2010-2011 CEREAL RUST SURVEY ANNUAL REPORT

I. SUMMARY

As in recent years, the Cereal Rust Laboratory received a significant number of rust samples from artificial greenhouse and field inoculations for pathotype analysis. The results for these samples are excluded from the following report.

Wheat stem rust: Stem rust was detected at widely separate locations in eastern Australia in April (from Kapinnie, SA to Glen Innes, nNSW). It built up during the season and the resulting inoculum levels plus above average summer rainfall in 2010-11 are a huge concern for 2011. 70 samples were received and 66 isolates were established, most of which (60; 91%) were identified as pt. 34-1,2,7 +Sr38 or variants of this pathotype. Pt. 34-2,12,13 and a mutant with virulence for *Sr21* were also isolated.

Wheat leaf rust: Following 5 years of very low incidence, leaf rust was common in eastern Australia. 111 samples were received, from which 111 isolates were established. The three *Lr37* (VPM)-virulent pts, 104-1,2,3,(6),(7),11 +Lr37, 76-3,5,7,9,10 +Lr37, and 76-3,5,9,10,12 +Lr37 accounted for 81% of isolates, while pts 104-1,2,3,(6),(7),11, 10-1,3,9,10,11,12 and 76-1,3,5,9,10,12 were also identified. Of significance was the rapid increase in frequency of the race 76 pts with virulence for Lr37, from 4% in 2009 to 44% in 2010.

Wheat stripe rust: A major epidemic in eastern Australia began in southern NSW in June. The pathogen population was dominated by the 'WA Yr17' pt, and this provided the opportunity for a new mutation that gave rise to the 'Yr17-27' pathotype. It is anticipated that the later pathotype will progressively increase in frequency on varieties carrying *Yr17, Yr27* or the combination of both genes. Stripe rust was not recovered from commercial fields in WA in 2010.

Oat crown rust: After nearly 10 years at very low levels, crown was widespread. 163 samples were received, and 290 isolates were pathotyped. Interestingly, after a long dry period and low rust levels, 47 pts were identified -the highest diversity since at least 1998. Two new pts. with virulence for cv. Genie (0107-1,4,5,6,7,10,12 +Warrego +Nugene +Gwydir +Genie and 0307-1,4,5,6,7,10,12 +Warrego +Nugene +Gwydir +Genie) were identified. It is likely that Genie carries *Pc48* and *Pc56*. Eighteen other new pts were also detected.

Oat stem rust: Higher sample numbers from eastern Australia also gave rise to increased pathotype diversity. Race 94 predominated, with *Pga* variants distributed across all states in the east. Oat stem rust was not sampled in Tasmania and Western Australia.

Barley leaf rust: Leaf rust of barley was again widespread in nNSW and Qld and reached epidemic levels resulting in some chemical control and crop losses. 125 samples were received, 172 isolates established, and 7 pts identified. Pts 5453P-, 5453P+, 5457P+ (virulent on *Rph3*) and 5473P+, all closely related, predominated, accounting for 83% of the isolates analysed. Pt. 5457+ increased in frequency to 25% of IDs, and was isolated as far south as Wagga.

Barley stem rust: Of 5 samples received, only 1 from Qld yielded a viable isolate, which was identified as the "scabrum" rust and wheat stem rust pathotype 34-1,2,7 +Sr38.

Barley grass stripe rust: A greater number of samples were recovered in 2010, with the majority associated with wild barley grass. One sample from Maritime barley was detected in Victoria. No crop losses were reported.

Triticale and rye rusts: Stripe rust on triticale was largely confined to the higher rainfall region of southern NSW. The Jackie and Tobruk pathotypes were frequently recovered. Two samples of rye leaf rust were received.

II. DETAILED REPORT

SEASONAL CONDITIONS

The 2010 winter cropping period in Australia was marked by significant regional contrasts. Western Australian farmers struggled with drought conditions for most of the year and this led to well below average yields. In contrast, eastern Australia received above average rainfall over the pre-season period that provided ideal conditions for crop establishment. Continuing good rainfall through winter and spring set a potential for record crop yields. However, the wettest spring on record in the east not only set high yield potential but also led to reductions in quality and yield across several districts. Nevertheless, overall yields were high and estimates of the national wheat crop were placed above 25 million tonnes, which was more than 20% higher than the previous season.

Rainfall over the 2009-10 summer period was also above average, and this created opportunities for summer survival of rust pathogens across a large area of the southern region in eastern Australia. Consistently warm and dry conditions in Western Australia and parts of South Australia were not conducive for rust survival in the summer period. Green bridge survival was clearly of concern and extension activities were targeted to alert industry to alternative control strategies.

