	The University of Sydney **Plant Breeding Institute Cobbitty** **Cereal Rust Laboratory**

2002-2003 CEREAL RUST SURVEY ANNUAL REPORT

I. SUMMARY

Wheat Stem Rust This disease was only detected in experimental plots in eastern Australia during 2002–03, from which pathotypes 98-1,2,3,5,6 and 343-1,2,3,5,6 were isolated. The first detection in WA was in June from the Esperance region. Eight pathotypes were identified from WA, the most common being members of the "34-2 group" and including the "VPM virulent" 34-1,2,7 +*Sr38* that increased in frequency. Other pathotypes isolated were pts 34-1,2,7, 34-1,2,7 +*Sr9e*, and pts 343-1,2,3,5,6 and 343-1,2,3,5,6 +*Sr7b*.

Wheat Leaf Rust Pathotypes related to pt 104-1,2,3,(6),(7),11 dominated in all regions, a trend that has occurred since 1990. A derivative of this pathotype with virulence for *Lr37* was isolated in 2002–03 from WA. This pathotype became widespread in southern regions of WA and was isolated twice from SA. Pathotype 104-1,2,3,(6),(7),11 was also common in WA. Leaf rust incidence was low in eastern Australia. Pathotypes identified included the *Lr24* virulent pathotype 104-1,2,3,(6),(7),11,13, the Triller pathotype 104-1,2,3,(6),(7),9,11, and pts 104-1,2,3,(6),(7),11,12 and 104-1,2,3,(6),(7),11. A single isolate of a new pathotype combining virulence for *Lr1* and *Lr13* (104-1,3,5,10,12) was isolated from SA.

Wheat Stripe Rust The most significant event for the 2002 rust survey period was the first detection of wheat stripe rust in Western Australia. The pathotype, identified as 134 E16 A+, has not been identified previously in eastern Australia, and so represents a new foreign incursion. Following the initial outbreak in the Lake Grace region in August, the disease was found on a wide front and caused significant losses among vulnerable crops in the Great Southern region. In contrast, dry conditions in eastern Australia contributed to low disease levels. However, crops of H45 in more favoured districts were affected by pathotype 110 E143 A+, which has been present for many years but has become more prevalent due to its adaptation to H45.

Oat Stem Rust A historically low sample number was processed in 2002. Despite the low number, pathotype diversity was typically quite large with pathotype group 94 continuing to predominate. One sample with virulence for *Pga* (94-2,3,4) was recovered from Victoria late in the season.

Oat Leaf Rust Only 12 samples of leaf rust on oats were received during 2002–03, too few to make reliable conclusions concerning pathotype frequencies. With the exception of pt 0002-4,6,10, all pathotypes isolated had been detected in previous surveys. The most common pathotypes isolated were 0001-0 and 0001-2. Five other pathotypes were identified, all of which were virulent for *Pc51*, *Pc55* and *Pc71* and are regarded as closely related. These included the Cleanleaf pathotype 0207-4,6,10, and pt 4473-4,6,10, with the latter combining virulence for *Pc39*, *Pc58*, *Pc59*, and *Pc61*.

Barley Stem Rust There were no reports of stem rust in barley crops in 2002–03, and only one sample of stem rust on barley, collected from an experimental plot in Qld, was successfully processed and identified as the wheat stem rust pathogen, pt 98-1,2,3,5,6.

Barley Leaf Rust Whilst levels of barley leaf rust were low in eastern Australia, epidemics did develop in southern parts of the WA cereal belt. Three pathotypes were isolated from WA, including 5453P+, isolated for the first time and considered a single-step mutant from pt 5453P-. Pts 4610P+, 5610P+, 5453P- and 5452P+ were isolated from eastern Australia.

Barley Grass Stripe Rust The majority of samples were received from southern NSW and Victoria. Although some samples were collected from barley crops, there were no reports of severe infection. Despite extensive monitoring, no samples of barley grass with stripe rust symptoms were observed in the Western Australian wheat stripe rust epidemic.

Triticale and Rye Rusts There were no reports of rust in crops of triticale or cereal rye in 2002–03.

