Grains Research UPDATE
Southern Region

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No Doubt On Cost-Effectiveness

Escalating prices for phosphorus (P) fertiliser have greatly increased interest in varying fertiliser rates based on paddock zones.

While this tends to focus thinking towards reducing rates there are potential gains to be made through increasing inputs on better soils, according to Peter Treloar.

Mr Treloar, principal of Precision Ag Services, said calculations based on large-scale trial results showed variable rate (VR) application of fertilisers based on soil characteristics or yield performance was cost-effective at prices of around $550 a tonne so there was no doubt about the economics with fertiliser prices at two or three times that figure.

And there's more good news. Growers don't need top-end technology to take advantage of the concept.

"A basic GPS signal such as a hand-held GPS receiver used for fishing will get you started, although a basic GPS receiver for a tractor or header actually costs less than a recreational hand-held unit," Mr Treloar said. "This level of technology is enough for yield mapping and VR applications, although many farmers already use some form of GPS guidance and should be able to access the same GPS signal for yield mapping and VR."

Much of the seeding and spreading equipment produced in the past decade or so has built-in VR capability so many growers with relatively new equipment only needed a GPS signal to access the technology, he said.

"VR equipment just needs a GPS signal to tell it where it is, so for growers with VR-capable equipment, getting a start is as simple as accessing a GPS signal. With VR equipment and a yield map growers can easily begin exploring the potential for VR on their properties by putting in trial strips in paddocks.

"The key is to work out how to define the zones. EM mapping, which essentially identifies areas with similar moisture-holding capability based on soil type and sub-soil constraints, works well in the Mallee but yield mapping is also an option."

So too is farmer observation and knowledge.

"It's amazing how accurate maps of soil type and yield potential drawn by hand by experienced farmers can be," Mr Treloar said.

Dollar returns are another option.

"Some growers are using financial performance to distinguish zones by converting yield maps into income maps based on grain prices then cutting back on fertiliser rates on areas that didn't return input costs the previous season.

"The research team I was part of in the Mallee opted for a 25 mm difference in plant unavailable soil moisture, equivalent to a yield potential difference of around 500 kg/ha, as the basis for zone divisions."

Perhaps the simplest of the VR options is to maintain the current nutrient regime by replacing nutrients removed in the previous year's grain.

This involves yield mapping at harvest time and using that map as the basis for fertiliser rates the following season.

In this approach an area that produced 1 t/ha would receive twice as much as one where the yield was 500 kg/ha and half as much as a location where the crop produced 2 t/ha.

On one level growers in the Mallee have been using VR for decades; sowing barley on the sandhills and wheat on the flats and putting more or less fertiliser on their sandhills depending on what they were aiming to achieve, Mr Treloar said.

"Growers using GPS signals and variable rate (VR) equipment are just applying new technology to the same management approach.

"Precision agriculture and VR are simply modern tools farmers can use to improve efficiency and better target their management in a variable landscape."

For more information: Peter Treloar, 0427 427 238, pete.pas@internode.on.net

Good news on N volatilisation

Losses from top-dressed urea may be less than previously feared and the addition of an inhibitor can reduce the loss of nitrogen (N) through volatilisation.

In a trial designed to look at losses from urea top-dressed in crop when there is little or no rain after application the N loss from top-dressed urea was less than 10 pc and addition of a urease inhibitor to the urea reduced the volatilisation losses by 90 pc.

The University of Melbourne's Debra Turner, who headed the research, reports that, where the inhibitor was used the loss of nitrogen through volatilisation was 0.8 kgN/ha – 1% of the total amount of N applied - compared with 7.5 kg/ha - 9.5% - from urea without the inhibitor.

Soil nitrate concentrations were similar with and without the inhibitor and gradually increased over the measurement period for both treatments, indicating nitrification of ammonium to nitrate as the applied urea was hydrolysed.

The trial plots, on a Wimmera clay soil in western Victoria in August last year, were top-dressed with 80 kg/ha of urea.

