

# Australian barley cultivar pedigree and leaf rust seedling and adult plant resistance genotype information

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In the past, the primary objective of cultivar circulars was to provide information on the expected field responses of cultivars to the most relevant, and often the most predominant rust pathotypes. In the current document, in addition we provide information on the seedling rust resistance genes and adult plant resistance (APR) genes to leaf rust carried by new and historical Australian barley cultivars (Ausbars). The information produced in this circular is based on consensus results of seedling tests performed in the greenhouse using 8-10 *Puccinia hordei* pathotypes with diverse virulence spectra. The prediction of APR is based on the application of recently developed co-dominant molecular markers closely linked to APR genes *Rph20*, *Rph23* and *Rph24*. Our ability to reliably identify three minor genes conferring additive APR to *Puccinia hordei* has been a major advance in our efforts to help control this pathogen.

As in past circulars, we have listed other information on cultivars where such information is available publicly and/or supplied by any researcher. It is likely that there are some omissions and possibly some errors in the information included and it would be greatly appreciated if the users could notify us of any such cases. Your suggestions and additional information will help us to provide clearer indications of how we might expect our cultivars to perform over a range of stresses.

### Information on resistance genes and pathotype virulence

To date, there are 23 designated seedling resistance genes (*Rph1-19*, *Rph21-22*, *Rph25-27*; note that our recent research has demonstrated that the resistance conferred by *Rph15* and *Rph16* are mediated by the same gene) and three APR genes (*Rph20*, *Rph23* and *Rph24*) to *P. hordei*. Of these genes, Ausbars primarily

carry *Rph2*, *Rph3*, *Rph4*, *Rph7*, *Rph9.am* (allele of *Rph12*), *Rph12*, *Rph19* and *Rph25*, and APR genes *Rph20*, *Rph23* and *Rph24*.

Annual surveys of pathogenic variability in *P. hordei* at the Plant Breeding Institute from 1992 to 2019 revealed a significant shift in the composition of populations across Australia. Virulence for the resistance gene *Rph12*, first detected in a single pathotype in Tasmania in 1991 (*viz.*

4610 P+), was subsequently detected in 1993 in South Australia, Victoria and southern New South Wales (NSW). By the end of 2001, eight pathotypes with virulence for *Rph12* had been isolated and virulence for this gene was present in all Australian barley growing regions. Virulence for *Rph3* was first detected in pathotype 5457 P+ in northern NSW in 2008, and later detected independently in pathotype 5656 P+ in South Australia in 2011 and pathotype 5457 P- in Western Australia in 2013. Surveys in the years since have demonstrated widespread virulence for *Rph1*, *Rph2*, *Rph3*, *Rph4*, *Rph6*, *Rph8*, *Rph9.am*, *Rph12*, *Rph19* and *Rph25*. Virulence has not been detected in Australia for the resistance genes *Rph7* or *Rph14*. Resistances derived from *H. vulgare* ssp. *spontaneum* (*Rph11*, *Rph13*, *Rph15*) and *H. bulbosum* (*Rph17*, *Rph18*, *Rph22*

and *Rph26*) are also broadly effective in Australia. These genes have not been utilized by Australian breeding programs and therefore unlikely to be present in Ausbars. More detailed information on pathotype occurrence and distribution can be found in our Cereal Rust Update sereis. These reports will soon all be available from a new website that is under construction and should be active by June 2020.

Molecular markers linked very closely to genes *Rph20*, *Rph23* and *Rph24* have been recently developed under the GRDC funded project US00074. We applied these markers (bPb0837 and sun690-1 linked to *Rph20*, EbMac0603 linked to *Rph23* and sun43-4 linked to *Rph24*) and predicted the presence of genes *Rph20*, *Rph23* and *Rph24* in the Ausbars reported here

## Disease ratings

The disease ratings provided in this circular are based on the range (2-5 years) of consensus ratings generated by PBI Cobbitty and the National Variety trials (NVT). The disease response categories are summarised and colour coded in Table 1. The colour coding has been applied on Table 2 to assist in highlighting strengths and potential weaknesses in varieties with respect to rust reaction.