II. DETAILED REPORT

INTRODUCTION

Rust surveys or inspections conducted during 2002–03 included:

Northern NSW - Qld	14 – 18 October	Bob McIntosh
WA	23 - 27 September	Colin Wellings
Southern NSW	22 - 25 October	Colin Wellings
WA, south of Perth	30 October - 1 November	Robert Park

SEASONAL CONDITIONS

Drought conditions were the dominating influence on cereal production in 2002. Climatic factors were reasonably good in eastern Australia at the beginning of the season with average and above average rainfall providing good moisture for crop establishment. However, lower than average rainfall throughout much of the winter period and very much below average rainfall in spring led to low yields and crop failure in the western fringes of the cereal growing region. In contrast, Western Australian wheat growers experienced low rainfall in the crop establishment phase, but recovered with good rain in spring to assist final yields.

WHEAT RUST PATHOGENS

Wheat Stem Rust (caused by *Puccinia graminis* f. sp. *tritici*)
R. F. Park and M. Williams
University of Sydney

Epidemiology and pathotype distribution

Only seven samples of stem rust on wheat were received from eastern Australia in 2002–03, and all were collected from experimental plots. The only pathotypes identified from these samples were 98-1,2,3,5,6 and 343-1,2,3,5,6 (Table 1). Two isolates of the latter were identified in samples collected from the Disease Progress Nursery at Gatton, which was inoculated with this pathotype.

First reports of stem rust in commercial wheat crops in WA were made from the Great Southern and Esperance regions in June. A total of 37 samples were received from WA, from which eight pathotypes were identified (Table 1). The most commonly isolated pathotypes were members of the "34-2 group". This group is typified by the pathotypes 34-2 and 34-2,7, common in WA throughout the 1990s and in 2000/2001. The most commonly isolated pathotype was the "VPM virulent" 34-1,2,7 +*Sr38*. This pathotype was first detected in samples of stem rusted Camm wheat collected from the Esperance region in November 2001. It was again isolated from volunteer wheat in the Esperance region in early 2002, and became established there during the 2002 season. It was detected from Mt Barker later in the season, and again from volunteer wheat at Manjimup in March 2003. Pt 34-1,2,7, a presumed single-step mutational derivative of 34-2,7 with added virulence for *Sr6*, and a variant of the "VPM virulent" pathotype with added virulence for *Sr9e* were also isolated (Table 1). Three pathotypes belonging to the "Oxley" group, typified by pt 343-1,2,3,5,6, were isolated, and included a variant of the Oxley pathotype with added virulence for *Sr7b* (Table 1).

Notes on cultivars carrying genes for stem rust resistance

All cultivars with the following genes are resistant to the pathotypes isolated in 2002–03. Cultivars with *Sr30* should be considered with caution because virulence for *Sr30* has been detected in recent years, and a single isolate of a pathotype combining virulence for *Sr9g* and *Sr30* was isolated from WA during 1999-2000. Furthermore, field studies at PBIC have shown clearly that some cultivars with *Sr30* perform better than others to avirulent pathotypes (see below).

Sr9e Sunland and Yarralinka (a single isolate of a pathotype virulent for *Sr9e* was identified from WA in 2002).

Sr22 Schomburghk

Sr24 Anlace, Annuello, Babbler, Cunningham, Datatine, Dennis, Giles, Goroke, Janz, Koelbird, Krichauff, Lang, Mira, Mitre, Mulgara, Pardalote, Perouse, Petrie, QAL2000, Sunco, Sunelg, Sunpict, Sunsoft 98, Swift, Tasman and Worrakatta

Sr26 Hybrid Apollo, Blade, Chough, Currawong, Darter, Flinders, Hybrid Gemini, Harrier, Hybrid Mercury, Petrel, Hybrid Pulsar, Shrike, Snipe, Sunelg, Sunlin, Tern, Wylah, and Yanac

Sr30
1. (close monitoring required; significant rust may develop) Ajana, Arrino (heterogeneous), Kalgarin, Yitpi
2. Banks, Batavia, Brookton, Calingiri, Chara, Cunderdin, EGA Bonnie Rock, EGA Hume, EGA Wedgetail, Frame, Gordon, H45, Kalannie, Katunga, Lark, Lorikeet, Molineux, Osprey, Rosella, Silverstar, Sunfield, Sunmist.

