steve Mulder says the new 60 series air carts will set a new standard in seeding technology.

Irresponsible disposal costly and harmful

INCREASED scrutiny from consumers and the wider community means responsible waste disposal and good farm environmental management practices are more important than ever if farmers are to maintain consumer confidence.

In June 2015, a Cowra vineyard operator was convicted and fined $15,000 in Orange Local Court and ordered to pay the prosecutor's costs of $20,000 after pleading guilty to polluting waters on an estate near Orange.

The NSW Environment Protection Authority (EPA) prosecuted the operator after the residue from 21 drums, containing the pesticide chlorpyrifos, was emptied into a constructed stormwater drain on the estate.

In another example of irresponsible disposal, the Victorian EPA fined an Echuca man for setting industrial waste, including plastic drums, on fire on a site not permitted to receive it in June 2015.

Following the EPA investigation, the man was fined $1771 for burning the waste.

*drum*MUSTER and ChemClear are perfectly placed to provide Australian farmers with a simple and cost effective way to keep their farms clean and protect the environment.

In the first instance, had the operator in Orange utilised the services of ChemClear, he would have been able to dispose of his chemicals at a significantly reduced cost.

Collection of Group 1 chemicals is free to waste holders due to a levy applied at the point of sale. Alternatively, had the operator in Orange registered the chemicals as 'unknown, unlabelled, expired or no longer registered for use' (Group 2 eligible), it would have cost him $3500 including freight to dispose of them in a safe manner.

National ChemClear Program Manager Lisa Nixon said, "If the Cowra farmer had registered his obsolete chemicals with ChemClear, he would have had two opportunities in the last two years to have them collected in his local council area".

In the second case, the operator could have delivered his plastic drums only kilometres away at the Echuca Environment Centre, one of 789 *drum*MUSTER collection sites available across Australia for the recycling of chemical drums.

Visit www.chemclear.com.au or www.drummuster.com.au for more information about the programs. ■

District Reports...

September–October 2015

Western region

WESTERN REGION SUMMARY

Winter crop prospects have improved in Western Australia as a result of timely rainfall events in the grains belt during the end of July and early August. This rainfall increased soil moisture to favourable levels. It followed generally unfavourable seasonal conditions during June to late July, when rainfall was generally average to below average.

In its latest three-month rainfall outlook for spring (September to November), issued on 27 August 2015, the Bureau of Meteorology forecast the chance of spring rainfall exceeding the median in the Western Australian grains belt at 60 per cent to 70 per cent.

Total winter crop production in WA is forecast to increase by 9 per cent in 2015–16 to 15.8 million tonnes. Given the late winter rainfall and the favourable rainfall outlook for spring, crop yields for the state are forecast to be above average. But crops in some southern regions and earlier sown crops in all regions are expected to achieve around average yields.

Wheat production is forecast to increase by seven per cent in 2015–16 to 9.5 mt, largely reflecting a forecast 6 per cent rise in average yield to around 1.9 tonnes a hectare. Area planted to wheat is estimated to have risen by one per cent to 5.2 million hectares.

Barley production in WA is forecast to rise by 10 per cent in 2015–16 to around 3.4 mt, reflecting an estimated 5 per cent rise in planted area and a forecast four per cent increase in average yield.

Canola production is forecast to fall by five per cent in 2015–16 to 1.5 mt. Area planted to canola is estimated to have fallen by nine per cent to 1.2 million hectares, which partly reflects an increase in area planted to minor crops such as lupins and oats.

Lupins production in WA is forecast to rise by 39 per cent in 2015–16 to 532,000 tonnes, reflecting an estimated increase in planted area and forecast higher yields.

