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Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

Resistance of barley, durum and bread wheat varieties to the root lesion nematode *Pratylenchus thornei* – Coonamble 2011

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Key findings

Winter crop type and variety choice has a large effect on the build-up of nematode populations in the soil due to differences in their ***resistance*** to *Pt*.

This was most pronounced in bread wheat where variety choice increased the *Pt* population by between 1.8 to 3.6 times (9,737 up to 19,719 *Pt*/kg of soil).

The build-up of *Pt* populations in this field trial are broadly in line with published resistance ratings but discrepancies appear to exist, especially with LongReach Spitfire$^{\Phi}$ which appears better than its current very susceptible (VS) rating.

Introduction

The root lesion nematode (RLN) *Pratylenchus thornei* (*Pt*) is widespread in cropping soils through central and northern NSW. Winter cereal varieties differ in the extent of yield loss from *Pt* (***tolerance***) and the numbers of nematodes that multiply in their root systems within a season (***resistance***). Resistance to *Pt* is an important consideration as it dictates a varieties effect on subsequent crops in the rotation. That is, more susceptible varieties allow greater multiplication of *Pt* in their root systems over a season. The higher resulting *Pt* population left in the soil the greater the potential for a negative impact on the yield of subsequent crops.

A winter cereal time of sowing trial examining the interaction between *Pt* and crown rot was conducted near Coonamble in central western NSW in 2011. Yield outcomes from this trial were reported in the Autumn 2012 Northern Grains Region Trials Results. The harvested plots were left intact and soil cores were taken in March 2012 to assess the effect of winter cereal crop type and variety choice on the build-up of *Pt* in the soil under the 2011 plots. This type of testing determines the ***resistance*** of each variety to *Pt* under field conditions.

Site details

Location:	**"Woolingar", Coonamble**
Grower:	**Lindsay Meers**
Manager:	**Jason Peters**
TOS 1:	**20th May 2011**
TOS 2:	**22nd June 2011**
Pt at sowing:	**5,522 *Pt*, 0 *Pn*/kg soil at 0–30 cm**

Treatments in 2011

- Five barley varieties (Oxford$^{\Phi}$, Commander$^{\Phi}$, Hindmarsh$^{\Phi}$, Shepherd$^{\Phi}$ and Grout$^{\Phi}$).
- Four durum wheat varieties (Caparoi$^{\Phi}$, Hyperno$^{\Phi}$, EGA Bellaroi$^{\Phi}$ and Jandaroi$^{\Phi}$).
- Nine bread wheat varieties (EGA Gregory$^{\Phi}$, SUN627A, LongReach Spitfire$^{\Phi}$, EGA Bounty$^{\Phi}$, Livingston$^{\Phi}$, LongReach Crusader$^{\Phi}$, Sunvex$^{\Phi}$, Ellison$^{\Phi}$ and Strzelecki$^{\Phi}$).
- All plus and minus crown rot inoculum at each sowing time.

Nematode testing

Ten small intact soil cores were then taken from the 0–30 cm zone from each harvested plot in March 2012. The cores from each plot were bulked and sent to the South Australian Research and Development Institute (SARDI) for PreDicta B analysis of *Pt* numbers within each soil sample based on this sensitive and selective DNA test.

Results

Sowing time had little effect on the build-up of *Pt* populations at this site in 2011. The difference between sowing times was only significant in two varieties. The *Pt* population increased from 6,211 *Pt*/kg soil with the May sowing to 11,129 *Pt*/kg soil with the June sowing in Grout[Φ] barley. Conversely, with the bread wheat Ellison[Φ] the population decreased from the first (18,747 *Pt*/kg soil) to the second sowing (14,599 *Pt*/kg soil).

The addition of crown rot inoculum at sowing also had little impact on the build-up of *Pt* populations with significant differences in only three varieties. Shepherd[Φ], LongReach Crusader[Φ] and LongReach Spitfire[Φ] all had lower (19 to 34% reduction) *Pt* populations in the presence of added crown rot (data not shown).

Winter crop type and variety significantly impacted on the build-up of *Pt* populations over the season. Every variety across all winter cereal types increased the *Pt* above the starting population at sowing in 2011. Barley (av. x1.6 multiplication) and durum (av. x1.3) generally had better resistance than bread wheat (av. x2.7; Figure 1).