Sr31 Grebe, Mawson, Tennant, Triller and Warbler

The gene *Sr2* confers adequate adult plant resistance and is present in the cultivars Arnhem, Batavia (heterogeneous), Baxter, Bowerbird, Brennan, Carnamah, Diamondbird, Dollarbird, Eradu, Glover, Goldmark, Gordon, Hartog, Houtman, Kennedy, Kukri, Leichardt, Lowan, Machete, Mackellar, Nyabing, Pelsart, Rowan, Sunbrook, Suneca, Sunstate, Tailorbird. Cultivars with *Sr13* (Gutha, Machete, Stiletto, Sunmist and Wialki) are moderately susceptible to moderately resistant.

The detection of stem rust in crops of several cultivars with *Sr30* in recent years has caused some concern, however, in all cases, isolates from these crops have proven to be avirulent on *Sr30*. Field tests at Cobbitty by Dr Bariana have shown that cultivars with *Sr30* differ considerably in their response to stem rust, even with pathotypes that are avirulent to *Sr30*. In general, two groups of cultivars could be identified, with the cultivars listed in Group 1 above being clearly worse (moderately susceptible to susceptible) to the avirulent pathotype 98-1,2,3,5,6 than those in Group 2.

Results of seedling greenhouse tests indicate that the cultivars Camm, Trident, Bowie, Sunlin, and Sunstate have some residual resistance to the new pathotype 34-1,2,7 +*Sr38*. In the case of Camm, this may be due to the presence of *Sr12*, a gene that provides some protection in seedling tests but which is not fully effective against avirulent pathotypes in adult plants under the field conditions. All other cultivars with the VPM resistance are expected to carry a gene (s) (Trident and Bowie, possibly *Sr9b*; Sunlin, *Sr26*; Sunbri, *Sr36*; Sunstate, *Sr2* and *Sr8a*) that should provide some protection against this new pathotype in adult plants as well as seedlings. Gene *Sr38* is still effective in eastern Australia.

<u>Wheat Leaf Rust</u> (caused by *Puccinia triticina*; formerly *Puccinia recondita* f. sp. *tritici*)
R. F. Park and M. Williams
University of Sydney

Epidemiology and pathotype distribution

Nine pathotypes were identified from 167 samples that were received during 2002–03 (Table 2). Eight of these are regarded as closely related, being derived from pt 104-1,2,3,(6),(7),11. This group of pathotypes has dominated in all wheat growing regions since 1990.

A new pathotype of leaf rust with virulence for the resistance gene *Lr37* was isolated in early 2002 from self-sown Camm wheat on the south-western fringe of the wheatbelt north of Albany, WA. This pathotype was detected subsequently in many other samples forwarded from that state throughout 2002 and it appears to be well established. It was also isolated from the south eastern corner of SA in samples collected from Bool Lagoon and Mt Benson in December 2002, indicating that it has managed to spread from the western cereal growing regions to the east. Efforts are underway to obtain accurate information on the response of other cultivars with resistance gene *Lr37* to this new pathotype.

Pathotype 104-1,2,3,(6),(7),11 was also isolated commonly from samples forwarded from WA during 2002-03. The first recording of this pathotype was in eastern Australia in 1989, and it was identified subsequently from WA in 1990. This pathotype, and many of its presumed mutational derivatives, are avirulent on the *Lr23* differential Gaza, despite being virulent for *Lr23*. This indicates that Gaza carries a second uncharacterised resistance gene that is effective against these pathotypes. Variants of pt 104-1,2,3,(6),(7),11 with complete virulence on Gaza are now common (*eg* 104-1,2,3,(6),(7),11+Gaza High). A single isolate of pathotype 104-1,2,3,5,(6),(7),11, regarded as a derivative of pt 104-1,2,3,(6),(7),11 with added virulence for *Lr3ka*, was isolated from a sample collected at Jerramungup.

