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Impact of durum and bread wheat variety choice on final root lesion nematode soil populations – Wongarbon 2018

Steven Simpfendorfer
NSW DPI, Tamworth

Key findings

- Winter cereal crop and variety choice can have a large impact on the build-up of the nematode *Pratylenchus thornei* (*Pt*) population within paddocks which can then impact on the performance of following crops and/or varieties in the rotation.
- Significant differences were evident amongst varieties with a 5.3 fold difference in final *Pt* populations between the best (PBICR-08-012TC-3) and worst (Mitch⁽ᴰ⁾).
- Very susceptible varieties (e.g. Mitch⁽ᴰ⁾) should be avoided in paddocks where *Pt* is known to be present at any level as they can increase the population to high risk levels in one season.
- *Pratylenchus neglectus* (*Pn*) was also present at the site at a much lower density than *Pt* with varietal differences in final populations evident. However, all varieties either maintained or lowered starting *Pn* levels at this site in 2018 which remained at a low level of risk.

Introduction

The root lesion nematode (RLN) *Pratylenchus thornei* (*Pt*) is widespread in cropping soils throughout northern NSW and southern Qld where it feeds on root systems throughout the soil profile. A second RLN species, *P. neglectus* (*Pn*) is also present but at lower frequency and population densities across the region and mainly feeds on roots in the 0–15 cm soil layer. Winter cereal varieties differ in their extent of yield loss from either *Pt* and *Pn* (tolerance) and the numbers of nematodes that multiply in their root systems within a season (resistance). Interestingly, an individual variety can differ markedly in their resistance or tolerance to these two RLN species. Resistance to RLNs is an important consideration as it dictates a variety's effect on subsequent crops in the rotation. That is, more susceptible varieties allow greater RLN multiplication in their root systems over a season. The higher the resulting RLN population left in the soil, the greater the potential for a negative effect on the yield of subsequent crops.

The effect of four durum and 16 bread wheat entries on final *Pt* and *Pn* populations was determined in a replicated field experiment near Wongarbon in central-west NSW in 2018.

Site details

Location	'Hillview', Wongarbon, Latitude 32°33' 50.87" S, Longitude 148°71' 49.83" E
Co-operator	The Kelly family
Sowing date	29 May 2018
Fertiliser	80 kg/ha Granulock Z Extra (10.5 N:19.7 P:8.0 S:5 Zn) at sowing
Starting nitrogen (N)	95 kg N/ha to 120 cm
PAWC	~90 mm plant available soil water (0–120 cm)
Rainfall	The growing season rainfall was 222 mm

PreDicta B	14.6 *Pt*/g soil (medium risk), 2.2 *Pn*/g soil (low risk) at sowing (0–30 cm)
Post-harvest soil sampling date	9 April 2019 with a bulk of 15 cores (0–30 cm) per plot

Treatments

Varieties (20)

- Four durum entries: DBA Lillaroi$^{\phi}$, DBA Bindaroi$^{\phi}$ plus the numbered lines AGTD090 and TD1602.
- Sixteen bread wheat entries: EGA Gregory$^{\phi}$, Coolah$^{\phi}$, LongReach Lancer$^{\phi}$, LongReach Reliant$^{\phi}$, LongReach Spitfire$^{\phi}$, LongReach Mustang$^{\phi}$, LongReach Oryx$^{\phi}$, Mitch$^{\phi}$, Suntop$^{\phi}$, Sunguard$^{\phi}$, Sunprime$^{\phi}$ and numbered lines LPB14-3634, PBICR-08-012TC-3, PBICR-10-108-29, PBICR-10-011-3 and PBICR-10-109-24.
- All entries sown to achieve a target plant population of 100 plants/m^2.

Pathogen treatment

Added or no added crown rot at sowing using sterilised durum grain colonised by at least five different isolates of *Fp* at a rate of 2.0 g/m of row at sowing.

Results

Inoculation with crown rot at sowing had no impact on final soil *Pt* or *Pn* densities measured after harvest. There was a 5.3 fold difference in final *Pt* densities between the lowest (PBICR-08-012TC-3) and highest (Mitch$^{\phi}$) entry (Figure 1). Generally, there was lower variation in final *Pt* populations with the four durum entries, which were on the lower end compared with many of the bread wheat entries. The *Pt* population across the site was measured as 14.6 *Pt*/g soil which was just below the high risk threshold of >15 *Pt*/g. All four durum entries lowered the *Pt* population when measured post-harvest. However, there was considerable variation between the 16 bread wheat entries with PBICR-08-012TC-3 and Suntop$^{\phi}$ roughly halving the starting *Pt* population whilst Mitch$^{\phi}$ more than doubled it (Figure 1).