Response	Description
R	highly resistant: occasional symptoms of infection including necrotic flecks; no sporulation
RMR	resistant: symptoms evident and usually with necrosis and chlorosis, limited sporulation, and affected leaf area up to 15%
MR	moderately resistant: evidence of sporulating areas on the leaf surface with some chlorosis and necrosis, and affected leaf area up to 30%
MRMS	intermediate: restricted sporulating areas with some chlorosis, and affected leaf area up to 50%
MS	moderately susceptible: freely sporulating lesions and affected leaf area up to 70%
MSS	moderately susceptible to susceptible: freely sporulating lesions with leaf area affected up to 90%
S	susceptible: abundant sporulation across the whole leaf surface; leaf area affected up to 100%; some chlorosis and necrosis evident
SVS	susceptible to very susceptible: abundant sporulation across the leaf surface: leaf area affected up to 100%; limited chlorosis
VS	highly susceptible: abundant sporulation across the whole leaf area with no evidence of chlorosis or necrosis; 100% leaf area affected

Cultivar	Consensus Rating (range)		Seedling Resistance Gene	Adult Plant Resistance Gene			Resistance due to:**
	Min	Max		<i>Rph20</i>	<i>Rph23</i>	<i>Rph24</i>	
Alestar#	RMR	MS	<i>Rph3</i>	NT	NT	NT	APR
Arapiles	S	VS	<i>Rph19</i>	-	-	-	N/A
Bandulla	S	SVS	<i>Rph9.am</i>	-	-	-	N/A
Banks#	MS	S	<i>Rph3</i>	-	-	-	APR
Barque	MS	S	<i>Rph19?</i>	+	-	-	APR
Bass#	SVS	VS	<i>Rph3</i>	-	-	-	N/A
Baudin#	SVS	VS	<i>Rph12</i>	-	-	+	N/A
Beecher	MSS	S	Nil	-	+	+	APR
Binalong	S	VS	<i>Rph2+</i>	-	-	+	N/A
Bottler#	MR	MSS	<i>Rph3</i>	+	-	+	APR
Brewstart#	MR	S	<i>Rph3</i>	NT	NT	NT	APR

Brindabella	S	VS	Rph2	-	-	-	N/A
Buff#	MSS	SVS	Nil	NT	NT	NT	N/A
Buloke	S	SVS	Nil	-	-	-	N/A
Bussell	S	VS	Rph9.am	-	-	-	N/A
Capstan	MR	MSS	Rph19	+	-	+	APR
Cask	MS	MSS	Nil	-	-	+	APR
Charger	R	MRMS	Rph3	+	-	+	APR
Chebec	S	SVS	Rph19 + Rph9.am	-	-	-	N/A
Chieftain	MR	MSS	Rph14?	+	-	+	Seedling resistance
Clipper	S	SVS	Nil	-	-	-	N/A
Commander#	MS	S	Rph19+Rph3*	-	-	-	APR
Compass#	S	VS	Rph3	-	-	-	N/A
Corvette	MRMS	MSS	Nil	+	-	-	APR
Cosmic	MR	MS	Rph?	+	-	+	Seedling + APR
Cowabbie	S	SVS	Rph12	-	-	+	N/A
Cutter	S	SVS	Rph19	-	-	-	N/A
Dash	R	MRMS	Rph12+	+	-	+	Seedling + APR
Dhow	S	SVS	Nil	-	-	-	N/A
Dictator	S	SVS	Nil	-	+	-	N/A
Dictator 2	MR	MS	Rph7	-	+	-	Seedling resistance
Doolup	SVS	VS	Rph12+	-	-	+	N/A
Empress	S	VS	NT	-	-	-	N/A
Fairview#	MR	S	Rph3	-	-	-	APR
Fathom#	MRMS	S	Rph+?	+	-	-	Seedling + APR
Finniss	MS	S	Rph3	+	-	-	APR
Fitzgerald	MSS	S	Rph4+Rph12	-	+	-	APR
Fitzroy	S	SVS	Rph3	-	-	-	N/A
Flagship	MRMS	S	Nil	+	-	-	APR
Fleet	MR	MS	Rph+?	+	-	+	Seedling + APR
Flinders#	MRMS	S	Rph12+	+	-	+	Seedling + APR
Franklin	MS	S	Rph12	-	-	+	APR
Gairdner#	MS	S	Rph12	-	-	-	APR
Galaxy	R	MR	Rph7	-	-	+	Seedling resistance
Galleon	MRMS	MSS	Nil	-	-	-	APR
Gilbert	MRMS	MS	Nil	-	-	+	APR
Granger#	MR	MS	Rph3+	+	-	+	Seedling + APR
Grimmett	MSS	S	Rph4	-	-	+	APR
Grout*	S	VS	Rph2	-	-	-	N/A
Hamelin	S	VS	Rph9.am	-	-	+	N/A
Hannan	S	SVS	Rph19	-	-	+	N/A
Harrington	S	VS	Nil	-	-	-	N/A
Henley	MR	MRMS	Rph3	+	-	+	APR
Hindmarsh*	MRMS	S	Rph9.am+	-	-	-	Seedling + APR

