

Reaction of Australian barley varieties to scald from southern NSW 2015

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Key findings

- » There are large differences in virulence at the seedling stage in southern NSW (sNSW).
- » The variety grown in a region influences time-based changes in virulence.
- » Strategic variety choice can affect the existence of virulent pathotypes.

Introduction

Successful disease management requires an in-depth understanding of the pathogens present in a region. Barley scald is a highly variable disease. Changes in virulence have been observed in a number of varieties at the adult stage in recent years, therefore a better understanding of the virulence profile present in sNSW is required. This experiment is beginning to characterise the reaction of Australian barley varieties at the seedling stage to scald isolates collected from southern NSW. It complements the adult plant screening process.

Site details

The trial was conducted in a glasshouse at the Wagga Wagga Agricultural Institute.

Treatments

Varieties

Thirty-five commercially available varieties with a range of adult plant resistance to scald were used (Table 1).

Scald inoculum

The varieties were inoculated at seedling stage under glasshouse conditions with isolates collected from barley growing areas in southern NSW. A total of 39 isolates (15 from 2013, 11 from 2014 and 13 from 2015) were used in the study (Figure 1).

Table 1. Australian barley varieties (AusBar) used in glasshouse trials and their adult plant reaction to scald.

Cultivar	Scald rating 2014*	Scald rating 2015*
Barque	nd**	nd
Bass [†]	MR-MS	S-VS
Baudin [†]	S	S-VS
Buloke [†]	VS	S-VS
Capstan [†]	S	S-VS
Charger [†]	S-VS	VS
Commander [†]	S	VS
Compass [†]	S-VS	S-VS
Fairview [†]	VS	VS
Fathom [†]	MR	MR
Finniss [†]	nd	nd
Fitzroy [†]	S	S-VS
Flagship [†]	MS-S	S-VS
Fleet [†]	MS-S	S-VS
Flinders [†]	S	S-VS
Franklin [†]	nd	nd
Gairdner [†]	S-VS	S-VS
GrangeR [†]	S	S-VS
Hindmarsh [†]	VS	VS
La Trobe [†]	VS	VS
Litmus [†]	VS	nd
Navigator [†]	S-VS	S-VS
Oxford [†]	S-VS	S-VS
Schooner	S	S
Scope [†]	S	S-VS
Shepherd [†]	VS	S-VS
Skiff	nd	nd
Skipper [†]	S-VS	VS
SY Rattler [†]	MS	S-VS
Tantangara	nd	nd
Tilga	S	S
Tulla [†]	S	S
Urambie [†]	MR	MR
Westminster [†]	MR	S
Wimmera [†]	S-VS	S-VS

*Adult plant reaction to scald as published in the NSW DPI Winter crop variety sowing guide 2014 and 2015.

**No data.

Results

Differential reactions were observed among barley varieties from the different scald isolates (Table 2). For example, a 2013 isolate collected from Franklin, a barley cultivar identified to have adult plant resistance (APR), caused a susceptible (S) seedling reaction to Franklin and the majority of the varieties tested. It also caused moderately susceptible (MS) reaction to Buloke, previously identified to have seedling resistance to the disease. Some isolates also displayed lower levels of virulence such as 2013 isolate collected from Keel and a barley breeding line (BL no.1). In the 2015 collection, more virulent isolates were observed, which were able to infect most of the varieties tested. These results highlight the variable nature of scald.

The results appear to show differences in cultivar reactions to scald isolates influenced by where and when the isolates were collected. However, many more isolates will need to be tested before these apparent patterns can be verified. At this early stage of data collection, it is apparent that the scald pathogen is highly variable and that the changes in adult plant reaction recently observed are also present at the seedling stage. In addition, these virulences have been collected from growers' paddocks and, as such, represent a more broad potential risk for infection in the region. The absence of any virulent isolates detected on Tantangara in these tests appears promising; however, further isolates are required to determine if this resistance is effective in the whole region.