Winter conditions in eastern states were mild and moist, and ideal for crop establishment. The rust diseases also became established early, allowing the potential for epidemic development in spring. However, industry awareness of variety responses to rusts and timely intervention strategies combined well to place the winter cereals crop in a good position to capture the benefits of a potentially high production year. Wheat crops in southern NSW were expected to average well above 3 tonnes per hectare.

WHEAT RUST PATHOGENS

Wheat Stem Rust (caused by *Puccinia graminis* f. sp. *tritici*)
R. F. Park and M. Williams
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Epidemiology and pathotype distribution

Above average rainfall in many parts of eastern Australia during the first half of 2010 provided conditions favourable for the development of cereal rust diseases, and stem rust of wheat became widespread in southern parts of this region. Stem rust was detected at widely separate locations in eastern Australia in April, from Kapinnie in SA to Glen Innes in northern NSW. It built up during the season and the resulting inoculum levels plus above average summer rainfall in 2010-11 mean that this disease could pose a threat in eastern Australia in 2011.

A total of 70 samples were received, 16 of which failed to yield a viable isolate (Table 1). The latter included a single sample from WA. From the remaining 54 samples, 66 isolates were established, most of which were identified as pt. 34-1,2,7 +Sr38 (49 isolates), or variants of this pathotype, *viz*. 34-1,2,7 (2 isolates, Qld and SA) and 34-1,2,7 +Sr38 Yalta low (9 isolates). The latter pathotype was isolated from southern NSW, Victoria and SA. It differs from pt. 34-1,2,7 +Sr38 in being avirulent for an uncharacterized resistance gene in the differential genotype Yalta.

The Satu triticale stem rust pathotype 34-2,12,13 was isolated from a triticale summer nursery at Glen Innes (northern NSW) in March and April 2010. This pathotype has been isolated from northern NSW and/or Queensland over the past 5 years despite it being only rarely isolated from 1990 to 2006. A variant of this pathotype with added virulence for *Sr21*, pt. 11-2,12,13, was also isolated from samples from Glenn Innes. Interestingly, this is the first variant of the Satu rust we have identified, despite this pathotype reaching epidemic levels in the mid 1980s in north eastern Australia.

A report of stem rust in a crop of Kite (a cultivar known to carry *Sr26*) was received from SA in early October. The sample was pathotyped as pt. 34-1,2,7 +Sr38 and was avirulent on *Sr26*. Marker analyses by Dr Ian

Dundas at the University of Adelaide and Dr Rohit Mago CSIRO Plant Industry confirmed that the cultivar from which the sample was collected, while similar in agronomic appearance to Kite, lacked *Sr26*.

The five pathotypes isolated during 2010-11 all belong to the "race 21" lineage, which was established following the introduction of pt 21-0, first detected in 1954-

- 34-1,2,7 — A presumed variant of pt. 34-2,7 with virulence for *Sr6*.
- 34-1,2,7 +Sr38 — The "VPM" pathotype. Derived from pathotype 34-1,2,7 via acquisition of virulence for *Sr38*.This pathotype was first detected in WA in 2001, and presumably spread to eastern Australia, where it was first detected at Arno Bay (SA) in Nov 2003. It has now been detected in all Australian states.
- 34-1,2,7 +Sr38 [Yalta low] — A variant of the "VPM" pathotype avirulent for an uncharacterized resistance gene in the *Sr11* differential genotype Yalta.
- 34-2,12,13 — The Satu triticale pathotype, arose from the Coorong triticale pathotype (34-2,12) via acquisition of virulence for *SrSatu*. First detected in 1984.
- 11-2,12,13 — A mutational derivative of the Satu pathotype with added virulence for *Sr21*, a gene not present in Australian wheat cultivars. Cultivar Thornbill carries *Sr45*, a gene that displays a very similar specificity to *Sr21*. The pathogenicity of this pathotype on Thornbill is, however, currently unknown.

Notes on cultivars carrying genes for stem rust resistance

Current information on genes for resistance to stem rust in Australian commercial wheat varieties was detailed in Cereal Rust Report Volume 9, Number 1 (April 2011). All Cereal Rust Reports can be accessed from the PBI website : (http://sydney.edu.au/agriculture/plant_breeding_institute/cereal_rust/reports_forms.shtml).