For more information: Debra Turner, 03 8344 5031; daturner@unimelb.edu.au

Barley Disease Puts Focus On Crop Rotation

The importance of crop rotation is highlighted by an outbreak of a damaging and difficult to control fungus disease in barley crops across the southern zone.

The disease, net form net blotch (NFNB), can devastate crops, and while fungicide applications after the first node stage (GS31) may have a yield benefit, not growing barley-on-barley is the best and most cost-effective way of preventing development and spread of this extremely damaging disease.

NFNB, like blackleg in canola, yellow leaf spot in wheat and blackspot in peas, is a foliar disease that carries-over on stubble.

NFNB, blackleg, yellow leaf spot and blackspot are all essentially diseases of close rotations, so sowing barley on barley stubble, wheat on wheat, canola on canola or peas on peas maximises the likelihood of problems with them.

Conversely, maintaining wide rotations and choosing varieties with good levels of resistance to the disease are the best and most cost-effective tools available to prevent them as emerging as costly issues for growers and the industry.

An increasing tendency for growers to ignore biology, advice and past experience to grow successive years of the same crop on the same paddock is rapidly emerging as a major issue for commercial advisers to contend with.

"The best advice is not to grow the same crop in successive years," Dr Eglinton said.

"Growing barley on barley increases the risk of yield loss due to NFNB and higher production costs because there are no cheap options for chemical control of this disease.

"It also puts valuable, hard-won resistance to the disease at risk by increasing disease pressure on the resistance mechanisms and the chance of new forms of the disease emerging as a result of changes in the population."

The situation is further complicated by the fact that NFNB is seed-borne; something growers need to consider when planning seed supplies and pre-seeding treatments for next year, Dr Eglinton said.

Resistance in several varieties is already under attack by the disease, according to SA plant pathologist Hugh Wallwork.

The resistance rating of Barque has been reduced to MS-S and the recent discovery of a new, more virulent strain of NFNB able to attack Keel means it is now no better than MS and possibly worse, Dr Wallwork said.

Development of this new strain may also change the resistance rating of other varieties.

Andrew Barr, former Professor of Barley Breeding at the University of Adelaide and now a Mid North farmer, questions the practice of growing barley on barley, which is becoming increasingly common in SA and Victoria.

"Barley is an important crop for us, but on our farm we have made a conscious decision not to sow barley on barley because of the potential for disease build-up and the breakdown of disease.

"Disease resistance is a rare and valuable industry asset that benefits everyone so we need to do everything we can to maintain it.

'Growing continuous barley might be more profitable in the short term but in the long term could significantly reduce profitability by slashing yields and increasing production costs because it encourages build-up of NFNB and other diseases, resulting in loss of resistance so we have to use chemical controls every time we grow the crop."

For more information: Hugh Wallwork, 08 8303 9382, wallwork.hugh@saugov.sa.gov.au; Jason Eglinton, 08 8303 6553; jason.eglinton@adelaide.edu.au.

Plumbing The Depths Of Root Penetration

Some wheat varieties are able to penetrate hardpans of compacted soil to access water below it. Others are not.

Research underway in WA is designed to identify varieties that are able to access water below compacted soil layers, a capability considered likely to increase yield in drought conditions because they can access a larger volume of soil moisture.

The GRDC-supported research is being done by Dr Xinhua He, who is using a thin wax layer to simulate compacted layers of soil.

Professor Len Wade, Professor of Agronomy at Charles Sturt University, said Dr He's work would identify lines better adapted to hostile soils and help identify promising lines for future WA breeding programs.

Of the 24 wheat cultivars and breeding lines tested so far, EGA Bonnie Rock$^{\phi}$, Camm$^{\phi}$, Carnamah$^{\phi}$, Halberd, Janz, Machete, Stiletto and Wilgoyne have exhibited superior root penetration ability.

Cranbrook, C18 and Karlgarin didn't penetrate the wax layer and soon died under drought conditions.

For more information: Xinhua He, 08 6488 2220

‘Be proactive’ on stripe rust

Growers in southern and central NSW need to be proactive and closely monitor their wheat and triticale crops for stripe rust.