The starting *Pn* population was considerably lower than that of *Pt* at only 2.2 *Pn*/g soil which is consistent with previous paddock surveys across the northern region. All entries either maintained or reduced the starting *Pn* population at this site in 2018 which all remained at a low level of risk. However, there was still a 3.2 fold difference in final *Pn* densities between the lowest (LongReach Reliant$^{\phi}$) and highest entry (LongReach Lancer$^{\phi}$).

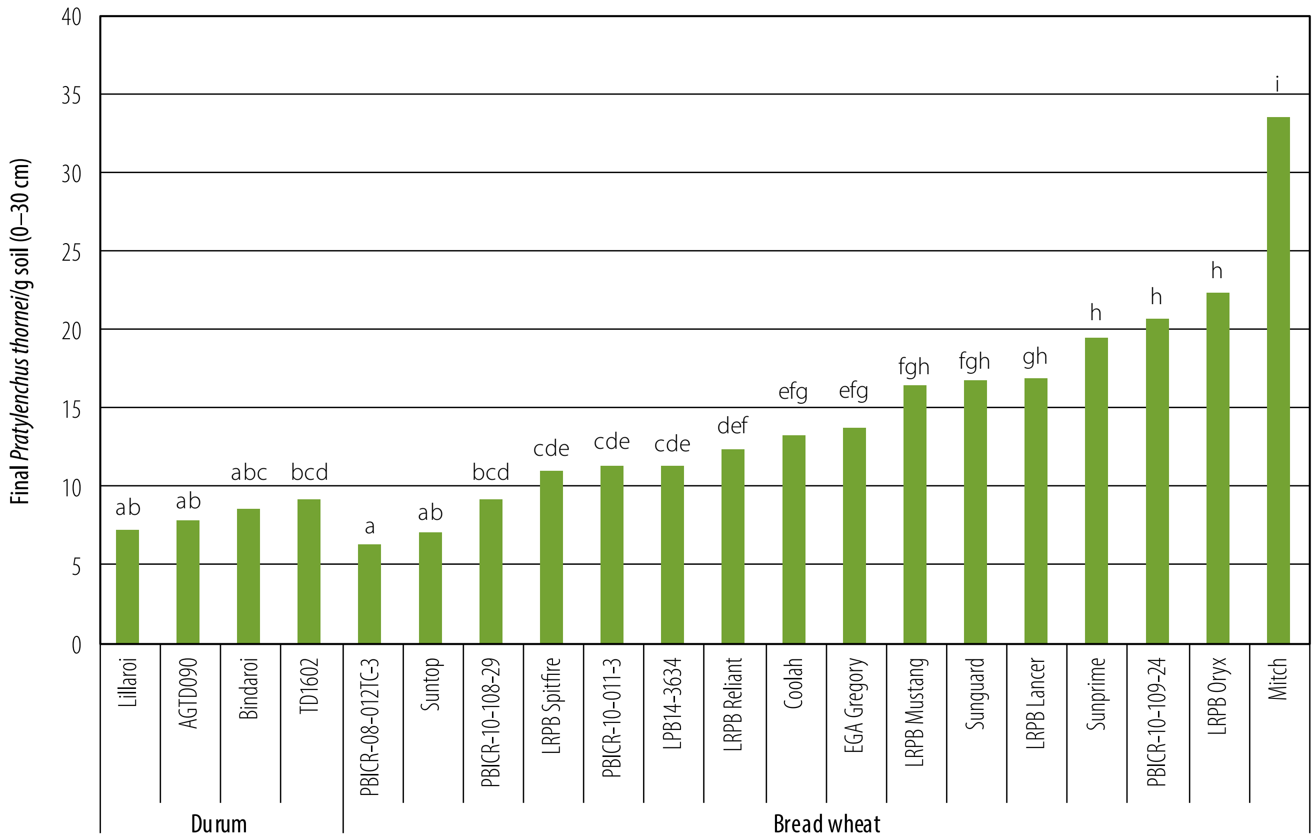

Figure 1 Final *Pratylenchus thornei* soil populations (*Pt*/g soil; 0–30 cm) produced by four durum and 16 bread wheat entries – Wongarbon 2018.
Bars with the same letter are not significantly different (*P*=<0.001) based on transformed data (ln(x + 1)). Back-transformed values are presented in figure 1.