The drought conditions that prevailed over much of eastern Australia in 2002 resulted in a very low incidence of wheat leaf rust. Samples forwarded from Qld and NSW all came from experimental plots and yielded either the *Lr24* virulent pathotype 104-1,2,3,(6),(7),11 +*Lr24*, the Triller pathotype 104-1,2,3,(6),(7),9,11, the *Lr17b* virulent pathotype 104-1,2,3,(6),(7),11,12, or the presumed parent of these, 104-1,2,3,(6),(7),11 (Table 2). A new pathotype, 104-1,3,5,10,12, was isolated from a sample collected at Wanilla on the Eyre Peninsula. This pathotype is regarded as a single-step mutational derivative from pt 76-1,3,5,10,12. It is of potential importance because it combines virulence for *Lr1* and *Lr13*. It was present at a very low level in the sample forwarded for pathotype analysis, possibly indicating that its frequency in the crop from which it was collected was very low.

Notes on cultivars carrying genes for leaf rust resistance

It is possible that some cultivars with *Lr17a* (Baxter, heterogeneous; Perenjori), may be more susceptible to a variant of pt 104-1,2,3,(6),(7),11 that has been detected in most wheat growing regions, which appears to have increased virulence for this gene. Cultivars with *Lr13* in combination with *Lr2a* (Sunmist), *Lr23* (EGA Hume, Strzelecki), *Lr24* (Dennis, Giles, Petrie and Sunsoft 98) or *Lr37* (Braewood and Rudd) are also resistant to the pathotypes isolated in 2002–03. Cultivars with *Lr1* and *Lr13* (Hybrid Apollo, Arnhem, Batavia, Bowerbird, Cunderdin, Diamondbird, Goldmark, Hartog, Kukri, Leichardt, Lowan, Hybrid Pulsar, Rowan, Silverstar, Stretton, Sunbrook, Sunfield and Tailorbird) are still regarded as resistant since pt 104-1,3,5,10,12 is at low frequency. Cultivars with *Lr26* (Grebe, Triller and Warbler) are seedling susceptible to pt 104-1,2,3,(6),(7),9,11, now present in all eastern states, and it is anticipated that Tennant (*Lr26*) will be at least seedling susceptible to this pathotype.

Cultivars with *Lr37* in combination with *Lr13* (see above) or *Lr24* (QAL2000) are resistant to all pathotypes isolated from Australasia during the 2002-03 survey period.

Cultivars with *Lr21* (Thornbill), *Lr28* (Sunland) and the complementary seedling resistance genes *Lr27+Lr31* (Carnamah and Karlgarin) are resistant to all pathotypes isolated in 2002–03. Genetic studies at PBIC have indicated that Carnamah and Kalgarin should also carry the adult plant resistance gene *Lr12*, which is completely linked to *Lr31* and in fact may be the same gene.

It is apparent that many cultivars with *Lr24*, and at least some cultivars with *Lr37* have additional adult plant resistance to pathotypes virulent for these genes.

<u>Wheat Stripe Rust</u> (caused by *Puccinia striiformis* f. sp. *tritici*)
C. R. Wellings* and K. R. Kandel
(*on secondment from NSW Agriculture)

Disease development

Stripe rust was first reported from wheat growing areas in eastern Australia in mid July in northern NSW (Narrabri) with further samples from southern NSW in late August. It was not until late September-early October that samples were received from Queensland, Victoria and South Australia, and at this stage the epidemic was too late in initiation to cause any real problems. In comparison with the previous season, sample numbers were very low in Regions 1 and 3, no doubt reflecting drought conditions. Despite the dry conditions, samples from Region 2 were similar to last year. This was due to continuing problems with stripe rust on H45 in irrigated crops and in the higher rainfall eastern fringe of southern NSW. Although high yield potential crops were treated with fungicide, no crop losses were reported.

The first detection of wheat stripe rust in WA in late August 2002 is probably the most significant rust event to happen in Australia since this disease was first detected in eastern Australia in 1979. The initial infections were recorded in cultivar Stiletto (carrying resistance gene *Yr6*) growing in the Newdegate shire, and from cultivar Harrismith in the Broomehill shire, both in the south eastern wheatbelt of WA. Within two weeks there were 15 confirmed occurrences and within four weeks confirmed infected fields had increased to 95. By the end of the wheat growing season in 2002, the disease was present over a wide area encompassed by Dongara (N), Wongan Hills (NE), Esperance (far SE) and Manjimup (far SW), and the major wheat areas in the south east. Disease impact was greatest in the south and minimal in the north. Dry conditions were thought to have limited opportunities for further disease extension. The rapid spread of stripe rust in the early phase of the epidemic was consistent with experiences in eastern Australia in 1979. However, the initial widespread distribution of the disease suggested that it may have been present for a considerable period, and perhaps even in the previous season, prior to the first confirmed detection. Crop losses in the Great Southern region were estimated from fungicide trials conducted by Department of Agriculture WA to range from 30 to 50 per cent, with estimates in severely infected crops of up to 65 per cent yield loss.

