Grains Research UPDATE
Southern Region

GRDC
Grains Research & Development Corporation

Winter 2008

Australia 'well placed' to face new stem rust strain

Australia is comparatively well placed to deal with the virulent new Ug99 strain of wheat stem rust if it gets here, according to Prof. Robert Park.

Scientists believe Ug99 is a threat to world wheat supplies because it can attack plants carrying many of the resistance genes that have provided bread wheat varieties with protection against other strains of stem rust for many years.

These include protection provided by the *Sr31* resistance gene that provides good protection against all other known strains of stem rust and is an important source of stem rust resistance in varieties grown in most other countries, Prof. Park said.

However, *Sr31* is not used in many Australian varieties because it is linked with a 'sticky dough' characteristic culled from Australian breeding programs, Prof. Park said.

The new rust strain was first identified in Uganda in 1999 and has since been found in Kenya, Ethiopia, Yemen and most recently Iran.

Prof. Park, who is part of the international team working to counter the global threat posed by Ug99, said Australian breeding lines and commercial varieties were 'among the best' of the material screened for resistance to the new pathotype in trials being conducted by the Kenyan Agricultural Research Institute (KARI) in conjunction with CIMMYT in Kenya.

This indicates Australia is better placed than most other countries to counter the threat posed by Ug99 because many – though not all – Australian varieties and breeding lines carry resistance to the new rust strain whereas much of the material from other countries has proved highly susceptible to it.

There is no way of knowing whether or not the new strain will reach Australia nor what impact it might have if it does, Prof. Park said, but it makes sense to be prepared and the off-shore screening program is Australia's front line of defence.

"The aim is to prepare the Australian wheat industry for the anticipated attack from Ug99 by identifying lines and varieties with resistance to it."

That preparation includes GRDC-funded research by the Australian Cereal Rust Control Program (an alliance between the University of Sydney, CSIRO and CIMMYT) to identify molecular markers that will enable breeders to select breeding material with resistance to the disease without needing to expose it to the disease in the field.

Markers for three resistance genes, *Sr2*, *SrR* and *Sr26*, that provide good protection against Ug99 have already been identified as a result of this work, Prof Park said.

Ug99 is one of several exotic disease threats Australia is keeping a watchful eye on.

The others include barley stripe rust, which is likely to cause major problems for the Australian barley industry if it were to reach here since most Australian varieties and breeding lines do not carry resistance to it.

For more information: Robert Park, 02 9351 8806, robertp@camden.usyd.edu.au or go to www.grdc.com.au

Facing up to the challenges

The 14th Australian Society of Agronomy conference will be held in Adelaide from September 21 to 25.

Under its 'Global Issues – Paddock Action' theme the GRDC-sponsored conference will focus on the ability of agronomy to provide practical solutions to the challenges facing agriculture including climate change and variability, uncertainty over energy supplies and resource use efficiency.

Speakers will explore global trends in agriculture, the resilience of crop/livestock systems and the contributions of Australian agronomists to agriculture in developing countries.

Other topics will include emerging opportunities for Australian agriculture, the synergy between agronomy and biotechnology and managing and adapting to climate change and variability.

Early-bird registration, which carries a discount of $110, is available until June 20.

To register, or for more information, phone 1800 177 636, email donna@estherprice.com.au or visit www.agronomy.org.au/events/2008

Knowledge is power

"Never assume' is good advice when it comes to herbicide resistance in weeds.

Wrongly assuming survival of sprayed weeds is due to an application problem allows the resistance problem to develop unchecked.

Assuming a weed population is resistant when it isn't can result in thousands of dollars being wasted on more expensive chemicals when everyday herbicides would continue to provide cost-effective control.

According to Dr Peter Boutsalis, principal of Plant Science Consulting, such costly errors can be avoided by having weed seeds or plants collected from paddocks tested for herbicide resistance.

Plant Science Consulting uses the Syngenta Quick-test developed by Dr Boutsalis to check the resistance of plants. The company can also test the resistance status of weed seeds collected after each season.

Charles Sturt University at Wagga Wagga also provides a comprehensive Herbicide Resistance Testing Service.

The CSU service, which focuses on testing seedlings germinated from collected seed, will handle seed supplied by growers or agronomists or can arrange to collect samples from paddocks.

It offers standard cross-resistance tests for annual ryegrass, wild oats and broadleafed weeds or clients can choose to have tests done for resistance to other weeds and/or chemicals.

John Broster, manager of the CSU service, which is in its 17th year of operation, said it has tested approximately 1,500 samples of annual ryegrass in the past seven years.

Of those samples, 80% were resistant to Group A 'fop' chemicals, 22% to 'dims', 48% to Group B and 7% to Group D herbicides.

For more information: Peter Boutsalis, 0400 664 460, info@plantscienceconsulting.com;
John Broster, 02 6933 4001, jbroster@csu.edu.au;
or go to www.grdc.com.au/weedlinks

Rotation can reduce Pythium impact

Pythium root rot is widespread in southern cropping regions and causes far greater losses than seedling 'damping-off', widely considered to be the main symptom of Pythium infection.