Conclusions

Cereal crop and variety choice can significantly affect *Pt* build-up within paddocks. There was a 5.3 fold difference in populations between the best and worst entry at Wongarbon in 2018. In the northern grains region, starting *Pt* populations of below 2.0 *Pt*/g soil are considered low risk; populations between 2.0 and 15.0 *Pt*/g soil are considered medium risk; and above 15.0 *Pt*/g soil is considered high risk for yield loss in intolerant crops or varieties. Seven bread wheat entries (LongReach Mustang⁽ᴾ⁾, Sunguard⁽ᴾ⁾, LongReach Lancer⁽ᴾ⁾, Sunprime⁽ᴾ⁾, PBICR-10-109024, LongReach Oryx⁽ᴾ⁾ and Mitch⁽ᴾ⁾) elevated the *Pt* population to a high risk level, all other entries either maintained or decreased *Pt* soil densities to within a medium risk level for yield loss in a subsequent crop in 2019.

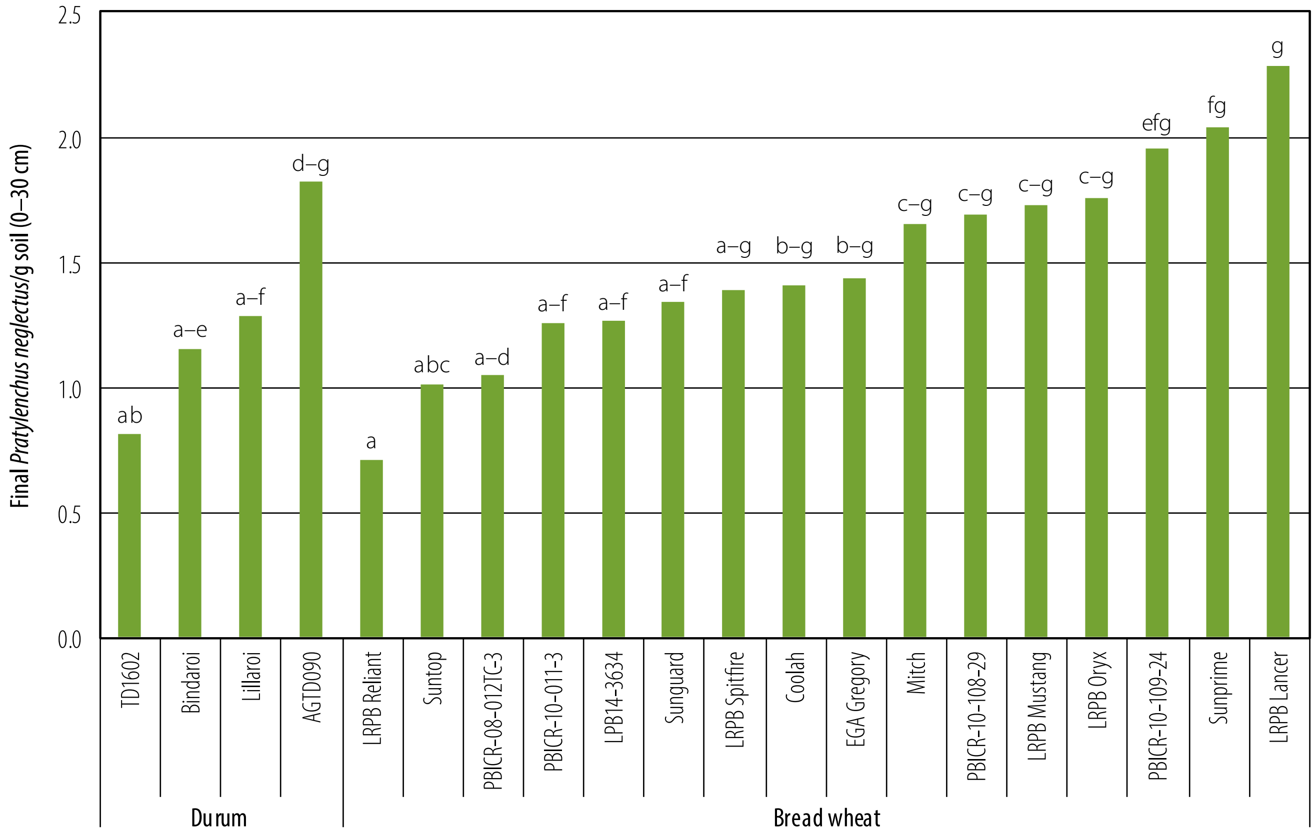

Figure 2 Final *Pratylenchus neglectus* soil populations (*Pn*/g soil; 0–30 cm) produced by four durum and 16 bread wheat entries – Wongarbon 2018.
Bars with the same letter are not significantly different (P=0.072) based on transformed data (ln(x + 1)). Back-transformed values are presented in figure 2.

Acknowledgements

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Contact

Steven Simpfendorfer
Tamworth Agricultural Institute
steven.simpfendorfer@dpi.nsw.gov.au
02 6763 1222