MAJOR CROP PRODUCTION FORECASTS, 2015–16

	Area ('000 ha)	Yield (t/ha)	Prod'n (kt)	Prod'n change (%)
Western Australia				
Wheat	5150	1.85	9528	7
Barley	1350	2.50	3375	10
Canola	1200	1.29	1548	–5
Lupins	326	1.63	532	39

Note: Production change is relative to last season. Yields are based on area planted.
Sources: ABARES; Australian Bureau of Statistics; Pulse Australia

Australian Bureau of Agricultural and Resource Economics and Sciences
September, 2015

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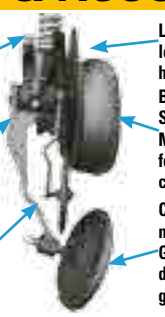

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NORTH

Since my last report in early July the district has received very good rainfall from late July through August. Some areas managed upward of 100 mm over this period.

Wet conditions at this time of year in our part of the world mean exceptional plant growth rates and crops took off. The turnaround by the crops after a dry June and early July was fantastic. Light crops have bulked up and the crops that were doing well at the start of the wet conditions are now looking pretty awesome.

Our loam soils have high potential crops on them while the sand soils are a bit behind – but getting better. Deep ripping, particularly deeper than 600 mm, is making a large difference in crop growth especially during dry spells. I hope it equates to yield improvements when the header hits these paddocks in a few weeks.

Warm conditions are on us now with two days this week above 30°. This means it is pretty much all over for season 2015.

Wheat crops are mostly finished and grain quality for all but the latest sown crops will be good. Some crops are on the turn in the Binnu area and headers will be going this month. There is some leaf disease in the area but most crops are beyond requiring any fungicide.

Canola crops are generally very good with the Roundup Ready hybrids leading the way for growth, as well as standing up to

stress and insects. Crops should be above average in most areas particularly on loam soils where there were good early rains.

Lupins are generally well grown and smothered in pods.

Lupins in the northern region of WA have grown very well and are smothered in pods. Some record yields may well be harvested.

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Infrequent rainfall suits this crop and we could see some farms set a new record lupin yield. We will know in a few weeks.

Albus lupin crops in coastal areas have also loved conditions this season and should generally yield very well.

Barley is looking very good in most areas. Recent hot temperatures will have some crops struggling for grain size but there should still be a reasonable yield. New, higher yielding varieties are helping boost confidence in the crop again. I hope crops yield as good as they look and we see more barley in our area in coming seasons.

Overall we are looking at a slightly above average season with some crops in the northeast likely to be close to the best ever. Unfortunately, some farms in the Irwin area are likely to have one of their worst ever crops.

Let's hope it cools down and there is another rain in the next week or so to get all crops finished well. Harvest should be underway in the next couple of weeks.

Peter Norris
Agronomy For Profit and Synergy Consulting, Geraldton
September 8, 2015

Seasonal rainfall across the grain regions – 25 year averages and year to date

Brought to you in association with JOHN DEERE	25yr Annual Average (mm)	2015 rainfall to date (mm)	Summer 25yr Annual Average (mm)	Summer 2014–15	Autumn 25yr Annual Average (mm)	Autumn 2015	Winter 25yr Annual Average (mm)	Winter 2015	Spring 25yr Annual Average (mm)	Spring 2015 to date
Emerald Qld	549	199	242	283	112	20	60	43	122	0
Toowoomba Qld	662	369	272	339	130	212	82	63	121	6
Roma Qld	578	286	247	286	128	54	72	100	126	16
Goondiwindi Qld	608	457	251	308	124	158	66	109	135	0
Narrabri NSW	633	439	227	148	119	252	126	98	160	10
Gunnedah NSW	660	374	234	178	118	163	129	107	177	2
Dubbo NSW	609	479	197	239	132	138	128	172	152	7
West Wyalong NSW	444	354	113	166	86	33	118	189	126	10
Wagga Wagga NSW	537	469	130	133	114	85	151	259	143	18
Swan Hill Vic	322	151	73	20	65	37	89	83	95	16
Bendigo Vic	514	289	109	77	102	84	167	113	136	25
Horsham Vic	384	194	75	84	70	38	132	61	107	22
Lake Bolac Vic	529	272	117	78	100	82	160	113	152	19
Murray Bridge SA	369	287	66	65	76	129	128	83	99	17
Kadina SA	343	198	58	31	77	54	120	112	88	14
Cummins SA	395	342	51	47	87	104	175	176	82	33
Esperance WA	615	428	80	30	142	155	249	211	144	54
Wagin WA	402	242	46	16	95	97	171	109	89	21
Northam WA	404	291	42	19	85	81	192	177	86	15
Mingenew WA	366	158	31	1	92	56	176	98	68	0
Moora WA	384	366	43	51	86	77	183	223	72	16
Mullewa WA	309	406	48	40	90	230	131	135	50	3

Last rainfall reading September 14, 2015.