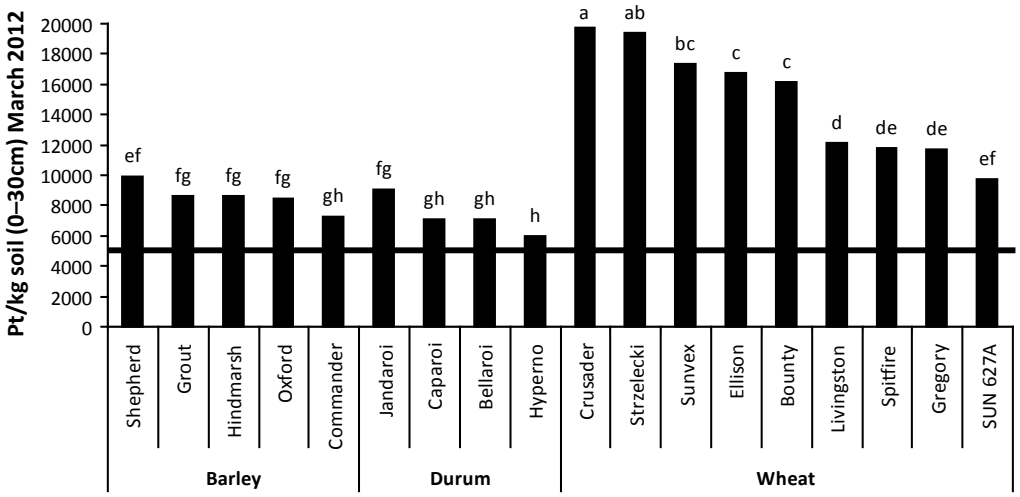

Figure 1: *Resistance of 5 barley, 4 durum and 9 bread wheat varieties to Pratylenchus thornei averaged across two sowing dates – Coonamble 2011 Starting Pt population at sowing 2011 of 5,522 Pt/kg soil (0–30 cm) indicated by solid line. l.s.d (95% confidence level) = 2,255 Pt/kg soil.*

The only significant difference between barley varieties was that Commander[Φ] (x1.3) was more resistant (i.e lower *Pt* population) than Shepherd[Φ] (x1.8). In durum, Hyperno[Φ] (x1.1) was significantly more resistant than Jandaroi[Φ] (x1.6), which is in line with their published resistance ratings for *Pt.* Hyperno[Φ] is rated moderately resistant (MR) while Jandaroi[Φ] is moderately susceptible-susceptible (MS-S).

Considerably more variation appears to exist in the resistance of bread wheat varieties to *Pt*. The breeding line SUN627A produced half the *Pt* population (9,737 *Pt*/kg soil) of the most susceptible varieties LongReach Crusader[Φ] (19,719 *Pt*/kg soil) and Strzelecki[Φ] (19,388 *Pt*/kg soil; Figure 1). All bread wheat varieties multiplied the *Pt* population above the starting level present at sowing in 2011 but variety choice had a huge impact on the extent of build-up (x1.8 to x3.6).

Conclusions

Pt populations were roughly in line with published resistance ratings but some discrepancies appear to exist. The most noticeable is the current very susceptible (VS) rating of LongReach Spitfire[Φ]. *Pt* populations at both sowing times with LongReach Spitfire[Φ] were equivalent to Livingston[Φ] and EGA Gregory[Φ] which are rated MR-MS and MS-S, respectively. The *Pt* population following LongReach Spitfire[Φ] was around 40% lower than those following the S-VS varieties LongReach Crusader[Φ] and Strzelecki[Φ] (Figure 1).

The resistance ratings also do not appear to maintain good relativity across winter cereal crop types. Jandaroi[Φ] durum and the bread wheat varieties EGA Bounty[Φ] and EGA Gregory[Φ] are all rated MS-S yet *Pt* populations varied significantly from 9,072 up to 16,194 *Pt*/kg soil.

Breeding programs need to focus on developing and releasing winter cereal varieties with good levels of ***tolerance*** to *Pt* to limit yield impact on crops. However, released varieties also need to have improved levels of ***resistance*** to *Pt* to limit the build-up of this widespread pest within cropping systems in the northern region.

Acknowledgements

This project was funded by NSW DPI and GRDC under the Northern Integrated Disease Management Project (DAN00143) and Variety Specific Agronomy Package Project (DAN00169). Thanks to Lindsay Meers and Jason Peters for hosting the trial on his property at Coonamble. Technical assistance provided by Amy Alston, Rod Bambach, Zeb Taylor, Jayne Jenkins and Tim Weaver is gratefully acknowledged. Nematode numbers were assessed using PreDicta B, which was developed by SARDI with funding support from GRDC.