3a. Eyespot - Varietal resistance in commercial wheat varieties

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KEY MESSAGES

- There is a range (from susceptible to moderately susceptible) in varietal resistance to eyespot in long season wheat varieties commonly grown in the South East. Although this range is small it is large enough to influence damage due to eyespot.
- Know the eyespot inoculum levels (which indicate the risk of yield loss) in paddocks being sown to cereals and use this information to assist in variety selection.
- Avoid sowing the susceptible varieties Wedgetail, Kiora and Forrest in paddocks which have high eyespot levels.
- Trojan, Brennan and Manning are generally more resistant (moderately susceptible) to eyespot than other varieties screened.

Background

Eyespot is an increasing problem in the higher rainfall grain growing areas of SA such as lower Eyre Peninsula, the Cleve Hills, the mid North, the Adelaide Plains and the South East. This increase is mainly due to farming systems moving to stubble retention, direct drill and more cereals in rotations as well as the trend to sowing cereals earlier. In Australia, eyespot in cereals is caused by the fungus *Oculimacula yallundae* (previously known as *Pseudocercosporella herpotrichoides*) which infects stem bases causing the eye-like lesions which gives eyespot its name.

Yield losses from this disease occur as a direct result of the stem lesions and, secondarily, from plants lodging due to weakened stem bases which can make it difficult or impossible to harvest affected plants. Overseas, eyespot control includes fungicide application and the use of partial resistance in varieties. As eyespot has a restricted distribution in Australia, little has been known about resistance levels in Australian varieties.

GRDC has funded research to assess varietal resistance in Southern Australian germplasm and this is the second variety screening trial undertaken in the South East of South Australia. Results from five screening trials undertaken elsewhere in South Australia over the period 2014-2016 are available on request.

Activities

The Kangaroo Inn site was located on Richard Kirkland's property in a paddock that has had a history of eyespot problems. High levels of eyespot inoculum (162,000 copies – very high compared with other paddocks having eyespot problems) were present in the site at the start of 2016.

To encourage eyespot expression, the trial was sown as early as practicable (18th May) with high plant density (250 plants per m²) and with good N levels (140kg DAP). Seed was treated with insecticide to reduce barley yellow dwarf issues. The site was on a black loam, plots were 8 rows (1.2 m) wide by 10 m long and 3 replicates were used in a randomised block design.

Thirteen long season and four main season bread wheat varieties were screened for resistance to eyespot. Entries were chosen after consultation to include locally grown varieties, to represent a range of genetic backgrounds (including genes for resistance to crown rot) and to have some commonality with the 2015 Kangaroo Inn screening trial and the 2016 screening trial at Tarlee.

Stem samples were collected on 5th December, when plants were at late grain fill. Thirty to 40 stems were assessed in each plot, with stems being taken from each of the 6 inner rows of the plot. The percentage of the circumference of each stem occupied by eyespot symptoms was recorded as an indicator of eyespot expression. This scoring method also allowed calculation of eyespot incidence (% stems with lesions).

Results & Discussion

The trial established well and weeds, other diseases and insect pests were adequately controlled.

Eyespot infection in the trial was moderate, with 56% of Mace stems being infected, compared with 100% of Mace stems being affected at the Tarlee site. This level of infection was similar to the 55% infection rate seen in Mace at the Kangaroo Inn trial in 2015 where there were very much higher inoculum levels, which indicates that the 2016 season was more conducive to eyespot infection than the 2015 season.

Eyespot lesions were not as clearly defined in 2016 as they have been in other years due to seasonal conditions being very conducive to eyespot expression on infected stems. Additionally, the lesions were more numerous and much larger than has previously been seen, which made scoring difficult and also meant the ability to discriminate between varieties was reduced.

As varietal rankings for eyespot incidence and severity (% stem circumference affected) were similar, only results for eyespot severity are presented here (Figure 1). Compared with 2015, there is some movement in rankings of varieties, which means that preliminary resistance ratings can only be provided for those varieties which have been present in 2 or more trials. Overall, the best of the more resistant (moderately susceptible) varieties include Manning (has the Pch2 gene which confers partial resistance to eyespot), Trojan and Brennan. Conversely, the varieties which consistently are worst affected by eyespot include Wedgetail, Forrest and Kiora.

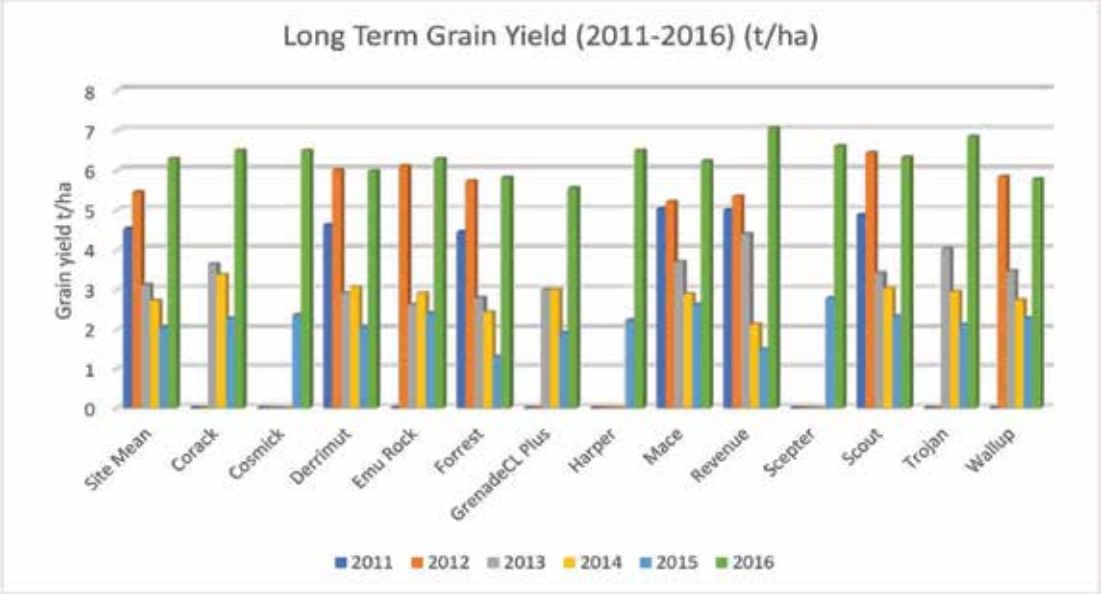

Figure 1: Resistance responses of wheat varieties to eyespot – Kangaroo Inn, 2016.

Conclusions

There is a range of eyespot resistance levels in current long season and main season bread wheat varieties which will assist growers to manage yield losses from eyespot if they know the inoculum levels of eyespot in their paddocks.

As screening for eyespot resistance has only been undertaken in 1-2 trials (depending on the variety), variety resistance ratings presented here should be considered as preliminary.

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