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September–October 2015

SOUTH COAST

Seasonal conditions on the South Coast of WA continue to be favourable for most of the region. Rainfall during August and the first half of September has been very good. In some places the rain has been too good causing some waterlogging which will have a negative impact on crop yields. The waterlogging is mainly confined to an area 20 km north of Esperance, extending 120 km to the east. All other areas are experiencing a very good season.

CBH is forecasting a record crop for the Esperance port zone. This forecast is very realistic if the weather remains mild for the remainder of September and October.

Local growers are now busily preparing for a big harvest and getting their heads around the logistics involved in taking off and transporting a potentially record crop. Good quality used headers and grain handling equipment – especially grain bags – are all in high demand.

Harvest should start by early to mid October. Some of the early sown canola will be ready for windrowing or desiccation in the last week of September.

Harvest will be a slow process with the high yielding crops and large stubble loads that will have to be managed well to prevent seeding hassles in 2016.

Quenten Knight,
Agronomist, Precision Agronomics Australia
September 13, 2015

Mark Wandel from Scaddan on WA's South Coast, is all smiles with his massive crop of GT-50 RR canola.

Southern region

SOUTHERN REGION SUMMARY

South Australia

Timely rainfall in August improved the outlook for 2015–16 winter crops in SA, following unfavourable seasonal conditions in early winter. Below average rainfall in many cropping regions in June and July resulted in falling levels of soil moisture. Winter temperatures were below average in parts of the Eyre Peninsula and the northern districts, which slowed crop development.

Yields are forecast to fall slightly but still compare favourably with the 10-year average to 2014–15. Over the 10 years to 2014–15, average yields for wheat, barley and canola in SA were 1.7 tonnes a hectare, 1.9 tonnes and 1.2 tonnes respectively.

In its latest three-month rainfall outlook for spring (September to November), issued on 27 August 2015, the Bureau of Meteorology forecast the likelihood of rainfall exceeding the median in most cropping regions in SA at 60 to 65 per cent.

Total winter crop production in SA is forecast to be largely unchanged in 2015–16 at 7.5 million tonnes, reflecting an expected decline in average yields. Area planted to winter crops is estimated to be one per cent higher in 2015–16, at around four million hectares.

Wheat production is forecast to fall by three per cent in 2015–16 to around 4.5 mt, reflecting a forecast decline in average yield from 2014–15. Area planted to wheat is estimated to have been largely unchanged at 2.4 million hectares.

Barley production is forecast to increase by four per cent in 2015–16 to two mt. Area planted to barley is estimated to have increased by seven per cent to 935,000 hectares, reflecting expected favourable returns compared with production alternatives. But average yield is forecast to fall by four per cent to 2.1 tonnes a hectare.

Canola production is forecast to fall by 14 per cent in 2015–16 to 281,000 tonnes, largely reflecting an estimated 21 per cent decline in planted area to 225,000 hectares. If realised, this would be the smallest area planted to canola in SA since 2010–11. The estimated fall in planted area was a response by producers to relatively unfavourable returns from growing canola compared with barley and pulse crops.

Victoria

Seasonal conditions have been unfavourable in the major cropping regions in Victoria. Winter rainfall was significantly below average, particularly in August, and soil moisture levels are well below average. Rainfall has been sufficient for crops to continue developing but yield prospects have declined. Sufficient and timely rainfall during spring will be critical given the current condition of crops in Victoria and the below-average levels of soil moisture.