Kaputar	MSS	S	Rph2	-	+	+	APR
Keel	SVS	VS	Rph19?	-	-	-	N/A
Ketch	S	SVS	Rph19	-	-	+	N/A
La Trobe	MRMS	S	Rph9.am	-	-	-	APR
Lara	MSS	S	Nil	-	-	-	APR
Lindwall	MSS	S	Rph12	-	-	-	APR
Litmus#	MS	S	Nil	-	-	-	APR
Lockyer#	MSS	S	Rph25	-	-	-	APR
Lofty Nijo	MS	MSS	NT	-	-	+	APR
Mackay	MR	MS	Nil	+	-	-	APR
Macquarie	MSS	S	Rph2	-	-	-	APR
Malebo	MS	MSS	Rph2	-	+	+	APR
Maltstar#	MRMS	S	Rph3	+	-	+	APR
Maritime	MRMS	SVS	Rph12	-	-	+	N/A
Milby	S	VS	Nil	-	-	-	N/A
Moby	MS	S	Nil	-	+	-	APR
Molloy	S	SVS	Rph+?	-	-	-	N/A
Moondyne	S	SVS	Rph9.am	-	-	-	N/A
Morrell	MS	S	Nil	-	-	-	APR
Mundah#	S	SVS	Rph2	-	-	+	N/A
Navigator#	SVS	VS	Nil	-	+	-	N/A
O'Connor	S	VS	Rph19?	-	-	+	N/A
Onslow	MS	S	Nil	-	+	-	APR
Oxford#	MR	MS	Rph3	+	-	+	APR
Pacific Ranger	S	SVS	Rph?	-	-	+	N/A
Parwan	S	VS	Rph19	-	-	-	N/A
PB216	S	SVS	NT	-	-	-	N/A
Picola	S	SVS	Rph19	-	-	-	N/A
Prior	S	VS	Rph19	-	-	+	N/A
Quasar	MR	MS	Rph2+	+	-	+	Seedling + APR
Quickstar	MR	MS	Rph?	+	-	+	APR
RGT Planet#	MRMS	MS	Rph3	+	-	+	APR
Roe	S	VS	Rph2+Rph12	-	-	+	N/A
Rosalind#	MR	MS	Nil	+	-	+	APR
Schooner	S	SVS	Rph19	-	-	-	N/A
Scope CL	MSS	SVS	Nil	-	-	-	N/A
Shannon	S	VS	Rph4	-	-	-	N/A
Shepherd#	MRMS	MS	Nil	+	-	+	APR
Skiff	S	VS	Rph4+Rph19	-	-	+	N/A
Skipper	S	SVS	Rph4+Rph19	-	-	-	N/A
Sloop	S	VS	Rph19	-	-	-	N/A
Sloop SA	S	VS	Rph19	-	-	-	N/A
Sloop Vic	S	SVS	Rph19	-	-	-	N/A

Spartacus CL#	MR	S	Rph9.am	-	-	-	APR
Starmalt	MR	MS	Rph3	+	-	+	APR
Stirling	S	SVS	Rph9.am	-	-	+	N/A
SY Rattler	R	MS	Rph+?	+	-	+	Seedling + APR
Tallon	S	SVS	Rph12	-	-	NT	N/A
Tantangara	MS	MSS	Rph2	-	-	+	APR
Tilga	S	SVS	Rph9.am	-	-	-	N/A
Topstart#	R	MRMS	Rph3	NT	NT	NT	?
Torrens	S	SVS	Rph2	-	-	-	N/A
Tulla	MRMS	S	Rph19	-	-	+	APR
Ulandra	MRMS	MSS	Rph2*	-	-	+	APR
Unicorn	S	SVS	NT	-	-	-	N/A
Urambie#	MS	S	Nil or Rph?	-	-	+	APR
Vertess	MR	MRMS	Rph12	+	-	-	APR
Vlamigh	S	VS	Nil	-	-	NT	N/A
Weeah	S	S	Rph19	-	-	+	N/A
Westminster#	RMR	MRMS	Rph3	+	-	+	APR
Wimmera	MRMS	S	Rph3	-	+	+	APR
Windich	S	SVS	Nil	-	-	-	N/A
Wyalong	S	VS	Rph9.am	-	-	+	N/A
Yagan	MS	S	Rph25	NT	NT	NT	APR
Yambla	MSS	S	Rph19	-	-	+	APR
Yerong	MS	S	Rph2	-	+	-	APR