Pathotypes detected

The main pathotypes detected in 2002-03 are described below. The features of these pathotypes are described in terms of avirulence genes that indicate the corresponding host resistance genes that remain effective in providing protection against the particular pathotype.

104 E137 A-	avirulent on resistance genes *YrA* (*eg* Baxter), *Yr6* (*eg* Sunbrook), *Yr7* (*eg* Diamondbird), *Yr9* (*eg* Mawson), *Yr17* (*eg* Sunbri) and a range of adult plant resistance genes including *Yr18*. First detected in 1979.
110 E143 A+	avirulent on *Yr9*, *Yr17* and adult plant resistances. First detected in 1986.
104 E137 A-, Yr17+	avirulent on *YrA*, *Yr6*, *Yr7*, *Yr9* and adult plant resistances. First detected in 1999 on wheats carrying *Yr17* (*eg* Camm, Trident).

104 E153 A-	identical to 104 E137 A- with additional virulence for *Yr8*. First detected in 1985, and occasionally recovered in the survey. This pathotype has no obvious advantage for survival and is not expected to cause problems.
111 E143 A-	detected in Tasmania for the first time in 2002 and identical to 110 E143 A+ with additional virulence for *Yr1*. The importance of this pathotype is difficult to determine, given that *Yr1* is rare in Australian wheats (*eg* More).
134 E16 A+	first detected in Western Australia in 2002. Avirulent on *Yr17* and adult plant resistances including *Yr18*.

Miscellaneous pathotypes included those of unusual pathogenicity requiring further study. This group also included several pathotypes listed separately as 104 E9 A- (first detected in 1988) and 104 E25 A- (first detected in 2002) which have lost virulence for certain host genes, including *Yr2*.

Pathotype distribution

Pathotypes recorded in 2002-03 are indicated in Table 3. Although 12 pathotypes were detected, over 80% of isolates were represented by three pathotypes. The main pathotype in eastern Australia was 110 E143 A+ which was associated with sometimes severe infections in H45. Although this pathotype was first detected in 1986, it remained at very low levels in the pathogen population until the past several seasons. The rapid increase in frequency of this pathotype is due to its survival advantage on H45, which has become a popular variety for late sowing in Region 2 and Region 1, despite being not recommended in the latter.

The pathotype in Western Australia was identified as 134 E16 A+ which combines virulence for *Yr6, Yr7, Yr8, Yr9* and *YrA*. Although these virulences are present in various pathotypes in the eastern states, the unique combination in the WA pathotype clearly indicates that the pathogen was of foreign origin. This was supported by molecular studies that showed a 20% difference in AFLP polymorphism between the first WA isolate and 10 representative isolates from the east. Although a large sample was examined from the first epidemic, there was no evidence of pathotype change. This was similar to observations in the east during the initial establishment of the pathogen in the early 1980s.

Notes on current resistances

Resistance genes *YrA, Yr6, Yr7, Yr9, Yr10, Yr17, Yr18* are deployed in certain Australian wheats and these will generally continue to provide varying protection in areas where the prevailing pathotypes remain avirulent. Among these genes, however, only *Yr18* is expected to provide durable resistance in association with other undescribed adult plant resistances.

OAT RUST PATHOGENS

Oat Stem Rust (caused by *Puccinia graminis* f. sp. *avenae*)
C. R. Wellings* and P. Kavanagh
(*on secondment from NSW Agriculture)

A historically low sample number was processed in 2002, due largely to drought conditions in eastern Australia. Despite the low number, pathotype diversity was typically quite large (Table 4). Pathotype group 94 continues to predominate, although just one sample with virulence for *Pga* (94-2,3,4) was recovered.