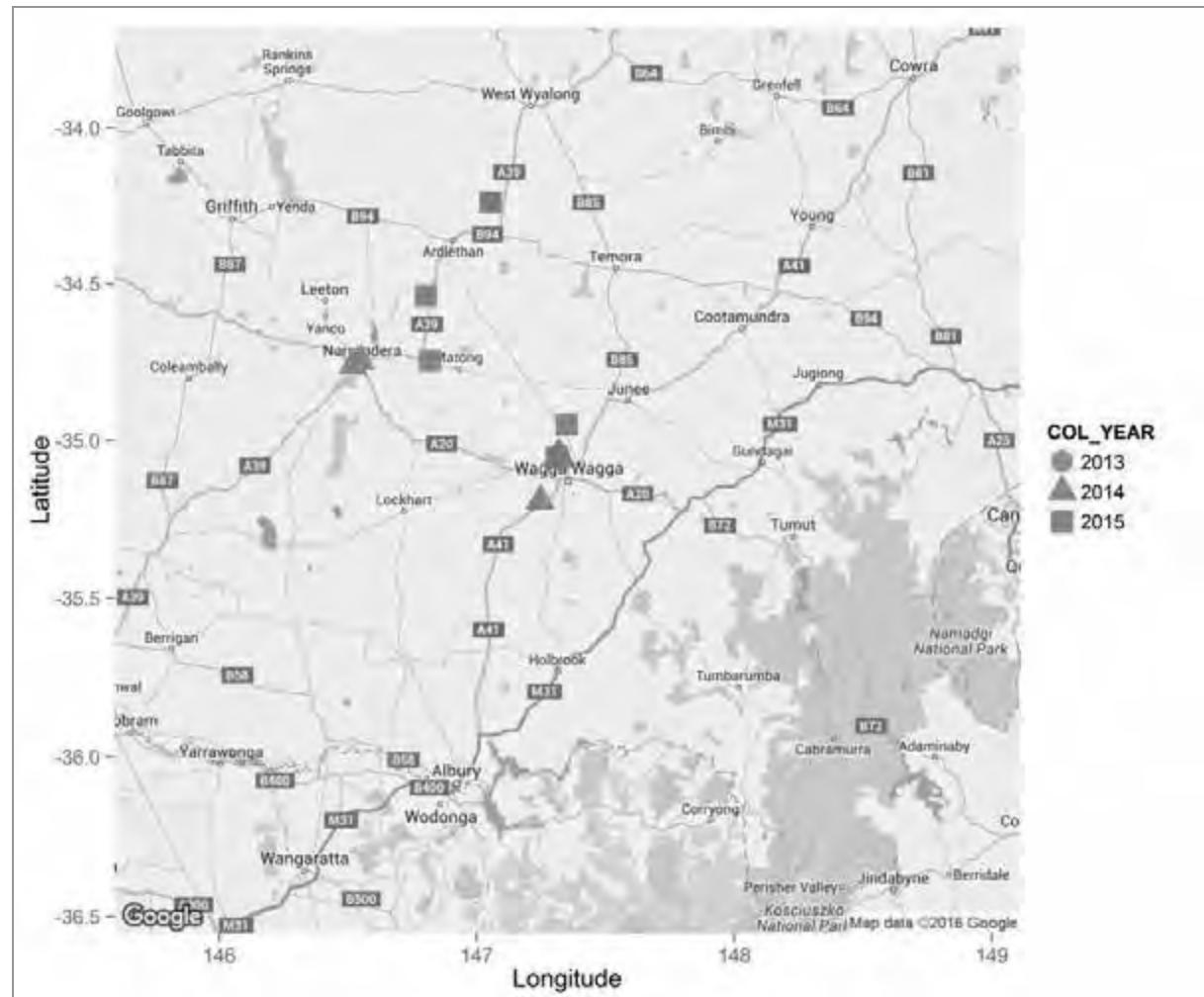


Figure 1. Locations of barley scald isolates collection in southern NSW 2013–2015.

Table 2. Reaction of AusBar to selected scald isolates representing the 39 scald isolates collected from barley growing areas of southern NSW 2013–2015 *.