The disease attacks all major grain crops and pastures in southern Australia and readily interacts with other diseases such as Rhizoctonia, take-all and Fusarium, increasing their severity and causing production losses totalling millions of dollars a year.

The good news is that crop rotations including tolerant varieties and use of appropriate fungicides and bio-control agents can reduce Pythium levels and improve grain yields.

These findings, from four year's research by CSIRO scientists at trial sites in SA, Victoria, NSW and WA, suggest advisers would be wise to ensure their clients take Pythium into account when shaping their rotations and deciding what seed dressings to use, according to Paul Harvey.

In trials carried out by the CSIRO team, use of a Pythium-selective fungicidal seed dressing reduced soil inoculum and root infection levels by 25% and increased average grain yields by 4% in cereals, 12% in canola and 11–26% in grain legumes.

This was despite the chemical providing only partial disease control.

A parasitic Trichoderma fungus applied as a biological control agent proved as effective as the pathogen-selective fungicide.

Combining the biological and chemical treatments further reduced disease incidence and increased wheat yields.

Dr Harvey, who headed the research team, said growers need to routinely use more diverse crop rotations to manage Pythium root rot.

Pythium levels were significantly greater after long-term pastures and in less diverse rotations such as alternating years of wheat and canola than in more diverse three or four-year rotations cycles that included a grain legume.

Four-year rotations with two non-consecutive cereals, for example wheat and barley, had the lowest incidence of Pythium root rot in wheat.

The researchers found there tends to be more Pythium in minimum tillage systems, particularly in higher-fertility acidic soils, and that there can be high levels of the disease, and significant losses from it, during periods of drought; conditions not previously considered conducive to Pythium.

For more information:
Paul Harvey, 08 8303 8589; paul.harvey@csiro.au

Narrow window for Cercospora control

Chemical control of cercospora leaf spot (Cercospora zonata) in faba beans can be effective provided the timing is right and the disease is accurately diagnosed.

A fungicide spray to control cercospora needs to be applied 5-7 weeks after sowing for maximum benefit. Mis-diagnosis can lead to use of an ineffective chemical.

Cercospora, the most common disease of faba beans in SA last season, can reduce yields by up to 10%, according to SA Research and Development's Rohan Kimber, so the predicted high grain prices mean control is likely to be economic.

The disease is soil-borne and faba beans sown within six years of the previous faba bean crop or in close proximity to infected soils are at greatest risk.

For more information: Rohan Kimber, 08 8303 9380; kimber.rohan@saugov.sa.gov.au

Clearer picture from new P test

A new phosphorus soil test developed by SA researcher Sean Mason gives a clear picture of available phosphorus irrespective of soil type.

The new DGT test, which is specific to phosphorus (P) and 'behaves like a plant root', clearly shows whether or not there is sufficient P available in the soil to grow a crop and if not, how much needs to be applied as fertiliser, Dr Mason said.

"This test measures available P and gives a specific P value so it provides a clear threshold for P fertiliser application, which is a valuable attribute, given the increasing cost of P fertilisers.

"It also provides valid results across all soil types, irrespective of physical attributes or pH."

The new test uses different extraction and measurement methods than either the 'resin' test or extractive tests such as the Colwell method.

In the DGT test, developed using technology patented by Lancaster University in the UK, an iron-based ferrihydrite gel designed to attract only P anions is allowed to contact with the soil sample.

P bound to the gel is then removed using a dilute acid and the amount of P in the resulting solution is measured.

Chemical extraction can distort results depending on soil chemistry and whether an acid or alkaline extractant is used.

Characteristics of the DGT test make it possible to get meaningful results from samples taken at any time of the season so tests can be carried out well in advance of seeding.

Results from field trials at 22 sites during 2007 established a clear link between P levels identified by the DGT test and early dry matter production in a variety of crops, Dr Mason said.

The relationship between DGT results and grain yield was not quite as strong as with early dry matter production due to the dry finish in 2007 but was still considerably better than results from either Colwell or resin tests.

Dr Mason believes the test is ready for commercial application.

He is continuing to refine interpretation of DGT P test results this season and is turning his attention to applying the technology to develop tests for other important elements.

For more information: Sean Mason, 08 8303 8107, sean.mason@adelaide.edu.au

If you must do it, do it right

Given the importance of seed performance and today's grain prices it pays to get seed tested professionally, according to Heather Lawrie, Seed Testing Manager for SA-based Seed Services Australia.

She advocates growers have every batch of seed tested in the lead-up to seeding, rather than post-harvest, because germination can be reduced by less than ideal storage conditions.

Testing needs to be scheduled early enough to allow seed to be replaced if germination is too low and definitely before it is pickled so it can be fed to stock if it is not suitable for sowing.

Growers who choose to do their own seed germination tests run a considerable risk of getting it wrong, particularly if seed quality is questionable, Ms Lawrie cautions.

Constant moisture and temperature are very important to achieving accurate results and one of the biggest risks with farmer tests is a 'false low' reading leading to rejection of seed that is really fine to use, she said.