Virulence for *Pga*, which was first detected in 1997, peaked at 20% and has subsequently stabilised at 10% of isolates. Although effective stem rust resistance in Australian oat cultivars is essentially unavailable, cultivars carrying *Pga* (Barcoo, Culgoa II, Glider, Cleanleaf, Nobby) will be protected in situations where the matching virulence is absent in the pathogen population.

<u>Oat Leaf Rust</u> (caused by *Puccinia coronata* f. sp. *avenae*)

R. F. Park and P. Kavanagh
University of Sydney

Epidemiology and pathotype distribution

Only 12 samples of leaf rust on oats were received during 2002–03 (Table 5), too few to make reliable conclusions concerning pathotype frequencies. Eight samples from eastern Australia were all collected from wild oats, whereas only one of the six samples received from WA was from wild oats. With the exception of pt 0002-6,10, isolated from wild oats collected in Victoria, all pathotypes identified have been detected in previous surveys.

No samples were received from northern NSW or Qld. Nine of the 14 isolates identified in collections from southern NSW and Victoria, and all six isolates identified in collections from WA were either pt 0001-0 or pt 0001-2. Both of these pathotypes are avirulent for 11 of the 12 differentials used in assigning the coded triplet designation "0001" (Table 5; see also Table A5, 2001–02 Pathogenicity Survey Report). It should be stressed that although some of these isolates are given the same pathotype designation, they do differ on at least some oat genotypes that whilst not included in assigning pathotype designations, are still included in the differential set. Five other pathotypes were identified, all of which were virulent for *Pc51*, *Pc55* and *Pc71* and hence have the "tail" "4,6,10" in their pathotype designations. These pathotypes are regarded as closely related, and include the Cleanleaf pathotype 0207-4,6,10, a single isolate of which was recovered from southern NSW (Table 5). Pt 4473-4,6,10 is thought to have developed via somatic hybridisation between the Cleanleaf pathotype and the Amby pathotype 0071-0.

Notes on cultivars carrying genes for leaf rust resistance

With the detection of virulence for Bettong and Barcoo in the 2001–02 survey, virulence has now been detected for all current Australian oat cultivars in recent years. Extensive multi-pathotype testing of oat cultivars is continuing in an attempt to postulate the genes present in Australian oat cultivars. These tests have revealed that the cultivar Taipan, released in 2001, has the Nugene resistance. Of further interest was the discovery of two additional pathotypes in the PBIC rust collection with virulence for the cultivars Gwydir (collected in 1978) and Nugene (collected at least 30 years ago). Both of these pathotypes are avirulent for many of the resistance genes represented in the differential set.

BARLEY RUST PATHOGENS

<u>Barley Stem Rust</u> (caused by *Puccinia graminis*)

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University of Sydney

There were no reports of stem rust in barley crops in 2002–03, and only one sample of stem rust on barley, collected from experimental plot in Qld, was successfully processed and identified as the wheat stem rust pathogen, pt 98-1,2,3,5,6.

<u>Barley Leaf Rust</u> (caused by *Puccinia hordei*)
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University of Sydney

Epidemiology and pathotype distribution

Barley crops in eastern Australia did not experience any significant levels of leaf rust infection in 2002–03. Epidemics of leaf rust developed in southern parts of the WA cereal belt, mainly affecting the cultivars Gairdner and Fitzgerald. Fifty five samples were received, most of which (85%) came from WA (Table 6). Six pathotypes were identified, all of which were virulent for *Rph12*.

Three pathotypes of the barley leaf rust pathogen were isolated from WA. Pt 5610P+ was first isolated in WA in 1997 and is now also present in eastern Australia. Pt 5453P- was first detected in WA in 2001, and a presumed single-step mutational derivative of this pathotype with added virulence for *Rph19*, 5453P+, was isolated for the first time in 2002–03. These three pathotypes do not differ in their pathogenicity for the seedling resistance genes present in current WA barley cultivars.

