

Project Title: Northern Agribusines Trial Extension Network Cultivar Crown Rot Tolerance 2011

GRDC Project No: CRA 00001

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Objectives:

- Assess the relative disease incidence and yield performance of pre-release varieties for Crown Rot tolerance.
- Provide feedback to GRDC and co-operating wheat breeding companies (AGT, Longreach and SeedMark) regarding disease incidence and resultant yield performance of their submitted cultivars.
- Gather data to validate the potential use of a Crown Rot rank to be introduced as an industry standard.

Background:

- Traditionally Crown Rot resistance ratings have been based on whitehead assessments. Whilst whiteheads are one method of assessment they are strongly influenced by environmental factors and do not necessarily give a true reflection of its relative ability to perform in the field in the presence of known levels of inoculum.
- By engaging with commercial seed companies, namely AGT, Longreach Plant Breeders (plus Pacific Seeds by association) and SeedMark, our proposal is to use this assessment method across a number of suitable sites over a number of years in northern NSW to “road-test” a number of their elite cultivars before they are released to the market. This objective data should assist these seed companies to reliably select and promote the most suitable cultivars for a region. Similarly it should give consultants and growers more confidence to choose cultivars with a documented history of performance in the presence of Crown Rot.
- AGT, Longreach and SeedMark gave financial support for these trials.

Methodology

- The trial was conducted over three locations in Northern NSW, Bellata, Rowena and Mungindi to give a regional spread of soil type and climate. The sites were selected with the understanding they had low background levels of Crown Rot inoculum based on rotation and historical management.
- Five existing varieties were chosen as industry standard varieties in the trial. These were Gregory, Bellaroi, Strzelecki, Sunco and Wylie. These varieties provided a base to compare the pre-release varieties. Three companies, namely AGT, Longreach and SeedMark each submitted varieties that they were advanced in their development and so long as they continue to meet market standards are expected to be released in the near future.

The 14 pre-release varieties were

AGT:	SUN440H, SUN595B, SUN627A, QT1333, QT15047,
Longreach:	Crusader, Spitfire, LPB06-1209, LPB06-1106, C51021,
SeedMark:	B52, SMBW085B0168, SMBW0107, SMBW065B073.

- Crown Rot inoculum was prepared by growing the fungus (*Fusarium pseudograminearum*, mixture of 5 isolates) on sterilised Durum seed and adding it to the seed furrow of the inoculated plots at a rate of 2g/m row. This assessment method was devised by Dr Simpfendorfer to test the field tolerance of cultivars +/- known levels of added inoculum on selected clean sites. This was replicated four times per trial site in a randomised complete block design.
- Each of these plots were measured based on emergence, percentage biomass, NDVI, whitehead count, disease incidence and severity (basal browning assessment), grain yield and grain quality.

Results

The wet spring of 2011 (a soft finish) negated the impact of Crown Rot despite some encouraging early symptoms and levels of disease incidence.

Bellata site

- Showed no significant yield impact, despite statistically significant infection percentages and severity scorings (basal browning).
- Gregory, Bellaroi, Strzelecki, Spitfire and Sun440H had the most Crown Rot infected plants and greatest disease severity, while Sunco, Wylie, Crusader QT 15047 and LPB06-1209 had the least.
- Bellaroi was the only variety to have significantly more whiteheads in its CR infected plots.

Rowena site

- Most Crown Rot infected plots had significantly lower early crop biomass
- Bellaroi again was the only variety to have significantly more whiteheads in its CR infected plots.
- Bellaroi, Gregory, Sun440H and Sun595B plots inoculated with Crown Rot had significantly lower yield than the respective untreated plots.
- Flood rains prevented any basal browning assessments for disease incidence and severity.
- Starting *Pratylenchus thornei* levels were very high at this site.

Mungindi site

- Showed no significant differences between the treated and untreated plots for yield or disease incidence/severity for any variety.
- Disease incidence ratings were unusually high in the untreated plots at this site (highest being 90% for Bellaroi, lowest being 46% for Wylie) indicating the site had higher than expected background disease levels despite its rotation and paddock management.

Implications

- The breeders and associated seed marketing companies (AGT, Longreach/Pacific Seeds, and SeedMark) closely scrutinised the data for their relevant varieties. This data will help make decisions regarding the commercial viability of those varieties submitted. They were not granted access to the relative performance of their commercial competitors.
- In recent years with the rationalisation of government funding, seed companies need to be self-supporting. Accordingly they compete strongly in the marketplace. Unfortunately, in the past there have been instances where companies have made claims regarding Crown Rot tolerance that could not be substantiated, wasting time and money for growers and advisors and creating bad sentiment throughout the industry. Our trials will potentially act as a deterrent to any spurious claims being made in the future. Additionally they could add rigour and value to the End Point Royalty program by accelerating the adoption and demonstrating the worth of well adapted varieties.

Recommendations

- This research should be repeated over the next few years to create a data base of records over different seasonal conditions enabling the establishment of a rank (or other suitable scoring system) of the current commercial and new varieties for crown rot tolerance. This rank can then be used by growers and consultants as a tool to make more educated decisions regarding varietal choice, crop rotation and paddock selection.
- All companies to release a new variety should be encouraged to submit seed to be objectively tested for Crown Rot for at least 3 years prior to being released into northern NSW / southern Qld.

Extension & Field Days

- Penagcon/Agritech Field Day at “Locheran” Bellata 21st September. Approximately 85 attendees, mostly growers.
- Site inspection at “Lochearn” Bellata with AGT (Phil Davies Syd Uni, Tom Kapcejevs AGT) 13th September 2011.
- Site inspection at “Lochearn” Bellata with Longreach (Lindsay O’Brien, Adrain McNair) 13th September 2011.
- Site inspection at “Lochearn” Bellata with SeedMark (Todd Jones)
- Site inspection at “Lochearn” Bellata by Steve Jefferies AGT