

Monitoring powdery mildew resistance in barley varieties

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PURPOSE

Within the Western Australian barley producing zones, assess the impact of region and powdery mildew pathotype on field response of varieties with a range of resistance rankings to Powdery Mildew.

BACKGROUND SUMMARY

Surveys of barley powdery mildew in WA by Curtin University indicate a wide range of virulence for genes for resistance to Barley Powdery Mildew deployed in commercial barley varieties. However at this time there have not been reports of significant variation of resistance responses in commercial barley crops across the wheat belt.

A series of small nurseries were established at seven sites across the WA wheatbelt (Regans Ford, Northam, Cunderdin, Katanning, South Perth, South Stirling and Esperance) to examine field response of a range of barley varieties to powdery mildew infection and also collect mildew isolates from each location.

These trials will provide some feedback on field implications of isolate virulence and on potential instability of variety responses across regions. The trials will help to identify if varieties rated as MS or higher may be more susceptible to powdery mildew in one region than in others, therefore impacting on the need for disease management of these varieties between regions.

TRIAL DESIGN

Location: West Midlands Group field trial site (WMG)

Plot size: 1m row **Machinery**

use: Hand sown

Repetitions: Three

Crop type and varieties used: 30 commercial barley varieties (8 Pallas lines, differential set)

Seeding date: 28 May

Treatment rates and dates: Untreated seed (no foliar fungicide)

RESULTS

Powdery mildew was detected in all seven nurseries. Disease levels at Katanning, South Perth, South Stirling and Esperance were high throughout the season and noticeable differences in responses of varieties were observed. At Northam, Cunderdin and WMG, disease severity was low-moderate and differentiation between varieties was difficult at these low disease pressures.

At the WMG site, powdery mildew was first assessed on the 7th August (Z24-32), Disease was evident on VS, S and MS varieties, with Baudin having ~7% leaf area affected on the top 3 leaves. Varieties ranked MRMS or better had no infection or only trace levels of disease. Powdery mildew infection did not progress through the season and by heading (September), measurable levels of disease were present only in Baudin, Stirling and Gairdner.

Table 1. Resistance ranking and leaf area affected (top 3 leaves) by powdery mildew at West Midlands Trial site (Regans Ford) for selected commercial barley varieties. Assessment at tillering / stem extension (Z24-32) and heading (Z53-63).

Variety	Resistance rating ¹		Percentage leaf area affected by powdery mildew (L1-3)	
	Seedling	Adult	Stem extension	Heading
Baudin	VS	VS	7	2.0
Gairdner	VS	S	tr ²	0.1
Stirling	VS	S	4	0.2
Vlamingh	S	S	7	0
Bass	MS	MS	tr ²	0
Skiff	MS	MRMS	0.2	0
Capstan	MRMS	MRMS	0	tr ²
Fathom	MRMS	MRMS	0	0
Fleet	MRMS	MRMS	0	0
Hindmarsh	MRMS	MRMS	0	0
La Trobe	MRMS	MRMS	0	0
Lockyer	MRMS	MRMS	tr ²	0
Navigator	R-MR	MRMS	0	0
Yagan	R	MRMS	tr	0
Buloke	MR	MR	0	0
Commander	MRMS	MR	tr ²	0
Compass	MS	MRp	0	0
Barque	MRMS	RMR	0	0
Dash	R	R	0	0
Flinders	R	R	0	0
GrangeR	R	R	0	0
Oxford	R	R	0	0
Scope	R	R	0	0
Shepherd	R	R	0	0

¹ Resistance rating: VS = very susceptible, S = susceptible, MS = moderately susceptible, MRMS = intermediate, MR = moderately resistant, R = resistant, p = provisional rating only, - = no data available. Data from DAFWA Bulletins 4855.

² tr = trace level disease (<0.1% leaf area affected on the top 3 leaves)

Across all trials, in the varieties with an adult plant resistance score of MS or above, there were some regional differences in the disease expression of some varieties (ie. Bass, Commander, Compass, Flagship, Fleet, Skiff, Skipper and Yagan). In most cases differences were small and further experiments over coming seasons will help elucidate these differences and track any changes in regional disease expression. The largest regional difference was for Yagan which is classified as R in the seedling stage and MRMS at the adult stage. It did not show disease at any stage in South Perth; however it expressed obvious disease (~15% LAA) as a seedling (tillering growth stage) at Gibson. Commander, Compass and Lockyer also showed differences as seedlings between Gibson and South Perth, but both were moderately resistant to resistant as adult plants.

DISCUSSION

- Powdery mildew severity at the WMG field site, maximum of only 7% leaf area affected on Baudin, did not allow differences between varieties to be seen, other than VS and S types (Baudin, Stirling, Vlamingh, Gairdner)
- Laboratory seedling tests indicate that some of the genes postulated to provide resistance to powdery mildew in some commercial barley varieties may be compromised by some powdery mildew isolates.
- Field screening of these varieties has shown that local differences in variety responses can occur but no widespread regional variation, or 'breakdown' in the field resistance of varieties to powdery mildew was observed in 2013.
- The field response of commonly grown varieties at the WMG site and across the seven trials generally reflected the resistance rankings published in variety guides.
- The differences identified in 2013 were of minor impact, or occurred in non-commercially relevant varieties, however they indicate that regional differences in variety response are possible due to variability within the pathogen population and continued monitoring is important to facilitate appropriate disease risk assessment and in-crop management.

REVIEW

Brenda Coutts, DAFWA

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