This is the key recommendation from southern NSW meetings attended by almost 150 agronomists and advisers to discuss tactics in the face of widespread reports of stripe rust in wheat and triticale.

According to Temora-based NSW DPI District Agronomist Peter Matthews, discussion at the meetings highlighted the need for growers to be very aware of the resistance rating of the varieties they are growing and the growth stage of their crops because these are critical factors in deciding whether or not to spray and the timing of a spray if it is needed.

Stripe rust pressure is high this year because the disease was able to build up on volunteer cereals after good summer rains. And early break then enabled it to make an easy transition to early crops and by mid July many early-sown dual purpose crops, some sown as early as late March to early May, were carrying heavy stripe rust infestations. The disease has now spread to crops of main-season wheat varieties.

Mr Matthews likens this season to 2005, except that now there are two new stripe rust strains; the ‘YR17’ and ‘Jackie’ strains, which have seen the resistance rating of many triticale and wheat varieties lowered. The changes in resistance ratings mean it is important growers check the current resistance ratings of the varieties they are growing but in other regards fungicide management will be the same as in 2005.

Varieties with good levels of adult plant resistance – rated MR or R – to the disease may not need spraying despite the disease pressure, Mr Matthews said. It is not unusual to find low levels of stripe rust in crops of these varieties at early growth stages, before the adult plant resistance ‘kicks in’.

“Trial results from across southern and central NSW show there is unlikely to be a yield benefit from spraying a variety rated MR or R but emergence of a new strain could mean a variety is no longer resistant.

“Adult plant resistance should take care of stripe rust in varieties with a good level of resistance and we are seeing disease levels fall in some crops approaching GS39 that had stripe rust present during the seedling stages.

“However, growers still need to monitor paddocks of these varieties closely and talk to an adviser if they notice anything unusual or unexpected in case a new strain emerged that could attack previously resistant varieties,” he said.

Varieties rated MS or MS-S are likely to need spraying. The earliest recommended timing for crops with low stripe rust levels is GS32, when the first of the three main yield-contributing leaves are emerging.

Spraying earlier than GS32 will help keep the disease at bay but generally will not have a yield benefit unless the variety has a low resistance rating.

“A second spray at GS39 may be needed to protect the flag leaf depending on conditions.

Advisers are requested to send a sample of any rust found in a crop of wheat, triticale, barley or oats to: Australian Cereal Rust Survey, University of Sydney, Plant Breeding Institute, PMB 11, Camden, NSW, 2570. Samples should be packed in a paper envelope, not plastic.

Further information on rust management is available at www.grdc.com.au/rustlinks or contact Peter Matthews, 02 6977 3333, peter.matthews@dpi.nsw.gov.au

Multiple influences on germination

Investigation of widespread reports of poor cereal germination and emergence this season has revealed the problem was due to multiple factors.

Growers reported germination rates as low as zero % in self-stored seed grain, with figures of 30 and 40% more common.

Initially the problem was thought to be confined to the new malting barley variety Flagship but there were also germination difficulties with other barley varieties, bread wheat and durum.

Jason Eglinton, leader of the University of Adelaide’s Barley Program, who was involved in the investigation of the germination problem, said it was clear Flagship’s ability to germinate quickly was a significant factor but it was not the only one.

“Flagship is a new-generation malting barley bred to meet industry demand for rapid and highly efficient germination,” Dr Eglinton said.

“The traits that make it so desirable for malting also increase the risk of premature germination if there is rain at harvest.”

However, the team that investigated the reasons for poor seed germination also found a surprisingly high number of grower samples with other forms of damage.

Most growers are well aware of the key steps necessary to maximise seed quality, although during the hectic harvest period it can be tempting to take short cuts.

“Some samples had extensive insect damage,” Dr Eglinton said. “Others had been damaged by excess threshing and in other samples the embryo had been ‘cooked’ during storage as a result of heat build-up in seed that was too moist when it was put in the silo.

