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Impact of cereal variety and crown rot on the build-up of *Pratylenchus neglectus* – Bithramere 2013

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Introduction

Crown rot, caused by the fungus *Fusarium pseudograminearum* (*Fp*), remains a major constraint to winter cereal production across the northern grains region. There are two main species of root lesion nematode (RLN), namely *Pratylenchus thornei* (*Pt*) and *P. neglectus* (*Pn*), which also impact on crop production across the region. Surveys in the northern grains region have established that *Pt* is more widespread and generally at higher populations than *Pn*.

Recent research has demonstrated that infestation with *Pt* can exacerbate the expression of crown rot. However, the interaction of crown rot infection with the multiplication of RLNs has not been investigated. The opportunity was therefore taken to soil core a crown rot variety evaluation trial conducted at Bithramere in 2013 which had a moderate background level of *Pn*, to evaluate relative resistance of varieties to *Pn* and potential interactions with crown rot.

Key findings

Cereal variety choice can have a significant impact on the build-up of *Pt* populations within paddocks which was not related to sowing date.

All of the seven durum entries examined left relatively low *Pt* populations in the top 30 cm of soil.

Significant differences were evident between barley and bread wheat varieties with around a 2 or 3 fold difference in final *Pt* populations between the best and worst entries, respectively.

Site details

Location:	**'Wheatacres' Bithramere**
Co-operator:	**Richard and Michael Bowler**
Sowing date:	**7 June 2013**
Fertiliser:	**0 kg/ha urea and 50 kg/ha Granulock Supreme Z at sowing**
Starting N:	**180 kg/ha nitrate N to 120 cm**
Starting water:	**~194 mm PAW (0-120 cm)**
In-crop rainfall:	**119 mm**
PreDicta B®:	**2.0 *Pn*/g soil (medium risk), 3.4 log *Fusarium* DNA/g (high risk) at sowing (0–30 cm)**
Harvest date:	**21 November 2013**

Treatments

- Two durum varieties (Caparoi$^{\Phi}$ and Jandaroi$^{\Phi}$)
- Nine bread wheat varieties (EGA Gregory$^{\Phi}$, LRPB Crusader$^{\Phi}$, LRPB Dart$^{\Phi}$, LRPB Lancer$^{\Phi}$ LRPB Spitfire$^{\Phi}$, Mitch$^{\Phi}$, Strzelecki$^{\Phi}$, Suntop$^{\Phi}$ and Sunguard$^{\Phi}$) and one numbered line (SUN663A).
- Added (+CR) or no added (-CR) crown rot inoculum at sowing using sterilised durum grain colonised by at least five isolates of *Fp*.
- All plots cored (20 cores/plot at 0–15 cm on previous crop row) after harvest (March 2014) to determine final *Pn* concentrations for each variety across no added and added CR treatments.
- *Pn* populations determined in soil samples by PreDicta B®, a DNA based test provided by the South Australian Research and Development Institute (SARDI).
- *Pn* data transformed for analysis $ln(x + 1)$ to determine significance with back-transformed values are presented in Figure 1.

Results

- The effect of crown rot infection on final *Pn* populations was inconsistent with the added CR treatment significantly increasing *Pn* populations in Mitch$^{\Phi}$ and LRPB Dart$^{\Phi}$ by 2.7 (1.7 to 4.6 *Pn*/g) and 1.7 fold (3.6 to 6.0 *Pn*/g), respectively.
- Conversely, the final *Pn* population was halved (6.2 *Pn*/g down to 3.0 *Pn*/g) in the added CR treatment with EGA Gregory$^{\Phi}$.
- Background crown rot infection levels were high at this site in 2013 which complicated the interpretation of interactions with *Pn*.

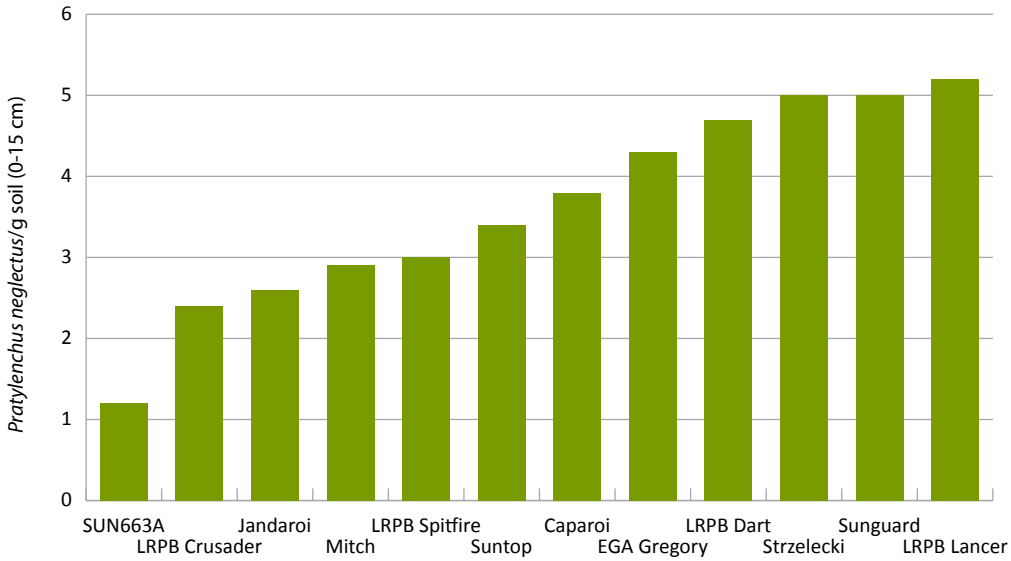

***Figure 1**. Final* Pratylenchus neglectus *soil populations (0–15 cm) produced by two durum and ten bread wheat entries – Bithramere 2013*

Bars followed by the same letter are not significantly different at 95% confidence level

- Significant differences were evident between varieties (averaged across CR treatments) in final *Pn* populations developed in the surface 15 cm of soil which ranged from 1.2 *Pn*/g of soil (SUN663A) up to 5.2 *Pn*/g soil (LRPB Lancer$^{\Phi}$). This represented a 4.4 fold difference in final populations (Figure 1). The resistance of varieties to *Pn* can be quite different to their resistance to the other RLN species, *P. thornei* (*Pt*) as there are different genes involved. For example, LRPB Lancer$^{\Phi}$ is susceptible to *Pn*, as highlighted at this site, but is only moderately susceptible to *Pt*.

Conclusions

- Cereal variety choice can have a significant impact on the build-up of *Pn* populations within paddocks with a 4.4 fold difference in final populations between the highest and lowest variety at this site in 2013. This site had a high background infection level of crown rot. This may have masked any effect of additional CR infection resulting from adding CR inoculum at sowing on the build-up of *Pn* populations in root systems.

Acknowledgements

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