Wheat Leaf Rust (caused by *Puccinia triticina*; formerly *Puccinia recondita* f. sp. *tritici*)

R. F. Park and M. Williams
University of Sydney

Epidemiology and pathotype distribution

Following five years of very low incidence, leaf rust was common in eastern Australia. A total of 111 samples were received, all from eastern Australia, and 30 of these failed to yield a viable isolate. 111 isolates representing 6 pathotypes were established from the remaining samples.

The three *Lr37* (VPM)-virulent pts, 104-1,2,3,(6),(7),11 +Lr37, 76-3,5,7,9,10 +Lr37, and 76-3,5,9,10,12 +Lr37 accounted for 81% of isolates and were isolated from throughout eastern Australia (Table 2). Of significance was the continued increase in frequency of the race 76 pts with virulence for *Lr37*, from 4% in 2009 to 44% in 2010. While avirulent on Lr3a, this pathotype combines virulence for Lr37 with virulence for *Lr13* and *Lr26*. Pt 104-1,2,3,(6),(7),11, first isolated in 1989 and since recorded in all Australian wheat growing regions, was also present throughout eastern Australia.

Pathotypes isolated

The six pathotypes of *P. triticina* isolated during 2010-11 are believed to belong to one of four clonal lineages:

1. The "104-2,3,(6),(7),11" lineage. Pt 104-2,3,(6),(7),11 was first detected in a sample collected from Mt Derimut in Victoria in July 1984. We have since detected many single step mutational derivatives, and with few exceptions, one or more of these pathotypes have been the most frequently isolated pathotype in all regions of Australia surveyed in the years since 1989. Two members of this lineage were isolated in 2010-11:

- Pt 104-1,2,3,(6),(7),11 — Derived from pt 104-2,3,(6),(7),11 via acquisition of virulence for *Lr20*. First detected in NSW in 1989 and subsequently spread to all Australian wheat growing regions.
- Pt 104-1,2,3,(6),(7),11 +Lr37 — The "VPM" pathotype. Derived from pt 104-1,2,3,(6),(7),11 via acquisition of virulence for *Lr37*. This pathotype was first detected in WA early in 2002 from self sown Camm near Albany. It was subsequently detected in the south eastern corner of SA in December 2002 and is now well established in all wheat growing regions.

<u>2. The "10-1,3,9,10,11,12" lineage.</u> First isolated from Victoria at Bairnsdale in October 2004, this pathotype is now more widespread in Victoria, NSW and Tasmania. Despite being virulent on many resistance genes in common wheat, it is unusual in that it is avirulent on wheat genotype Morocco. We now know that the resistance gene in Morocco is also present in several Australian wheat cultivars, including Avocet, Gatcher, Halberd, Harrier, Tarsa, Tincurrin and Warigal. It is regarded as an exotic introduction.

<u>3. The 76-3,5,9,10 +Lr37 lineage.</u> Regarded as an exotic introduction, first isolated from Inverleigh (Vic) in late July 2006, and now present throughout Victoria, southern and northern NSW, South Australia and Tasmania. A mutational variant of this pathotype with added virulence for *Lr17b*, 76-3,5,9,10,12 +Lr37, first detected in 2008, increased in frequency during 2010.

<u>4. The "76-1,3,5,10,12" lineage.</u> This pathotype was first detected from NSW in 1996, and is believed to have been introduced to Australia from New Zealand, where it had been present since 1989. This pathotype has now been isolated from Victoria, SA and Tasmania. It has remained at a low incidence but was associated with an epidemic of leaf rust in the western district of Victoria in 1999.

Notes on cultivars carrying genes for leaf rust resistance

Current information on genes for resistance to leaf rust in Australian commercial wheat varieties was detailed in Cereal Rust Report Volume 9, Number 1 (April 2011). All Cereal Rust Reports can be accessed from the PBI website (http://sydney.edu.au/agriculture/plant_breeding_institute/cereal_rust/reports_forms.shtml).

<u>Wheat Stripe Rust</u> (caused by *Puccinia striiformis* f. sp. *tritici*)

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([1]on secondment from NSW Department of Primary Industries)

Disease development

The first wheat stripe rust samples were received from southern NSW from the beginning of June. Early sown triticale (Endeavour, Tobruk) and wheat (Marombi, Whistler, Wedgetail) varieties were a source of initial inoculum. Samples were then progressively received from neighboring regions in Victoria and northern NSW in July, whereas more distant locations in Queensland and South Australia recorded a much later stripe rust onset (August and September respectively). It was clear that southern NSW was the primary site of pathogen survival over summer in 2009-10 and this region then became the focus of stripe rust development for the remaining season.