The Bureau of Meteorology has forecast the chance of rainfall exceeding the median as above 50 per cent for most key cropping areas in Victoria. BOM has also forecast cooler than average daytime temperatures in Victoria.

Total winter crop production in Victoria is forecast to rise by three per cent in 2015–16 to 5.7 million tonnes, which largely reflects an

expected increase in yields. But even with favourable spring rainfall, yields would still be expected to be below average.

Wheat production is forecast to rise by four per cent in 2015–16 to around 2.8 mt. Average yield is forecast to increase by 3 per cent, following below average yields in 2014–15.

Barley production is forecast to increase by six per cent in 2015–16 to 1.7 mt. Planted area is estimated to have risen by three per cent and average yield is forecast to rise by three per cent. The estimated increase in area planted to barley is likely to have been at the expense of area planted to canola.

Canola production is forecast to fall by 19 per cent in 2015–16 to 485,000 tonnes. Planted area is estimated to have declined by 19 per cent, reflecting unfavourable seasonal conditions and relatively low prices at the time of planting.

MAJOR CROP PRODUCTION FORECASTS, 2015–16

	Area ('000 ha)	Yield (t/ha)	Prod'n (kt)	Prod'n change (%)
South Australia				
Wheat	2360	1.92	4531	–3
Barley	935	2.14	2001	4
Canola	225	1.25	281	–14
Victoria				
Wheat	1625	1.75	2850	4
Barley	960	1.82	1745	6
Canola	365	1.33	485	–19

Note: Production change is relative to last season. Yields are based on area planted.
Sources: ABARES; Australian Bureau of Statistics; Pulse Australia

Australian Bureau of Agricultural and Resource Economics and Sciences
September, 2015

WESTERN MURRAY VALLEY

As we move further into spring, crops throughout the district are demanding more moisture. By mid September, the WMV has received 140 to 160 mm of growing season rainfall. The miserly 25 mm of summer rainfall contributed very little to stored soil moisture. Our district is currently on a Decile 4 rainfall level. If we have an average spring in terms of rainfall (Decile 5), cereal yield predictions are currently 2.5 to 2.8 tonnes per hectare.

Despite the late start to the 2015 winter season, most crops have grown rapidly with the consistent but small rainfall events. Many growers have topdressed nitrogen and the crops have good biomass despite the late start. Wheat, barley and oats are all on a good cereal growth stage track with flag leaf emergence generally happening between September 8 through 15.

Canola has struggled to cabbage with the late start and once again, early sown crops have done well and still have potential to maximise the benefits of any spring rainfall.

Field peas sown prior to mid May are in reasonable shape with around a 30 cm tall biomass. Later sown peas will be heavily reliant on spring rainfall as flowering has commenced, and without extra biomass, harvest will be difficult.

This again demonstrates the importance of sowing in the early part of the ideal window.

Interest in buying temporary water

Water allocations from Murray Irrigation Limited are currently at zero per cent. With this in mind, temporary water is trading at $190 to $210 per megalitre.

Growers are reluctant to purchase water for irrigating winter crops but it's very tempting with the relatively strong cereal and canola prices. We should be able to obtain 1.2 to 1.5 tonnes of cereal grain for every megalitre of irrigation water applied.

There's a big variation around the mean with this 'conversion' amount depending on soil type, irrigation layout, crop maturity and nutritional status.

Winter crop irrigators who are investing in their wheat and canola, are eagerly watering as evapotranspiration rates in August go from two mm per day up to two to four mm per day in September. With this irrigation, growers are also doing budgets on the extra nitrogen required to reach the desired yield potential. They are also applying copper where necessary and getting the appropriate fungicide program in place.

Summer cropping, given the zero water allocation, will be nearly non-existent. This is a big concern in a rice growing region. But bore pumpers will shandy carryover water from last year and grow some rice with the hope that prices reach the $400 plus per tonne level.

The area planted to corn will also be reduced substantially as export prices are under pressure from cheap US supplies.

Stripe rust management

The time for stripe rust protection of our wheat crops is upon us. Even without big spring rain – as predicted – we still need to remember from years past how a small investment in protecting

District Reports...