Notes on cultivars carrying genes for leaf rust resistance

Many Australian barley cultivars carry seedling genes for resistance to *P. hordei*, however most of these genes are ineffective against pathotypes that currently prevail. Before 1999–2000, the cultivars Tallon and Lindwall (*Rph12*) were regarded as resistant to the pathotypes occurring in Region 1. These cultivars will now need to be monitored carefully because their adult plant responses to the *Rph12* virulent pathotypes detected in the region last year are currently unknown. Only Galaxy has effective seedling resistance to leaf rust in Australia, however, not all cultivars will become severely infected and cultivars like Gilbert are known to have good levels of resistance at later growth stages. The cultivars Baudin (*Rph12*) and Hamelin (no resistance gene), released in WA during 2002, are expected to be susceptible to the pathotypes of leaf rust occurring in that state.

<u>Barley Grass Stripe Rust</u> (caused by *Puccinia striiformis*)
C. R. Wellings[1] and K.R. Kandel
University of Sydney
([1]on secondment from NSW Agriculture)

Disease development

Barley grass stripe rust (BGYR) in eastern Australia showed similar frequency and distribution to previous seasons (Table 3), despite drought conditions. Most samples were received from southern NSW and Victoria. Although some samples were collected from barley crops, there were no reports of severe infection. Despite extensive monitoring, no samples of barley grass with stripe rust symptoms were observed in the Western Australian wheat stripe rust epidemic.

TRITICALE AND RYE RUST PATHOGENS
R. F. Park and M. Williams
University of Sydney

There were no reports of rust in crops of triticale or cereal rye in 2002-2003.

MISCELLANEOUS RUST PATHOGENS ON GRASSES

Six samples of leaf or stem rust on grasses were received, of which only two yielded viable rust isolates. A single isolate of a form of stem rust thought to be *P. graminis* f. sp. *phalaridis* was isolated from a grass species collected at Gnowangerup in WA, and a single sample of the rye grass stem rust pathogen, *P. graminis* f. sp. *lollii*, was isolated from stem rusted rye grass collected in WA.

III ACKNOWLEDGEMENTS

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Table 1. Pathotypes of *Puccinia graminis* f. sp. *tritici* (wheat stem rust pathogen) identified by region, 1 April 2002 – 31 March 2003.

	Number of Isolates							
	Region 1		Region 2			Region 3	Region 4	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	TOTAL
34-1,2,7	-	-	-	-	-	-	5	5
34-1,2,7 +Sr38	-	-	-	-	-	-	18	18
34-1,2,7 +Sr38 +Sr9e	-	-	-	-	-	-	1	1
34-2	-	-	-	-	-	-	1	1
34-2,7	-	-	-	-	-	-	2	2
98-1,2,3,5,6	1	-	-	1	-	-	2	4
343-1,2,3,5,6	2	-	-	-	-	-	2	4
343-1,2,3,5,6 +Sr7b	-	-	-	-	-	-	2	2
Total no isolates	**3**	**0**	**0**	**1**	**0**	**0**	**33**	**37**
Total no samples	**4**	**0**	**1**	**1**	**0**	**1**	**37**	**44**
No failed samples	1	0	1	0	0	1	4	7

Table 2. Pathotypes of *Puccinia triticina* (wheat leaf rust pathogen) identified by region, 1 April 2002 – 31 March 2003.

	Number of Isolates							
	Region 1		Region 2			Region 3	Region 4	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	TOTAL
104-1,3,5,10,12	-	-	-	-	-	1	-	1
104-1,2,3,(6),(7),11	1	-	-	6	1	1	35	44
104-1,2,3,(6),(7),11+Gaza high	-	-	-	2	-	-	29	31
104-1,2,3,(6),(7),11 +Lr37	-	-	-	-	-	3	67	70
104-1,2,3,5,(6),(7),11 +Gaza high	-	-	-	-	-	-	1	1
104-1,2,3,(6),(7),11,12	-	-	1	5	-	-	-	6
104-1,2,3,(6),(7),9,11	2	-	-	2	-	-	-	4
104-1,2,3,(6),(7),11,13	10	-	-	7	-	4	-	21
104-2,3,(6),(7),11	-	-	-	5	-	-	-	5
Total no isolates	**13**	**0**	**1**	**27**	**1**	**9**	**132**	**183**
Total no samples	**10**	**0**	**2**	**20**	**2**	**7**	**126**	**167**
No failed samples	0	0	1	4	1	0	13	19

Table 3. Pathotypes of *Puccinia striiformis* f. sp. *tritici* (wheat stripe rust pathogen) identified by region, 1 April 2002 – 31 March 2003.