Pathotype identification

A total of 647 samples were received in 2009-10 (Table 3), with 580 isolates recovered for pathotype analysis. The recovery of viable samples (90%) was somewhat lower than previous years, although the total sample number was well above average.

The features of pathotypes recovered in 2010 (Table 3) are presented below. Note that where an S response is indicated, it is assumed that there are no additional supporting resistances present. The detection of the 'Yr17-27' pathotype was a significant development in 2010. The dominance of the 'WA Yr17' pathotype clearly provided the opportunity for a mutation with increased virulence for Yr27 to be selected from the pathogen population.

Pathotype	Year of 1st occurrence	Disease reaction on major resistance gene			
		Yr17	*YrJ*	*Yr27*	*YrT*
'WA' pt 134 E16 A+	2002	R	R	R	R
'WA Yr17' pt 134 E16 A+ Yr17+	2006	S	R	R	R
'Jackie' pt 134 E16 A+ J+	2007	R	S	R	R
'Jackie Yr27' pt 134 E16 A+ J+ Yr27+	2008	R	S	S	R
'Tobruk' pt 134 E16 A+J+T+	2009	R	S	R	S
'Yr17-27' pt 134 E16 A+17+27+	2010	S	R	S	R

Pathotype distribution

The 'WA-Yr17' pathotype was recovered from early samples, and this provided the opportunity for this pathotype to dominate the pathogen population through the subsequent season. The 'WA-Yr17' pathotype, first detected in 2006, reached a frequency of 44.3% (increasing from 12% in 2008; 30% in 2009) which placed it as the dominant pathotype. As in the previous season, the implications from the data clearly support the recommendation that Yr17 wheats known to be vulnerable to the 'WA Yr17' pt should be treated early with fungicide on the assumption that the pathotype is most likely to be present.

The 'Jackie' pathotype was next in importance, although it appeared to be displaced by the dominating influence of 'WA-Yr17' pt. The remaining pathotypes were relatively low in frequency. The 'Jackie 27' pathotype, detected at low levels for the first time in 2008, was detected in just one sample. It appears that this pathotype may be poorly adapted.
The detection of the 'Yr17-27' pathotype was confined almost exclusively to crops of Livingston wheat grown in an area covering central and parts of southern NSW. Although at low frequency in its first year, it is expected that the comparative advantage of virulence on both resistance genes may provide a basis for its progressive increase in frequency.

Pathotype 64 E0 A- was again recovered predominantly from Lincoln in southern NSW. This pathotype remains somewhat enigmatic, given its low frequency and the evident minimal impact on Lincoln in commercial fields. Further research is required to determine the potential impact of this pathotype.

Notes on current resistances

Current information on genes for resistance to stripe rust in Australian commercial wheat varieties was detailed in Cereal Rust Report Volume 9, Number 1 (April 2011). All Cereal Rust Reports can be accessed from the PBI website (http://sydney.edu.au/agriculture/plant_breeding_institute/cereal_rust/reports_forms.shtml).

OAT RUST PATHOGENS

Oat Stem Rust (caused by *Puccinia graminis* f. sp. *avenae*)
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([1]on secondment from NSW Department Primary Industries)

A greater number of samples in 2010 reflected a conducive season for oats and its diseases. The failure of samples was surprisingly high at 17%, although the reasons remain unclear. Oat stem rust samples were not received from Tasmania and Western Australia.

Samples were received from March and were predominately from Region 2 (southern NSW, Victoria and South Australia). Pathotype diversity was high, although variants of Race 94 predominated. Virulence for *Pga* was confined to Race 94 and was distributed across all regions of eastern Australia. The ineffectiveness of *Pga* indicates that varieties carrying this gene (Barcoo, Cleanleaf, Condamine, Culgoa II, Glider, Nobby, Quoll) will be potentially vulnerable.

Oat Crown Rust (caused by *Puccinia coronata* f. sp. *avenae*)
R. F. Park and P. Kavanagh
University of Sydney

After nearly 10 years at very low levels, crown was widespread in eastern Australia. 163 samples were received, and 290 isolates were pathotyped. Interestingly, after a long dry period and low rust levels, 47 pts were identified -the highest diversity since at least 1998 (Table 5). The most common pathotypes isolated included pt. 0071-0 (virulent for Pc61), pt. 0307-3,4,5,6,10 +Warrego +Volta, a new pathotype virulent on cv. Genie (viz. 0307-1,4,5,6,10,12 +Nugene, Gwydir, Genie), and pt. 0001-0. The latter comprises several variant pathotypes that can be separated based on virulence/ avirulence on Santa Fe, Landhafer, Trispernia, Pc45 and Pc48.