#The consensus rating range of varieties denoted with # is based on NVT consensus ratings (2018 and 2019) and for all other varieties is based on 2-5 years data generated at PBI Cobbitty.

NT = not tested

Nil postulation means that line does not carry any seedling resistance gene to any of the test pathotypes.

Rph+ = uncharacterized resistance

Rph? = doubtful postulation

+ = presence of marker and - = absence of marker

\* = heterogeneous

\*\* = In some cases, the resistance present will be inadequate to prevent yield loss

Cultivar	Synonym	Year	State/ Company	Pedigree
Alestar#	SMBA11-2341	2017	VIC	Unknown
Arapiles	Barley 568, 8727	1993	VIC	Noyep/Proctor//CI3576/Union/4/Kenia/3/Research/2/Noyep/Proctor/5/Domen
Bandulla		1981	VIC	Prior/Lenta//Noyep/Lenta
Banks#	IGB1305	2018	Intergrain	WABAR2312/WABAR2332
Barque	WI- 2868	1997	SA	Triumph/Galleon
Bass#	WABAR2315	2011	WA	WABAR2023/Alexis
Baudin#	WABAR2080	2002	WA	Stirling/Franklin
Beecher		1981		Atlas/Vaughan
Binalong	B1302	2001	NSW	Blenheim//Skiff/O'Connor
Bottler#	HV16	2017	Grainsearch	

Brewstart#	SMBA15-4557A	2018	Elders	
Brindabella	OR 385-1-2	1993	NSW & ACT	Weeah/CI7115//HCB27/3/Jadar II/4/Cantala
Buff#	IGB1506	2018	Intergrain	Not known
Buloke	VB0105	2005	VIC	Franklin/VB9104//VB9104
Bussell		1968	WA	Prior/Ymer
Capstan	WI3385	2004	SA	Waveney/WI2875//Chariot/Chebec
Cask				SCRI-8313/Fleet//Regatta
Charger	CA412402		Carlsberg/ Hieneken/LL	
Chebec	WI-2737	1992	SA	(USA) Orge Marin/2*Clipper(86)//Schooner (Aust.) (Orge Martin*Clipper#2)/86*Schooner
Chieftain	1846-4139	1995	VIC	Brittania/Prisma
Clipper				Proctor/Prior A
Commander#	WI3416	2008	SA	Keel/Sloop//Galaxy
Compass#	WI4593	2013	SA	County/Commander//Commander
Corvette		1976	WA	Bonus/CI3576
Cosmic	7574-1	2004	Syngenta	
Cowabbie	WB236	2002	NSW	(AB6/Franklin//Franklin-early)/3/(Rubin/Skiff-early)
Cutter		1975	WA	Proctor/Prior A
Dash	NFC 902/909	1995	VIC	Chad/Joline//Cask
Dhow	WI3102	2002	SA	WI2808//Skiff/Haruna Nijo 9
Dictator	726.2	1997	VIC	reselection of USDA accession CI2204
Dictator 2		2006	NSW	Reselection from Dictator
Doolup	WABAR0563	1998	WA	(XBVT210)/3/(B6729)Prior/Lenta(75S:323)/(MndS,74S:314)Dampier//(A14)Prior/Ymer/3/Kristina(70S20-20)/4/(73S13)Clipper/Tenn65-117
Empress	90BE32	1995	VIC	H1006.3/HE902
Fairview#				Malteurop
Fathom#	WI4483	2011	SA	JE013D-020/WI3806-1
Finniss		2009		
Fitzgerald	WABAR2030	1997	WA	Onslow/Tas 85-466
Fitzroy	VB9926			WI2808/Alexis
Flagship	WI3408	2005	SA	Chieftan/Barque//Manley/VB9104
Fleet	WI3804	2006	SA	Mundah/Keel//Barque
Flinders#	WABAR2537	2012	WA	Baudin/Cooper
Franklin	Barley 485, 85-83	1989	TAS	Shannon/Triumph
Gairdner#	WABAR2034	1997	WA	Onslow/Tas 83-587
Galaxy	Osprey	1993	NSW	24719DB/Robin SIB
Galleon	WI- 2231B	1981	SA	Clipper/Hipoly//3*Proctor/CI3576
Gilbert	Mx2-45B, Koru Reselection	1992	QLD	Reselection Of Mx(Q21517)
Granger#	SMBA09-3353	2010	Nickersons	Braemar/Adonis
Grimmett	BUS*ZEP 166	1982	QLD	Bussel/Zepher
Grout*	NRB01001	2005	QLD	Cameo/Arupo 31-04
Hamelin	WABAR2104	2002	WA	Stirling/Harrington
Hannan	WABAR2321	2007	WA	WABAR2023/Windich/Morex