	Number of Isolates							
	Region 1		Region 2			Region 3	Region 4	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	TOTAL
104 E9 A-	-	-	1	-	-	-	-	1
104 E25 A-	-	-	4	-	-	-	-	4
104 E137 A-	-	1	-	-	1	-	-	2
104 E137 A+	-	-	1	-	-	-	-	1
104 E137 A-, Yr17+	-	-	1	-	-	1	-	2
104 E153 A-	-	1	2	1	-	-	-	4
104 E153 A+	1	-	3	2	-	-	-	6
134 E16 A+	-	-	-	-	-	-	136	136
110 E143 A-	-	1	3	-	-	1	-	5
110 E143 A+	-	1	17	3	1	-	-	22
111 E143 A-	-	-	-	-	4	-	-	4
BGYR	1	1	14	14	2	4	-	36
Miscellaneous	-	3	7	2			1	13
Total no isolates	**2**	**8**	**53**	**22**	**8**	**6**	**137**	**236**
Total no samples	**2**	**9**	**56**	**30**	**7**	**7**	**150**	**261**
No failed samples	-	1	7	10	-	1	13	32

Table 4. Pathotypes of *Puccinia graminis* f. sp. *avenae* (oat stem rust pathogen) identified by region, 1 April 2002 – 31 March 2003.

	Number of Isolates						
	Region 1		Region 2		Region 3	Region 4	
Pathotype	QLD	NNSW	SNSW	VIC	SA	WA	TOTAL
30-1,2	-	-	-	-	-	2	2
77	-	-	-	1	-	-	1
77-3	-	-	-	1	-	-	1
94	-	-	-	-	-	1	1
94-2	-	-	-	-	-	1	1
94-3	-	-	-	1	1	2	4
94-2,3	-	-	-	-	1	4	5
94-2,3,4	-	-	-	1	-	-	1
Total no isolates	**-**	**-**	**-**	**4**	**2**	**10**	**16**
Total no samples	**-**	**-**	**-**	**1**	**1**	**7**	**9**
No failed samples	-	-	-	-	-	-	-

Table 5. Pathotypes of *Puccinia coronata* f. sp. *avenae* (oat leaf rust pathogen) identified by region, 1 April 2002 – 31 March 2003.

	Number of Isolates							
	Region 1		Region 2			Region 3	Region 4	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	**TOTAL**
0001-0	-	-	2	4	-	-	4	**10**
0001-2	-	-	-	3	-	-	2	**5**
0002-4,6,10	-	-	-	1	-	-	-	**1**
0003-4,6,10	-	-	-	1	-	-	-	**1**
0207-4,6,10	-	-	1	-	-	-	-	**1**
4001-4,6,10	-	-	-	1	-	-	-	**1**
4473-4,6,10	-	-	-	1	-	-	-	**1**
Total No. Isolates	**0**	**0**	**3**	**11**	**0**	**0**	**6**	**20**
Total no samples	**0**	**0**	**3**	**5**	**0**	**0**	**4**	**12**
No failed samples	0	0	1	0	0	0	0	1

Table 6. Pathotypes of *Puccinia hordei* (barley leaf rust pathogen) identified by region, 1 April 2002 – 31 March 2003.

	Number of Isolates							
	Region 1		Region 2			Region 3	Region 4	
Pathotype	QLD	NNSW	SNSW	VIC	TAS	SA	WA	TOTAL
4610P+	-	-	-	1	-	-	-	**1**
5453P- (+PI366444)	-	-	-	-	-	3	36	**39**
5453P+ (+PI366444)	-	-	-	-	-	-	10	**10**
5452P+ (+PI366444)	-	-	1	4	-	1	-	**6**
5653P+ (+PI366444)	-	-	-	1	-	-	-	**1**
5610P+ (+PI366444)	1	-	-	-	-	1	1	**3**
Total no isolates	**1**	**0**	**1**	**6**	**0**	**5**	**47**	**60**
Total no samples	**1**	**0**	**2**	**7**	**0**	**3**	**42**	**55**
No failed samples	0	0	0	1	0	0	6	7