All pts likely belong to four clonal lineages. The most virulent pts belong to two lineages that occur almost solely in nNSW/Qld, one comprising pathotypes virulent for Pc61 and a second comprising pathotypes virulent on *Pc38* and/or *Pc39*. The patter group includes the new pathotypes with virulence for cv. Genie. A second pathotype virulent on Genie was also detected (*viz.* 0107-1,4,5,6,10,12 +Nugene +Gwydir +Genie), which differes from pt. 0307-1,4,5,6,10,12 +Nugene +Gwydir +Genie in being avirulent for *Pc52*. It is likely that Genie carries *Pc48* and *Pc56*. Two other new pts, not important in terms of varietal response, were detected (pts 0004-2 +Saia; 0471-6,10), along with 16 others.

The pathotypic diversity in crown rust is likely a function of high inoculum loads maintained in wild oat populations. The only resistance gene that remains effective is *Pc91*, carried by cultivar Drover; all other current Australian oat cultivars are susceptible to crown rust. Cultivar Taipan, released in 2001, has the Nugene resistance. Some of the cultivars released in Region 1 and regarded at the time of release as resistant to *P. coronata* f. sp. *avenae*, are now susceptible to a range of pathotypes. These cultivars were believed to carry new genes for resistance to *P. coronata* f. sp. *avenae*, but it now seems that the resistance in practically all can be explained on the basis of known resistance genes. These experiences indicate very clearly that major gene resistance is of little value in developing crown rust resistant oat cultivars. Our research over the past 10 years has indicated that adult plant resistance to crown rust is common in hexaploid oats, and we are in the process of introgressing this resistance into adapted germplasm.

BARLEY RUST PATHOGENS

Barley Stem Rust (caused by *Puccinia graminis*)
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Two samples of stem rusted barley were received from Queensland (Toobeah and Brookstead), and one from northern NSW (Glen Innes). A viable stem rust isolate was only established from the sample from Toobeah, which was typed as the wheat stem rust pathogen, pt. 34-1,2,7 +Sr38.

Notes on cultivars carrying genes for stem rust resistance

While little is known about the stem rust resistance of current Australian barley cultivars to stem rust, experience suggests that all cultivars have some susceptibility to this disease. Recent tests by PhD student Ms Lida Derevnina using markers for the resistance gene *Rpg1* have confirmed its presence in cultivars Yerong, Vlamingh and Pacific Ranger. This gene conferred resistance to stem rust in barley for many years in the USA, before a virulent pathotype was detected in the Great Plains in 1989. It remains unclear whether or not this gene confers resistance under Australian conditions.

Barley Leaf Rust (caused by *Puccinia hordei*)
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Epidemiology and pathotype distribution

Appreciable levels of inoculum of the barley leaf rust pathogen oversummered during the 2009-2010 non-cropping phase in northern NSW and Queensland, and the disease reached epidemic levels in this region in 2010, causing high yield losses in some crops.

A total of 125 samples were received, and 172 pathotype identifications were made from the 125 samples from which viable isolates were established (Table 6). Only eight samples were received from WA, from which pathotypes 5453P- and 5453P+ were identified. These two pathotypes, along with the derivative *Rph3*-virulent pathotype 5457P+, were the most commonly isolated from eastern Australia (Table 6). The latter was first detected in March 2009 in northern NSW, and six isolates of this pathotype were identified during the 2009-10 survey period from from northern NSW and southern Queensland. The frequency of this pathotype increased in 2010, with 42 isolations, and while it was again found in southern Queensland centered on the region around Warwick-Toowoomba-Goondiwindi, it was isolated more widely in NSW, being found as far south as Wagga Wagga and Brocklesby.

Two isolates of pt. 5473P+, regarded as a mutational derivative of 5453P+ with added virulence for *Rph5*, were isolated from Victoria and SA. No Australian barley cultivar carries *Rph5*, and hence this pathotype is not considered important. It was isolated once before, from northern NSW in 2008. Pathotypes 220P+ and 5652P+ were isolated commonly; the former was first detected in 1983, and the latter in 1999, and both have been detected throughout eastern Australia in most years since first detected.