"With a home test there will almost always be changes in temperature that are likely to result in uneven germination that will be interpreted as indicating that the seed is lacking vigour.

"Seed Services Australia uses controlled temperatures and germination medium manufactured to specifications that ensure the optimum performance from a seed lot."

The cost of a germination test is minimal in the context of the overall cropping operation and can save a great deal of money and time; a fact highlighted by the experiences of many growers this season.

Growers who decide to do their own tests despite the risks involved can maximise their chances of achieving a reasonable result by placing the seeds on moistened cotton wool, which is likely to have a near-neutral pH, in a meat tray with a lid that allows some interchange of air, Ms Lawrie said.

The seeds on the cotton wool should be held at a temperature of 5°C for four days to break dormancy. The vegetable crisper in the kitchen refrigerator should provide suitable conditions for this phase.

The seeds should then be held at a constant temperature of around 20°C until germination. The temperature should not exceed 25°C during this period.

For more information: Heather Lawrie, 08 8303 9549, lawrie.heather@saugov.sa.gov.au

Email 'heads up'

Having trouble keeping up with new information on the GRDC web site?

You can receive a monthly update of what's new on the site by subscribing to a free eNewsletter designed specifically to keep users of the site up to date with developments.

To receive this convenient update go to www.grdc.com.au and click on 'Events and Publications' in the blue section of the tool bar under the green masthead then 'Subscriptions' at the bottom of the list to the left of the screen.

Click on the link under 'GRDC eNewsletter' then complete and send the form.

Ten tonne yield = 'exciting future' for irrigated wheat

Irrigated wheat can yield 10 t/ha, given appropriate nutritional management and irrigation timing, pointing to an 'exciting future' for the crop, according to John Lacy, NSW DPI's Rice Farming Systems Industry Leader.

His confidence is based on the results achieved in a 2007, GRDC-supported irrigated wheat variety trial at Yanco Agricultural Institute, in NSW.

The average yield across all varieties included in the trial was close to 10 t/ha with several – including Bellaroi durum – producing more than 10t/ha.

This was despite temperatures in the post-flowering period averaging 20°C, well above the 14°C considered the upper limit for high yields.

Management of the trial was based on the key checks in the 'eight-tonne club package' developed by NSW DPI but with inputs increased in line with the 10t yield target.

The trial was sown after a break crop of canola on a red loam soil that had previously carried lucerne. The site was pre-irrigated with 1.7ML/ha and soil nitrogen 'topped up' at sowing to the 120kgN/ha recommended for an eight-tonne crop.

Early inputs were limited to those for an eight-tonne crop in an effort to reduce the risk of excessive vegetative growth and lodging later in the season but lodging was still a problem in lodging-prone genotypes.

The plots were sown at 100kg/ha to achieve a target plant population of 160-200 plants per square metre.

In late July the plots were top dressed with 68 kg/ha of N, just ahead of 9 mm of rain. Another 110 kg/ha of N was applied on September 18 ahead of the second spring irrigation and just before the awns became visible.

The plots received a total of 3.6ML/ha in five irrigations over spring, with irrigations scheduled on the basis of soil moisture levels monitored with an Enviroscan system and gypsum-block Hansen loggers.

The gross margin per hectare was $1,780, based on income per hectare across all varieties of $3,430 - the average yield of 9.8 t/ha at $350/t – and variable cost of $1,650/ha, including water at $90/ML.

Total water use for the crop was 5.3 ML/ha, making the gross margin per megalitre $336/ML.

The gross margin of an eight-tonne crop grown with the same variable cost would have been $255/ML.

For more information: John Lacy, 02 6951 2738, john.lacy@dpi.nsw.gov.au

Pestlinks resource

Pestlinks, the latest addition to the GRDC's data base resource, is the starting point for any search for information about how to control pests of crops, stored grain or pastures ranging from mice and snails to aphids and weevils.

Modelled on the highly informative Rustlinks page, Pestlinks has a strong focus on integrated pest management (IPM) but is also the access point for a wealth of chemical-control related information.

It contains links to chemical control options, the Australian Government Pest and Diseases Library, CSIRO Entomology and Stored Grain Research Laboratory plus resources offered by State Departments of Agriculture and Primary Industries.

Pestlinks is best accessed by opening the GRDC specific pestlinks page at www.grdc.com.au/pestlinks

Gene technology workshop

A two-day, hands-on workshop scheduled for Bendigo on June 19 and 20 will improve participants' understanding of the science and regulation of gene technology and provide them with a basic understanding of laboratory techniques used in gene technology.

For more information: Nadja Moritz, 02 6273 9535, nadjamoritz@afaa.com.au

PA symposium

Topics on the agenda of the 12th Annual Symposium on Precision Agriculture in Australasia will include soil and crop sensors, livestock management, economics and practical applications of global navigation satellite systems and VR technology. The one-day event will be at Australian Technology Park, Sydney, on Friday, September 19.

To register or for program detail visit www.usyd.edu.au/agric/acpa/symposium.htm

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Design and layout - Lightning Designs