

The Impact of Crown Rot on Winter Cereal Yields

Background

Crown rot remains the number one winter cereal disease in the northern grain region with the NGA 2009 survey indicating it is still an important management issue in **~70% of the total cropping area**. Yield losses in wheat of 50 per cent or more are not uncommon where high disease levels are combined with moisture stress late in the season. The disease is caused by a stubble-borne pathogen *Fusarium pseudograminearum* (Fp), that survives in cereal or grass weed residues.

Interestingly our survey also indicated that for ~40% of respondents the risk of crown rot had **reduced** in the last decade – with sound rotation generally claimed as the key factor. However for another 40% the risk has **increased** in the same period – with adoption of reduced tillage and higher stubble loadings frequently cited. Many of those who thought the risk had decreased, **adopted reduced tillage earlier and also experienced increased crown rot risk until they developed effective disease management rotations**. Currently the key available tool for crown rot management is an **EFFECTIVE CROP ROTATION**.

Breeding progress against this pathogen has been slow at best, as evidenced by only one commercial variety being rated as an improvement over Sunco against this pathogen despite the best efforts of more than 20 years breeding.

Project aims

Growers and advisers on our Local Consultative Committees had questions relating to three different components of crown rot impact:

1. What is the level of yield impact actually due to crown rot across a range of winter cereal varieties?
2. How do new barley varieties such as Fitzroy and Grout compare to established varieties when under crown rot pressure?
3. How well do crown rot resistance ratings reflect commercial yield performance?

It is important to understand two key terms that are used to describe the disease response of a crop:

Resistance - the ability of the plant to **limit the incidence and/or buildup of disease**

Tolerance - the ability of the plant to **yield in the presence of the disease**

Industry crown rot ratings have most heavily focused on the level of stem or basal browning when comparing available varieties. These ratings provide a measure of crown rot 'resistance'. As crown rot induced stem browning increases, the expected % yield loss due to crown rot also increases. However this does not take into account the actual yield potential of the variety. **The primary focus of our work was to evaluate the impact of crown rot, under a range of conditions, on actual crop yield and quality.**

Results in a nutshell

Crown rot incidence and severity:

- *Narrow range in levels of incidence and severity between bread wheat varieties. General trends support published variety resistance ratings*
- *Barley and durum varieties were equal or more susceptible to infection than bread wheat*
- *More impact by halving inoculum level than by changing variety*

Yield impact:

- *Barley yield losses similar to tested bread wheat varieties (~20-30% mean yield loss in a high disease year)*
- *Yield losses in durum were dramatically higher than barley or bread wheat (~60% mean yield loss in a high disease year)*
- *Differences in % yield loss within barley or bread wheat varieties were small*

Grain quality impact:

- *Barley suffered minimal quality loss from addition of crown rot*
- *Increased screenings were the main effect in bread wheat (mean increase of ~4% in a high disease year)*
- *Screening losses in durum were extreme (mean increase of ~13% in a high disease year)*
- *Test weight was less affected by crown rot.*

Economic benefit:

- *Actual variety local adaptation/ yield potential appeared the main driver of financial return in all crops*
- *Even when crown rot inoculum added, Sunco resulted in ~\$40-50/ha lower returns than other tested varieties in both years.*

Overall:

- ***Current levels of crown rot resistance in bread wheat are low***
- ***Differences in yield potential and local suitability appeared more important in determining final yield than the variety crown rot resistance rating***
- ***Select varieties on a combination of local performance stability and key disease reactions***
- ***Season finish is the key driver of level of yield loss followed by inoculum level***
- ***Crop rotation remains the number one crown rot management tool***



High levels of whiteheads in Bellaroi, Cryon October 2008