Harrington	Barley 1935	1981	Canada	Klages/3/Gazelle/Betzes//Centennial
Henley		2010	Nickersons	European variety
Hindmarsh*	VB0324	2006	VIC	Dash/VB9409
Kaputar	Barley 577, Tr2, Arupo 'S'	1993	NSW & QLD	5604/1025/3/Emir/Shabet//CM67/4/F3 Bulk Hip
Keel	WI 2976	2000	SA	CPI18197/Clipper//WI2645
Ketch				Noyep/Lenta
La Trobe	IGB1101	2013	Intergrain	Dash/VB9409
Lara		1971	VIC	Research/Lenta
Lindwall	TG121-1	1997	QLD	Triumph/Grimmett
Litmus#	WABAR2625	2013	WA/ Intergrain	WB229/2*Baudin//WABAR2238
Lockyer#	WABAR2288	2007	WA	Tantangara/VB9104
Lofty Nijo	SWBI-1	2001	Japan	Kita A 66-1/Hokuiku 19
Mackay	CK85	2002	QLD	Cameo/Koru
Macquarie				
Malebo	WWB858	1981	NSW	Selection from CPI11083(Palladium WWB 18)
Maltstar#	SMBA11-1771		Elders	Henley/Sebastian
Maritime	WI3297	2002	SA	Dampier//A14(70S20-20)/3/(70S21)Clipper/M11,2Row (74S:314)/5/(74S:309)Dampier//A14(70S20-20)/4/(67S08-30)Dampier//Prior/Ymer/3/Union
Milby	WB238	2002	NSW	(AB6/Franklin//Franklin-early)/3/(Rubin/Skiff-early)
Moby				
Molloy	WABAR0519, 83S:519, 83S989-57-16	1996	WA	Golden Promise/WI2395(WARI2-38)/4/(72S:267)XBVT210/3/(66S08-4)Atlas57//(A14)Prior/Ymer(82S837)/O'Connor
Moodyne	Barley 312, 74S/312	1987	WA	Dampier//(A14)Prior/Ymer/3/Kristina/(70S20-20)/4/(73S13)Clipper/Tenn-65-117
Morrell	Barley 513, 82SN: 513, 82	1993	WA	WUM221/P23822(81S806)/5/(81S719)Forrest/4/(80S564)Psaknon/Dampier//M19(76T111)/3/ Zepher
Mundah#	835-514, 83S0227-17-34	1995	WA	O'Connor/Yagan
Navigator#	WI4262	2011	SA	
O'Connor	Barley 221	1984	WA	Proctor/CI3576(WI2231)/3/(XBVT212)Atlas 57//(A14)Prior/Ymer
Onslow	Barley 399, 77S167-7-26	1989	WA	Forrest/Aapo
Oxford#	Oxbridge	2009	Nickersons	Tavern/Chime
Pacific Ranger	AC Ranger	2007	QLD	PC11/AC Rosser [PC11 is a CIMMYT selection with resistance to stem rust race QCCJ]
Parwan		1979	VIC	Plumage Archer/Prior//Lenta/3/Research/Lenta
PB216	F216	2001	Qld	Triumph/3/GP59ms/TR211/ms/Triumph/4ms/Triumph
Picola	86045B	1998	VIC	75031/Elgina(75031=Noyep/Prior//CI3576/Union/Kenia/4/Research/Noyep/Prior)
Prior				Selected from either Archer or Chevalier
Quasar	6921-23	2002	VIC	Chalice/NFC breeding line
Quickstar				
RGT Planet#	SFR85-014	2017	Seed Force Ltd	Tamtam/Concerto
Roe	WABAR2310	2007	WA	Doolup//Windich/Morex
Rosalind#	IGB1302	2015	Intergrain	Lockyer/Dash
Schooner	WI-2468	1983	SA	Proctor/Prior A//Proctor/CI3576