“The clear message is that growers need to pay close attention to detail when harvesting and storing seed, but this is even more critical when there has been rain prior to harvest.

“Consideration should be given to header settings and subsequent grain handling to minimise physical damage.

“Seed needs to be harvested and stored at low moisture levels in the best possible conditions, preferably in sealed or aerated silos and a very good hygiene and control program used to prevent insect damage.”

For more information: Jason Eglinton, 08 8303 6553; jason.eglinton@adelaide.edu.au

Growers 'on track' to tackle climate change

Climate change is occurring at or above the previous 'worst case' rate and is accelerating, according to Mark Howden, Theme Leader of the CSIRO Climate Adaptation Flagship.

This means fundamental changes in climate are occurring within a decade, so past climate is no longer a reliable indicator of current patterns.

The good news is that grain growers are 'ahead of the game'.

Dr Howden considers adaptation fundamental to managing climate change and adaptation – taking action to reduce risks or take advantage of opportunities - is second nature to Australian growers who refine their production systems to take account of what they observe in their paddocks as a matter of course.

CSIRO research indicates that incremental adaptation – the type of change grain growers make as a matter of course – is worth between $100m and $500m a year to the Australian wheat industry.

It has also found that agronomic adaptations using current knowledge and technologies can compensate for the impact of about 2°C increase in average temperatures, which translates into about 17% of baseline yield world-wide, a huge benefit with positive implications for food security and prices and flow-on benefits in the areas of global geo-political stability, Dr Howden said.

Beyond about 2°C increase in average temperatures incremental adaptation quickly runs into limitations. At this point farmers may need to think of transformational adaptation, which might involve a different farming system, such as changing from grazing to cropping in a high-rainfall area, changing from cropping to grazing in low-rainfall areas or relocating to other region where the current farming system can still be used.

Examples of incremental adaptation in cropping systems include changing crops or varieties, moving from cultivation to no-till or changing from burning to stubble retention. Many of these options are already being used by Australian farmers.

Other practices with the potential to minimise risk in the face of climate change include taking a more flexible and opportunistic approach to sowing time, extending fallows, modifying row spacing and planting density and controlled traffic systems, Dr Howden said.

On an industry level the options include development of crop varieties with appropriate temperature requirements, resistance to heat shock, drought tolerance, high protein levels, resistance to new pests and diseases and perhaps the ability to set flowers in hot and windy conditions.

There is also a need to provide growers with access to climate data at the scale needed to analyse alternative management and land use options and to make appropriate decisions. On-going research and revision of recommendations on aspects such as soil fertility management are also needed, Dr Howden said.

The CSIRO is developing a series of 'adaptive capacity maps' to help policy makers identify where there is significant capacity to deal with climate risk and where there isn't and what aspects of adaptive capacity need to be enhanced.

For more information: Mark Howden, 02 6242 1679, Mark.Howden@csiro.au

Managing The Market Environment

Recent changes to Australia's wheat marketing arrangements mean growers and their advisers will be operating in a new marketing environment when they harvest this season's crop.

This new environment will bring new opportunities and challenges, including removal of some of the fall-back or default positions on which many growers have traditionally relied.

In an effort to prepare growers – and their advisers – for the new marketing environment, NSW Partners in Grain have scheduled a series of marketing forums for early to mid September.

The forums, which will run from 9 a.m. to 3 p.m., will be presented by independent grains analyst Malcolm Bartholomaeus.

They are scheduled for Lockhart on September 8, Griffith on September 10, Temora on September 11 and Forbes on September 12.

For more information: Pam Krieg, 02 6343 3205; krieggp@bigpond.com or visit www.partnersingrain.org.au

VISIT AUSTRALIA'S GRAINS RESEARCH WEB PAGE
www.grdc.com.au

Editor: Jon Lamb
81 Fourth Avenue, St Peters 5069
Ph: (08) 8362 5417

Research Writer: Graeme Jennings
Ph: (08) 8278 4225

Design and layout - Lightning Designs

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