AusBar	Year of collection, location and cultivar source of isolates																	
	2013				2014				2015									
	Wagga Wagga, Franklin **	Wagga Wagga, Hindmarsh	Wagga Wagga, Keel	Wagga Wagga, BL no. 1	Wagga Wagga, Franklin **	Wagga Wagga, Tilga**	Wagga Wagga, Keel	Wagga Wagga, Fathom	Narrandera, n/a ***	Uranquinty, Hindmarsh	Wagga Wagga, Skiff **	Wagga Wagga, Hindmarsh	Downside, n/a	Grong Grong, n/a	Derriwong, Hindmarsh	Bogong Gate, Buloke	Garema, n/a	Mirrool, n/a
Barque**	MR	MR	MR	R	R	MR	R	MR	R	S	R	R	R	R	R	R	S	
Bass	MS	MS	MR	R	R	R	R	R	MR	R	S	R	R	R	MS	S	MR	S
Baudin**	S	MS	MS	MR	S	MS	MS	R	MS	R	MR	R	R	R	MR	S	R	R
Buloke** #	MS	MS	MS	R	MR	S	MR	MR	MR	R	S	R	S	S	S	S	MS	S
Capstan	MS	MR	MR	R	R	R	R	R	R	MR	R	MR	MR	R	R	MS	R	R
Charger	S	S	MS	MR	MS	S	MR	MR	MS	R	S	R	S	S	S	S	MS	S
Commander**	S	MR	MS	R	MS	MR	MR	R	MR	R	MR	R	R	MR	R	S	MR	S
Compass	MS	MR	MR	R	R	MS	MR	R	MR	R	S	R	R	R	MR	S	MR	S
Fairview	MS	MS	MS	R	MS	S	R	MR	MR	R	S	MR	R	MS	MR	S	R	S
Fathom	S	MR	MR	R	MR	MR	R	R	R	MR	R	R	R	R	MS	R	R	S
Finniss**	MR	R	MR	R	MS	R	R	R	MR	R	S	R	S	S	S	R	S	R
Fitzroy	MR	MR	R	R	R	MR	MR	R	MR	R	S	R	R	R	R	R	R	S
Flagship**	S	MS	MR	R	MR	MR	R	MR	R	R	S	MR	R	R	S	n/a	MR	S
Fleet**	MR	MS	MR	R	MR	MR	R	R	R	MR	R	S	MS	R	R	MR	S	
Flinders	MS	MS	MR	MR	MS	MS	R	R	MR	R	S	R	MR	MS	MS	S	MR	S
Franklin**	S	MR	MS	MR	MS	MS	MR	R	MR	R	MR	R	R	MR	MR	S	MR	S
Gairdner**	S	MR	MS	R	MR	R	R	MS	R	R	MR	R	R	R	R	S	R	S
Granger	S	MS	MR	MR	MR	MS	R	MR	R	R	S	R	MS	S	MS	S	MR	S
Hindmarsh	MR	R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R	S
LaTrobe	R	S	R	R	R	R	R	R	R	R	MS	R	S	S	S	R	S	R
Litmus	S	S	MS	MR	S	S	MR	MR	MS	R	S	R	S	S	S	S	MS	S
Navigator	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S
Oxford	MS	MS	MR	R	MR	MS	R	MR	MR	R	S	R	MS	MS	MR	S	MS	S
Schooner	S	S	MS	MR	MR	S	MR	MR	MS	R	S	R	S	S	S	S	MS	S
Scope	MS	MS	MR	MR	S	S	R	MR	MR	R	S	R	MR	S	S	S	MS	S
Shepherd	MS	MS	MR	MR	MS	S	MR	MR	MR	R	S	R	S	S	S	S	MS	S
Skiff**	MR	MS	R	R	MR	MR	MR	MR	MR	R	S	R	R	R	R	R	R	S
Skipper	MS	S	MR	R	MS	MS	R	MR	R	R	S	R	MS	MR	S	S	MR	S
SyRattler	MR	R	MR	R	R	R	R	R	R	R	R	R	R	R	R	MS	R	MR
Tantangara**	MR	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Tilga**	MR	MS	MR	R	MR	MS	R	R	MR	R	S	R	MR	S	S	R	MS	S
Tulla**	MR	S	R	R	R	R	R	R	R	R	S	MR	R	S	R	R	R	S
Urambie	R	MS	R	R	R	R	R	R	R	R	MS	R	MR	S	S	R	R	R
Westminster	MS	MR	MR	R	MR	R	R	R	R	R	S	MR	R	R	MS	MS	R	MS
Wimmera	MS	S	MR	R	MR	MS	MR	R	MS	R	S	MR	MS	S	S	S	S	S

* R = Resistant, MR = Moderately resistant, MS = Moderately susceptible and S = Susceptible

** With identified adult plant resistance to scald

*** n/a – no cultivar information available

With identified seedling resistance

Summary

Changes in scale virulence can significantly affect both crop losses and control costs, especially for regularly grown commercial varieties. The variety's genetic composition influences changes in scald virulence, which leads to increased prevalence of virulent pathotypes against a variety. This has implications for variety selection by growers. Strategically choosing varieties with resistance levels of MS or better will have an effect on reducing the overall pathogen population size and help protect resistant genes.

It is important to also remember the results presented here are seedling reactions and that these do not always agree with results at the adult plant stage. The seedling results will be used to improve the understanding of the pathogen's dynamic nature. The NSW DPI Winter crop variety sowing guide is the recommended source of information for variety resistance ratings.

Surveying and collecting scald isolates in sNSW and testing against barley varieties is continuing to provide guidance to growers and agronomists in their variety selection and disease management strategies.

Note: This is an industry summary provided pre-publication. Further information and analysis will be published in due course.

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