September–October 2015

the crop can reap big rewards. Local trials have demonstrated that even in a 1.5 tonne per hectare season, we could be 300 to 400 kg per hectare better off compared to a nil fungicide treatment strategy.

We now have cheap and very effective stripe rust protection products such as Opus (epoxiconazol) costing around $5 to $6 per hectare and Folicur (tebeconazol) at $2.50 to $3.50 per hectare. This makes the 'do I or don't I' decisions much easier given the potential grain returns.

Some recent armyworm damage in barley crops is happening and we are finding more patches of pasture webworm, cutworm and wireworm. It's also worth mentioning that earlier in the season we also experienced more intense activity from slaters, slugs and millipedes.

This looks to be an ongoing issue with our cultural practices of direct drilling and stubble retention systems – just another challenge for us to overcome.

Good luck with spring and fingers crossed for some decent rainfall.

Laurence Pearce
Agronomist – IK Caldwell, Deniliquin NSW
May 18, 2015

WIMMERA/MALLEE

Yield potential in the area ranges from average to below but many crops have lost a lot of potential during August and early September. This is mainly due to low rainfall and increasing temperatures. Frost has also taken its toll.

Is this frost damage? This plant was collected from a Rupanyup paddock. It's most likely due to frost but samples have been sent away to cancel out nutrition as a cause.

Similar to recent years, symptoms have been exacerbated where there was limited soil water, sub-soil constraints (boron), heavier clay based soils, cereal on cereal or crops later sown.

There are also patches of crops where moisture stress has caused the flag leaf to die.

On the upside, a number of areas received 20 mm or more in August and potential is not far from average.

It's pretty amazing how crops can now grow on limited rainfall with our improved farming systems.

Stem frost

In the central/northern Mallee some stem frost has occurred in cereals. Experience from last year showed that tillers may be unaffected and can compensate. If damage is severe, cutting for hay is an option but it's important to do your sums carefully as there may not be as much bulk as you assume.

Deanne Ferrier
Birchip Cropping Group
September 14, 2015

Northern region

NORTHERN REGION SUMMARY

New South Wales

Seasonal conditions were generally favourable during winter in most cropping regions in NSW, despite the presence of a strong El Niño event. In the southern cropping zone, rainfall was well above average when crops were flowering. In the northern cropping zone, crops were not planted in some areas in the north-west because of unfavourable conditions earlier in the season. But crops in the north-east, and those that were planted in the north-west, benefited from rainfall in August and most are in a satisfactory condition.

In its three-month rainfall outlook for spring, issued on 27 August 2015, the Bureau of Meteorology forecast the chance of rainfall exceeding the median in the southern and central cropping zones at more than 50 per cent. In the northern cropping zone, it forecast the chance of rainfall exceeding the median at around 50 per cent.

Total winter crop production in NSW is forecast to increase by 14 per cent in 2015–16 to 10.5 million tonnes, reflecting the expectation that increases in production of wheat, barley and pulse crops will more than offset a small forecast fall in canola production. Average yields are forecast to be higher than last season, reflecting favourable seasonal conditions in the central and southern cropping zones.

Wheat production is forecast to increase by 15 per cent in 2015–16 to 7.2 mt, driven by a forecast 15 per cent increase in average yield to around 1.9 tonnes a hectare. Area planted to wheat is estimated to have remained largely unchanged at around 3.9 million hectares.

District Reports...

Barley production is forecast to increase by 14 per cent in 2015–16 to around 1.4 mt, reflecting an estimated increase in planted area and a forecast increase in average yield. Planted area is estimated to have increased by five per cent to 670,000 hectares and average yield is forecast to increase by nine per cent to two tonnes a hectare.

Canola production is forecast to fall by eight per cent in 2015–16 to around 833,000 tonnes, reflecting an estimated decline in planted area in response to less favourable returns than barley at the time of planting. Average yield is forecast to be 8 per cent higher than last season, at 1.5 tonnes a hectare, because of more favourable seasonal conditions in southern NSW.