Notes on cultivars carrying genes for leaf rust resistance

Many Australian barley cultivars carry seedling genes for resistance to *P. hordei*, however, other than *Rph7* (cv Galaxy), all of these genes are now ineffective against pathotypes that currently prevail and therefore all cultivars must be regarded as having at least some susceptibility to leaf rust. Before 1999–2000, cultivars carrying *Rph12* (Tallon and Lindwall) were resistant to pathotypes occurring in Region 1, however, virulence for *Rph12* now exists in this region and in all others. In fact, avirulence for this gene has been rare since 2002. Cultivars Fitzroy, Yarra and Starmalt carry *Rph3* and are now seedling susceptible to the new pathotype 5473P+. The adult plant responses of these cultivars to this pathotype was assessed at two field sites at PBI in 2009: Fitzroy was rated as 80S and 70S; Starmalt at 10MR and 5R, indicating residual resistance; and Yarra at 90S and 80S.

Work in Australia over the past 5 years has led to the characterisation and mapping of *Rph20*, a locus that confers adult plant resistance to leaf rust. Based on field assessments and marker data (marker *b-Pb-0837*), we believe that the cultivars Barque, Chieftan, Cosmic, Dash, Flagship, Henley, Mackay, Oxford, Quasar, Quickstar, Shepherd, Vertess and Westminster all carry *Rph20*.

Barley Grass Stripe Rust (caused by *Puccinia striiformis*)

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The twenty eight isolates of barley grass stripe rust (BGYR) were also predominately collected from southern NSW (Table 3). One isolate was recovered from Maritime barley in Victoria which is MS to this form of the pathogen. Although there were a greater number of BGYR isolates recovered compared to the previous season, this pathogen was not been implicated in crop losses in 2010.

TRITICALE AND RYE RUST PATHOGENS

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Stem rust and leaf rust: There were no reports of stem rust in triticale or rye crops in 2010. The triticale attacking stem rust pathotype 34-2,12,13, along with the new pathotype 11-2,12,13, were however recovered from experimental wheat and barley plots in Queensland and/or nNSW. Two samples of rye leaf rust were received, one from Sherlock in SA and the second from Mudgee in NSW.

Stripe rust: Early sown triticale was again implicated in early disease development in southern NSW. The majority of isolates from triticale were recovered from varieties Tobruk and Endeavour. The Tobruk pathotype was low in frequency in its second year of detection, but was generally associated with Tobruk and Endeavour in southern NSW. The vulnerability of Tobruk to this pathotype warrants careful planning to avoid the possibility of early disease development and significant yield loss.

Notes on stripe rust resistance in triticale

The dominance of the 'Jackie' pathotype resulted in noticeable changes in disease response in commercial triticales. The majority of current Australia triticales carry the *YrJ* resistance, usually in combination with *Yr9*. Current information in regard to expected disease responses in the field for Australian triticale varieties to stripe rust pathotypes, and known stripe rust resistance genotypes, were updated and circulated in Rust Report Volume 9, Number 1 (April 2011). The Cereal Rust Report series are available for download from the PBI website (http://sydney.edu.au/agriculture/plant_breeding_institute/cereal_rust/reports_forms.shtml).

MISCELLANEOUS RUST PATHOGENS ON GRASSES

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Thirty samples of miscellaneous rusts on other grass species were received, 10 of which came off unidentified grass species and from which viable rust isolates were not established, indicating that the rust present was either not viable or did not infect cereals. An unidentified leaf rust pathogen was common in NSW and Victoria on Phalaris. We received 11 samples of this rust, and while we were able to subculture it onto Phalaris seedlings, it did not infect any of the cereal accessions included and is therefore presumably a non-cereal infecting rust species.

A sample of stem rust on wild barley grass collected from Ganmain in NSW was identified as wheat stem rust pathotype 34-1,2,7 +Sr38. Three samples of stem rusted *Elymus scabrus* (formerly *Agropyron scabrum*) failed to yield a viable isolate. Three samples of stem rust and a single sample of leaf rust on rye grass were received, all from NSW/ Victoria and none of which infected the cereal testers.