Scope CL	VBHT0805		VIC/ AWB seeds	Franklin/VB9104//VB9104
Shannon				Proctor*4/Ethiopian line CI3208-1
Shepherd#	NRB03470	2008	QLD/WA	selection Baronesse/Cheri
Skiff	Barley 294, WI2584	1988	SA	Abed Deba/3/Proctor/CI-3576//CPI-18197/Beka/4/Clipper/Diamant/Proctor/CI-3576
Skipper				
Sloop	WI2875-22	1997	SA	RL1577/84/Schooner
Sloop SA	WI3167	2002	SA	CCN6-3/Sloop3
Sloop Vic		2002	VIC	Sahara/WI2723//Chebec/*2/Sloop
Spartacus CL#	IGB1334T	2015	Intergrain	Scope/4*Hindmarsh//HMVB0325-106
Starmalt				
Stirling	Barley 155	1981	WA	Dampier/Prior/Ymer/3/Pirolina
SY Rattler		2012	Syngenta	
Tallon	TMP*GMT 306/13	1991	QLD	Triumph/Grimmett
Tantangara	WB198, A%1055	1996	NSW	AB6/Skiff (AB6 is <i>Hordeum spontaneum</i> CPI71283/4*Clipper)
Tilga		1997	NSW	Forrest/Cantala
Topstart#	SMBA12-1361	2017	Elders	
Torrens	WI3107	2002	SA	Galleon/CIMMYT 42002
Tulla	WB230	2002	NSW	Skiff/FM437
Ulandra	WU3076	1987	NSW	Warboys/Alpha
Unicorn	Kinukei 21(Japan)	1997	WA	54C25/51C38
Urambie#	WB234	2005	NSW	Yagan/Ulandra//Ulandra
Vertess	T98189	2005	TAS	Franklin/Cooper
Vlamigh	WABAR2175	2006	WA	WABAR0570/TR118
Weeah		1968	VIC	Prior/Research
Westminster#	GS5033	2010	Nickersons	
Wimmera	VB0432	2011	VIC	
Windich	Barley 329, 75S:329	1989	WA	Atlas 57//(A16)Prior/Ymer(68S17-75)/3(B6729)Prior/Lenta//Noyep/Lenta
Wyalong	WB190R, AUS499038	1998	NSW	Schooner/Stirling
Yagan	Barley 286, IB/286, WUM143	1989	WA	Unknown
Yambla	WB220, W91%3466	1998	NSW	Skiff/FM437
Yerong	WB135, GR84%4293	1990	NSW	M22/Malebo

### Other notes

A "Nil" *Rph* gene postulation means that line does not carry any seedling resistance gene effective against any of the test pathotypes we used. Certain postulations marked as "?" indicate that such postulations are inconclusive, and these specific cultivars may require further testing. If a cultivar is listed "NT" for rust response,

it means we have not tested it, most likely because it did not go through our testing protocols or because we do not have seed of it. We would like to expand the number of Ausbars in this circular by adding more cultivars and encourage all groups involved in cereal breeding/ release of cultivars to submit seed of any lines to us for rust testing that they will like to add.



## Enquiries and further information

For more information or enquiries please contact Dr Davinder Singh (davinder.singh@sydney.edu.au) or Prof. Robert Park (robert.park@sydney.edu.au). For enquiries regarding the application of the APR markers contact Dr Peter Dracatos (peter.dracatos@sydney.edu.au).

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### Rust Plant Samples

Can be mailed in paper envelopes;  
do not use plastic wrapping or plastic  
lined packages. If possible, include  
the latitude and longitude of the  
sample location.

Direct samples to:

University of Sydney  
Australian Rust Survey  
Reply Paid 88076  
Narellan NSW 2567

The Australian Cereal Rust Control Program is  
supported by growers through the  
Grains Research & Development Corporation.