Total area planted to summer crops in NSW is forecast to increase by two per cent in 2015–16 to 481,000 hectares. Total summer crop production is forecast to be around 2.1 mt.

The planting window for summer crops in northern NSW runs to around mid January.

Area planted to grain sorghum is forecast to be largely unchanged in 2015–16 at 205,000 hectares. Grain sorghum production is forecast to fall by six per cent to 707,000 tonnes, which reflects an assumed fall in average yield.

Area planted to cotton is forecast to rise by 7 per cent in 2015–16 to 139,000 hectares, because more favourable returns are expected from growing cotton compared with production alternatives. Cotton production is forecast to increase by 6 per cent to 309,000 tonnes of cotton lint and around 437,000 tonnes of cottonseed. Average yield is assumed to fall by one per cent to 2.2 tonnes a hectare.

Area planted to rice is forecast to decline by seven per cent in 2015–16 to 65,000 hectares, reflecting an expected decline in supply of water available to irrigate rice. Production is forecast to fall by 10 per cent to 650,000 tonnes, reflecting the forecast decline in planted area and an assumed three per cent fall in average yield.

Queensland

Favourable winter rainfall has improved the winter crop prospects in Qld. Rainfall in south-western Qld was above average and was average to below average in most other cropping regions in Qld.

In its August 27 outlook, BOM forecast a 30 to 40 per cent chance of rainfall exceeding the median in Qld's cropping regions in September 2015. Harvesting of winter crops in Qld is expected to begin in late September.

Total winter crop production in Qld is forecast to rise by 26 per cent in 2015–16 to 1.8 mt, largely driven by forecast record chickpea production. Total area planted to winter crops is estimated to have risen by five per cent in 2015–16 to 1.2 million hectares.

Wheat production is forecast to increase by seven per cent in 2015–16 to around 1.1 mt. Area planted to wheat is estimated to have fallen by 11 per cent to around 750,000 hectares.

Chickpea production is forecast to more than double in 2015–16 to a record 518,000 tonnes. Area planted to chickpeas is estimated to have doubled to 338,000 hectares. The increase in planted area was largely in response to high chickpea prices at planting time.

Area planted to summer crops in Qld is forecast to be largely unchanged in 2015–16, at 609,000 hectares. Total summer crop production in Qld is forecast to fall slightly to 1.8 mt.

Area planted to grain sorghum is forecast to remain largely unchanged in 2015–16 at 445,000 hectares. Grain sorghum production is forecast to decline by two per cent to 1.3 mt, largely reflecting an assumption of a return to average yields.

The grain sorghum planting window in Qld runs from September until February. In its latest three-month rainfall outlook (September to November 2015) the BOM has forecast the chance of rainfall exceeding the median during the start of the grain sorghum planting window at between 50 and 60 per cent. Average seasonal conditions are assumed beyond the current three-month rainfall outlook.

The area planted to cotton is forecast to rise by four per cent in 2015–16 to 75,000 hectares. Cotton production is forecast to increase by two per cent to 161,000 tonnes of cotton lint and around 228,000 tonnes of cottonseed. Average yield is assumed to fall by two per cent to 2.1 tonnes a hectare.

MAJOR CROP PRODUCTION FORECASTS, 2015–16

	Area ('000 ha)	Yield (t/ha)	Prod'n (kt)	Prod'n change (%)
NSW				
Wheat	3900	1.85	7215	15
Barley	670	2.02	1353	14
Canola	555	1.50	833	–8
Grain sorghum	205	3.45	707	–6
Cotton lint	139	2.22	309	6
Cottonseed	139	3.14	437	6
Rice	65	10.00	650	–10
Queensland				
Wheat	750	1.50	1125	7
Barley	75	1.71	128	–15
Chickpeas	338	1.53	518	158
Grain sorghum	445	2.97	1320	–2
Cotton lint	75	2.15	161	2
Cottonseed	75	3.04	228	2

Note: Production change is relative to last season. Yields are based on area planted.
Sources: ABARES; Australian Bureau of Statistics; Pulse Australia

Australian Bureau of Agricultural and Resource Economics and Sciences
September, 2015

LIVERPOOL PLAINS

Spring is in the air! Winter crops are looking good across the Liverpool Plains.