ACKNOWLEDGEMENTS

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Table 1. Wheat stem rust pathotypes identified by region, 1 April 2010 - 31 March 2011

	Number of Isolates							
	Region 1	Region 2	Region 3	Region 4		Region 5	Region 6	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	**TOTAL**
34-1,2,7	1	-	-	-	-	1	-	**2**
34-1,2,7 +Sr38	2	3	1	17	-	26	-	**49**
34-1,2,7 +Sr38 Yalta low	-	-	2	3	-	4	-	**9**
34-2,12,13	2	3	-	-	-	-	-	**5**
11-2,12,13	-	1	-	-	-	-	-	**1**
Total no isolates	**5**	**7**	**3**	**20**	**-**	**31**	**-**	**66**
Total no samples	**3**	**7**	**7**	**21**	**-**	**31**	**1**	**70**
No failed samples	0	1	5	4	-	5	1	**16**

Table 2. Wheat leaf rust pathotypes identified by region, 1 April 2010 – 31 March 2011

	Number of Isolates							
	Region 1	Region 2	Region 3	Region 4		Region 5	Region 6	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	**TOTAL**
10-1,3,9,10,11,12	-	1	3	1	-	-	-	**5**
76-1,3,5,9,10,12	1	1	-	-	-	-	-	**2**
76-3,5,9,10 +Lr37	8	1	3	7	-	1	-	**20**
76-3,5,9,10,12 +Lr37	4	1	4	10	-	10	-	**29**
104-1,2,3,(6),(7),11	-	3	3	-	-	8	-	**14**
104-1,2,3,(6),(7),11 +Lr37	1	10	10	2	-	18	-	**41**
Total no isolates	**14**	**17**	**23**	**20**	**-**	**37**	**-**	**111**
Total no samples	**17**	**13**	**27**	**24**	**-**	**30**	**-**	**111**
No failed samples	4	3	10	6	-	7	-	**30**

Table 3. Stripe rust pathotypes identified by region, 1 April 2010 – 31 March 2011

	Number of Isolates							
	Region 1	Region 2	Region 3	Region 4		Region 5	Region 6	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	**TOTAL**
134 E16 A+	14	18	35	10	-	1	-	**78**
134 E16 A+ 17+	16	53	160	20	-	8	-	**257**
134 E16 A+17+27+	-	5	13	-	-	-	-	**18**
134 E16 A+ J+	8	15	66	32	-	17	-	**138**
134 E16 A+J+T+	1	9	25	7	-	3	-	**45**
134 E16 A+J+27+	-	-	-	1	-	-	-	**1**
64 E0 A-	-	-	14	1	-	-	-	**15**
BGYR	-	7	13	6	-	2	-	**28**
Total no. isolates	**39**	**107**	**326**	**77**	**-**	**31**		**580**
Total no. samples	**49**	**119**	**361**	**83**	**-**	**35**	**-**	**647**
No. failed samples	8	12	35	6	-	4	-	65

Table 4. Oat stem rust pathotypes identified by region, 1 April 2010 – 31 March 2011

	Number of Isolates							
	Region 1	Region 2	Region 3	Region 4		Region 5	Region 6	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	**TOTAL**
30-2	-	-	-	-	-	1	-	1
30-1,2,3	-	-	-	-	-	1	-	1
31-2	-	-	-	-	-	3	-	3
41-2	-	-	-	1	-	-	-	1
76	-	-	-	-	-	1	-	1
94	-	-	-	-	-	1	-	1
94-2	-	-	2	2	-	-	-	4
94-3	-	-	1		-	4	-	5
94-2,3	1	2	7	11	-	14	-	35
94-2,4	1	-	2	-	-	-	-	3
94-3,4	3	2	2	-	-	-	-	**7**
94-2,3,4	2	4	14	7	-	10	-	**37**
Total no. isolates	**7**	**8**	**28**	**21**	**-**	**35**	**-**	**99**
Total no. samples	**6**	**9**	**19**	**22**	**-**	**38**	**-**	**94**
No. failed samples	-	-	3	4	-	9	-	**16**

Table 5. Oat crown rust pathotypes identified by region, 1 April 2010 – 31 March 2011