Very welcome rain was received in late August which will help finish winter crops across the region – but more will be needed

Cereal crops on the Liverpool Plains are enjoying a good spring – some timely showers will help make it a great one.

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in the second half of September to help turn a good crop into a great one.

Growers are fine-tuning their planters ready for the next summer crop. More rainfall will be needed for a general summer sowing to commence but those growers with paddocks coming out of long fallow – and with good soil moisture reserves – can begin planting by the calendar and not the rain gauge.

Here's to some timely rainfall to help cap-off a very promising spring.

Lauren McGavin,
Precision Seeding Solutions, Premer
September 11, 2015

DARLING DOWNS

Winter crop

Good rain for many growers on the Downs delivered between 20 and 50 mm at the end of August, which has been excellent timing for barley and chickpeas in particular. This has left most of the crops in mid-September looking good with strong potential.

Barley crops are in the grainfill stage and about to start turning. They have overcome persistent disease through the season, particularly the spot form of net blotch and powdery mildew, but judicious use of fungicides was successful in keeping the top of the plant disease free, and growers are hoping for good yields.

The main problem with chickpea has been frost damage, which has affected most crops at one stage or another through the season. The crops planted into standing sorghum stubble have been the best protected, but have less stored soil moisture to work with – and crops planted into longer fallow ground have recovered fairly well. The chickpeas are now closed in, fairly tall and up to the early pod fill stage, whilst still flowering and putting on more pods. There have only been a few paddocks found with ascochyta and many growers are putting fungicide in with insecticide – as the heliothis numbers rise to above threshold levels – as protection.

The dreaded ascochtya showing chickpea stem infection.

Wheat is in the flowering to early grainfill stage, but will need some rainfall to match the barley's potential. Oats have recovered from early grazing with the end of July and end of August rain, and are being fed off again.

Overall, the winter crop has a good potential but there is some way still to go to harvest.

Summer crop outlook

Our friendly USQ climatologist has explained the influences on the El Niño this spring and given growers good advice on rainfall probabilities this spring and early summer. Growers are making use of the late August rain now to plant spring crops, particularly corn on irrigation for the silage and gritting markets, and dryland sorghum as the soil temperatures warm up.

The summer crop area will be less than last season due to so much winter crop being planted, especially chickpeas where

Barley crops on the Darling Downs have good potential.

The main problem for chickpeas on the Darling Downs has been frost.

there will be no double cropping opportunities. We do expect an increase in dryland cotton, but this is coming off a record low base, and there will be growers planning a summer crop of mungbeans in the late planted sorghum ground from last season.

These two factors will reduce the sorghum area from last season, but the irrigation area for cotton and maize particularly should be substantial with many growers having good water supplies.

Hugh Reardon-Smith
Agronomist, Landmark Pittsworth
September 14, 2015

WESTERN DOWNS

The end of August brought some good rainfall across the region with most areas receiving two to three inches (50–75 mm). This timely rain has been very beneficial for most winter crops.

Chickpeas have had a tremendous boost from the rain allowing crops to extend their flowering period and increase their potential yield.

At this stage there has been few disease issues with mouse damage being the bigger problem in western areas. A fair portion of winter crops in the western areas have been baited for mouse control. The mice have bred up in grass and fallow paddocks over the drier months.

Helicoverpa will be the next problem in our chickpea crops. The spraying thresholds will be lower this year due to the current high price (around $800 per tonne delivered Brisbane). It is expected we will get away with one spray by using new chemistry with good residual efficacy and spraying at the correct threshold.

Wheat and barley crops are currently at grain fill stage so watchful eyes need to be kept on these crops for potential mouse damage. Armyworm is also a potential threat, particularly to barley.

Minor frost damage has occurred in most cereals with the odd

Wheat crops are at the grain fill stage on the Western Downs. The crops are generally travelling along well but a watchful eye needs to be kept on mouse numbers.

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paddock worse off due to only a couple of days difference in planting date.

The good August rain has prompted growers to consider planting early summer crops from mid September if conditions (moisture and temperature) are ideal. The summer crops include both grain sorghum and dryland cotton.

Many fallow paddocks have good moisture but others could do with some storm rain soon to get the summer plant underway.

Nikolaus Fritz
Agronomy – Landmark, Miles
September 11, 2015

CENTRAL QUEENSLAND

Weather

So far 2015 has generally been a dry year for most grain growing districts across CQ – this is particularly the case in the north of the region. Almost all districts received above average rainfall during January 2015 and despite a dry finish, sorghum crops yielded better than expected.

The Central Highlands received below or well below average rainfall for the period February to July 2015.

During March 2015 the Callide region was belted by cyclone Marcia with huge flood damage on the floodplain and major runoff on sloping land.

The Dawson received a whole lot less rain from the cyclone but what they did get was more beneficial. Both summer and winter crops in the Dawson have generally yielded better than other districts.

More recently, there have been scattered showers – but also some very useful falls of 20 to 50 mm – during August across CQ.

There are many fallow paddocks across the region. Major summer rain will be needed to fill soil profiles before planting can occur.

Summer crops

I estimate about 250,000 hectares of sorghum was planted in CQ during the 2014–15 season. Yields were variable with a large area going only 1.0 to 2.0 tonnes per hectare. Some paddocks had significant lodging. A few top yielding crops achieved 3.0 to 4.0 tonnes but 2.5 tonnes per hectare was more common.

I expect little or no sorghum to be planted this spring in CQ but if we have some good rain, there should be a very large 2015–16 summer sorghum crop.

The 2014–15 summer was a very big mungbean season in CQ, in fact one of the biggest. I estimate about 45,000 hectares of mungbean was harvested and much of this in the Callide Valley.

Mungbean seed sales for this season are already high with growers ready to plant a spring crop. High prices will likely ensure another big mungbean season – both spring and summer.

Winter crops

A lack of planting rain during April-May 2015 resulted in an extremely low area planted to wheat across CQ. I estimate as little as 15,000 hectares of wheat was planted in CQ – this is

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down from an average of 200,000 hectares. Most of this area was planted in the Dawson and expected wheat yields are good to excellent.

Around about 45,000 hectares of chickpea was planted across CQ for this winter season. Most of this area is in the Central Highlands and almost all of it was deep planted to chase moisture. But establishment was variable. Northern areas will start harvest in the next week.

Katy Carroll, an experimentalist with DAF Queensland, inspecting a chickpea trial at Lex and Lester Webb's 'Belvedere' property near Baralaba in Central Queensland. The variety is Kyabra with row spacings of 25, 50, 75 and 100 cm and respective plant populations of 10, 20, 30 and 40 plants per square metre. The Gregory wheat crop in the background was double cropped out of mungbeans.

My guess is about a third of the chickpea area will fail or have very low yields (less than 0.75 tonnes per hectare), another third will have moderate yields (up to 1.5 tonnes) and another third will have moderate to good yields (better than 1.5 tonnes).

Livestock and pastures

CQ paddocks that have received 20 to 50 mm, and have some stubble, have a green pick. But more rain is needed to produce bulk feed. The condition of the cattle is very much a mirror of the country they are on. Cattle on the better country are currently in forward store condition or better.

Cattle on harder country are poor but generally in strong condition.

High cattle prices have created a very optimistic outlook for many beef producers.

Water

The Fairbairn Dam is currently at 47 per cent capacity (or 612,000 megalitres). This will allow a full irrigation allocation for the summer crop without any additional inflow.

Maurice Conway
Department of Agriculture, Fisheries & Forestry
Emerald, Queensland
September 11, 2015

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1 – Hercules.
2 – 31.6.
3 – 800.
4 – Harry Ferguson.
5 – Two-wheel drive.
6 – TEF.
7 – Italy.
8 – WA.
9 – Compressed air.
10 – 1936.

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