	Number of Isolates							
	Region 1	Region 2	Region 3	Region 4		Region 5	Region 6	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	**TOTAL**
0000-0	-	-	2	-	-	-	-	**2**
0000-2	-	-	-	2	-	19	-	**21**
0001-0	4	13	29	12	-	27	-	**85**
0001-0 +Pc92	-	1	1	-	-	-	-	**2**
0001-0 +Saia	1	-	1	-	-	1	-	**3**
0001-2	-	-	1	4	-	1	-	**6**
0001-4	-	-	-	1	-	-	-	**1**
0003-10	1	-	-	2	-	-	-	**3**
0004-2 +Saia	-	-	-	1	-	3	-	**4**
0007-1,4,6,8,10,12 +Nugene	-	-	3	-	-	-	-	**3**
0007-4,6,10	-	-	1	-	-	-	-	**1**
0007-4,6,10 +Nugene	1	1	1	-	-	-	-	**3**
0007-4,6,7,8,10 +Nugene	1	5	-	-	-	2	-	**8**
0007-4,6,8,10	-	-	1	-	-	-	-	**1**
0007-4,6,8,10 +Nugene	-	-	4	1	-	-	-	**5**
0007-4,6,8,10 +Warrego +Nugene	-	-	1	-	-	-	-	**1**
0107-1,4,6,10,12 +Nugene	-	1	2	1	-	-	-	**4**
0107-1,4,6,10,12 +Warrego +Nugene	6	1	-	1	-	-	-	**8**
0107-1,4,6,7,10,12 +Warrego +Nugene +Gwydir +Genie	4	-	1	1	-	-	-	**6**
0107-3,4,6,10 +Warrego +Volta	4	6	-	-	-	-	-	**10**
0107-4,6,10	-	-	-	-	-	1	-	**1**
0107-4,6,10 +Nugene	2	1	-	-	-	-	-	**3**
0107-4,6,10 +Warrego	-	1	-	-	-	-	-	**1**
0107-4,6,10 +Warrego +Nugene	1	1	1	-	-	-	-	**3**
0107-4,6,8,10 +Nugene	-	2	1	-	-	-	-	**3**
0307-1,4,5,6,10,12	1	-	-	-	-	-	-	**1**
0307-1,4,5,6,10,12 +Nugene	1	-	-	-	-	1	-	**2**

0307-1,4,5,6,10,12 +Warrego +Nugene	2	-	1	-	-	-	-	**3**
0307-1,4,5,6,7,10,12 +Gwydir	1	-	-	-	-	-	-	**1**
0307-1,4,5,6,7,10,12 +Warrego +Nugene +Gwydir +Genie	5	4	4	-	-	2	-	**15**
0307-3,4,5,6,10 +Warrego +Volta	3	8	1	-	-	-	-	**12**
0307-4,5,6,10 +Nugene	2	6	1	-	-	-	-	**9**
0307-4,6,8,10 +Warrego +Nugene	-	-	1	-	-	-	-	**1**
2007-4,6,10 +Nugene	1	3	-	-	-	-	-	**4**
2007-4,6,8,10 +Warrego +Nugene	-	-	1	-	-	-	-	**1**
2107-4,6,10	-	1	-	-	-	-	-	**1**
2107-4,6,10 +Nugene	-	1	-	-	-	1	-	**2**
2207-4,5,6,10 +Nugene	-	-	1	-	-	-	-	**1**
2207-4,6,8,10 +Nugene	1	1	-	-	-	-	-	**2**
2307-4,5,6,10	-	1	-	-	-	-	-	**1**
2307-4,5,6,10 +Nugene	-	-	1	-	-	-	-	**1**
0471-6,10	-	-	1	-	-	-	-	**1**
0071-0	-	14	13	-	-	4	-	**31**
0071-1,4,7,12 +Gwydir	1	1	-	-	-	-	-	**2**
0071-4	-	-	1	1	-	-	-	**2**
4473-4,6,10	1	-	2	-	-	-	-	**3**
4473-4,6,10 +Bettong +Barcoo	1	4	1	-	-	-	-	**6**
Total no isolates	**45**	**77**	**79**	**27**	**-**	**62**	**-**	**290**
Total no samples	**27**	**34**	**45**	**16**	**-**	**41**	**-**	**163**
No failed samples	6	1	4	3	-	5	-	**19**
Samples from cultivated oats	22	14	35	5	-	14	-	**90**
Samples from wild oats	5	20	10	11	-	27	-	**73**

Table 6. Pathotypes of *Puccinia hordei* identified by region, 1 April 2010 – 31 March 2011

	Number of Isolates							
	Region 1	Region 2	Region 3	Region 4		Region 5	Region 6	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	**TOTAL**
220P+	-	-	1	3	-	9	-	**13**
5453P- (+PI366444)	2	2	2	3	-	1	5	**15**
5453P+ (+PI366444)	12	11	23	14	-	21	3	**84**
5457P+ (+PI366444)	25	10	5	-	-	2	-	**42**
5473P+ (+PI366444)	-	-	-	1	-	1	-	**2**
5472P+ (+PI366444)	-	1	-	1	-	-	-	**2**
5652P+ (+PI366444)	-	3	4	3	-	4	-	**14**
Total no isolates	**39**	**27**	**35**	**25**	**-**	**38**	**8**	**172**
Total no samples	**28**	**20**	**32**	**15**	**-**	**24**	**6**	**125**
No failed samples	-	3	8	-	-	2	-	13