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Impact of wheat variety choice on the build up of *Pratylenchus thornei* and *Pratylenchus neglectus* – Wongarbon 2014

Steven Simpfendorfer

NSW DPI, Tamworth

Key findings

Cereal variety choice can have a large impact on the build-up of *Pratylenchus thornei* (*Pt*) and *Pratylenchus neglectus* (*Pn*) populations within paddocks which can then impact on the performance of following crops and/or varieties in the rotation.

Significant differences were evident between varieties, with a 27-fold difference in final *Pt* populations between the best (LRPB Gauntlet$^{\Phi}$ and Suntop$^{\Phi}$) and worst (Elmore CL Plus$^{\Phi}$) varieties.

Significant differences were also evident between varieties, with a 6.7-fold difference in final *Pn* populations between the best (Viking$^{\Phi}$ and Livingston$^{\Phi}$) and worst (Condo$^{\Phi}$) varieties.

Very susceptible varieties should be avoided in paddocks with known root lesion nematode (RLN) populations as they can increase the population to medium or high risk levels in one season.

Introduction

The root lesion nematodes (RLNs) *Pratylenchus thornei* (*Pt*) and *P. neglectus* (*Pn*) are widespread in cropping soils through central and northern NSW with *Pt* generally more widespread and at higher soil populations than *Pn*. Winter cereal varieties differ in the extent of yield loss from RLNs (tolerance) and the numbers of nematodes that multiply in their root systems within a season (resistance).

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 multiplication of *Pt* or *Pn* in their root systems over a season, with wheat varieties often differing in their level of resistance to these two RLNs. The higher the resulting RLN population left in the soil, the greater the potential for a negative impact on the yield of subsequent crops.

A GRDC-funded wheat national variety trial (NVT) examining the yield potential of released and near release cultivars was conducted at Wongarbon in central NSW in 2014. The stubble of harvested plots was left intact and soil cores were taken in March 2015 to assess the effect of variety choice on *Pt* and *Pn* build-up in the soil under the 2014 plots. This type of testing evaluates the relative resistance of each variety to *Pt* and *Pn* under field conditions.

Site details

Location:	**"Hillview", Wongarbon, central-west NSW**
Co-operator:	**Angus Kelly**
Sowing date:	**16 May 2014**
Fertiliser:	**90 kg/ha Granulock® 12Z and 70 kg/ha urea at sowing**
PreDicta B®:	**2.2 *Pn*/g soil (low risk), 2.3 *Pt*/g soil (medium risk) and nil *Fusarium* at sowing (0–30 cm)**
Harvest date:	**15 November 2014**

Treatments

- A total of 34 entries were in the main season evaluation trial: 20 released varieties and 14 advanced experimental lines.
- All plots in the main season NVT trial were cored (10 cores/plot at 0–30 cm on previous crop row) after harvest (March 2015) to determine final (Pf) for each variety.
- *Pt* and *Pn* populations determined in all soil samples based on PreDicta B® analysis, a DNA-based test provided by the South Australian Research and Development Institute (SARDI).
- *Pt* and *Pn* data transformed for analysis *ln*(x + 1) to determine significance with back-transformed values presented for released varieties only in Table 1 and Table 2.

Results

- This site had a mixed RLN population at sowing following a legume pasture grown in 2012 and wheat crop in 2013. There was a medium level of both *Pn* and *Pt* across the site as measured separately for each of the six ranges at sowing. Variety impacts on final RLN numbers, as measured in March 2015, were significant for both *Pn* and *Pt* at the 95% confidence level.
- Significant differences were evident between varieties in final *Pn* populations developed in the top 30 cm of soil, which ranged from 0.6 *Pn*/g of soil (Viking and

Livingston) up to 4.0 *Pn*/g soil (Condo). This represents a 6.7-fold difference in final *Pn* populations between varieties (Table 1).

Table 1. *Final Pratylenchus neglectus soil populations (0–30 cm) produced by 20 bread wheat varieties – Wongarbon 2014*

Variety	*Pn*/g soil		Variety	*Pn*/g soil	
Viking$^{\Phi}$	0.6	abc	Sunmate$^{\Phi}$	1.6	defghi
Livingston$^{\Phi}$	0.6	abc	LRPB Spitfire$^{\Phi}$	1.7	defghi
Sunvale$^{\Phi}$	1.1	bcd	LRPB Gauntlet$^{\Phi}$	1.8	defghij
LRPB Crusader$^{\Phi}$	1.2	bcde	LRPB Flanker$^{\Phi}$	1.8	defghij
LRPB Dart$^{\Phi}$	1.2	bcdef	Wallup$^{\Phi}$	2.1	defghijk
Gascoigne$^{\Phi}$	1.2	bcdef	Sunguard$^{\Phi}$	2.7	ghijklm
Ventura$^{\Phi}$	1.3	cdef	EGA Gregory$^{\Phi}$	2.9	hijklm
Suntop$^{\Phi}$	1.4	cdefg	EGA Wylie$^{\Phi}$	3.1	jklm
LRPB Impala$^{\Phi}$	1.5	defgh	Baxter$^{\Phi}$	3.3	jklm
Elmore CL Plus$^{\Phi}$	1.6	defghi	Condo$^{\Phi}$	4.0	lm
Values followed by the same letter are not significantly different at 95% confidence level					

- Significant differences were also evident between varieties in final *Pt* populations developed in the top 30 cm of soil, which ranged from 0.3 *Pt*/g of soil (LRPB Gauntlet and Suntop) up to 8.1 *Pt*/g soil (Elmore CL Plus). This represents a 27-fold difference in final *Pt* populations between varieties (Table 2).
- Some varieties appear to differ considerably in their relative resistance to the two RLNs. For example, LRPB Crusader ranked the 4th lowest variety for *Pn* but 3rd highest for final *Pt* population build-up.
- Viking appears to have a reasonable level of resistance to both *Pratylenchus* species, being equal lowest for *Pn* and the 3rd lowest variety for final *Pt* population build-up.
- Conversely, Condo appears to have a poorer level of resistance to both *Pratylenchus* species, being the highest for *Pn* and the 6th highest variety for final *Pt* population build-up.

Table 2. *Final Pratylenchus thornei soil populations (0–30 cm) produced by 20 bread wheat varieties – Wongarbon 2014*

Variety	*Pt*/g soil		Variety	*Pt*/g soil	
LRPB Gauntlet	0.3	a	Sunvale	1.3	cdefgh
Suntop	0.3	ab	LRPB Flanker	1.4	defgh
Viking	0.5	abc	Wallup	1.5	defgh
Sunguard	0.6	abcd	Baxter	1.7	efghi
Sunmate	0.8	abcdef	Condo	2.4	hijk
Livingston	1.0	abcdef	EGA Gregory	3.2	jkl
LRPB Dart	1.0	abcdef	Ventura	3.3	jkl
Gascoigne	1.0	cdef	LRPB Crusader	5.2	lmn
LRPB Spitfire	1.1	cdef	LRPB Impala	5.7	mn
EGA Wylie	1.2	cdefg	Elmore CL Plus	8.1	n
Values followed by the same letter are not significantly different at 95% confidence level					

Conclusions

Cereal variety choice can have a significant impact on the build-up of RLN populations within paddocks, with a 27-fold difference in final *Pt* populations and a 6.7-fold difference in final *Pn* populations between the best and worst wheat varieties at this site in 2014. Starting *Pt* populations of below 2.0 *Pt*/ g soil are considered low risk; populations between 2.0 *Pt*/g and 15.0 *Pt*/g soil are considered medium risk; and above 15.0 *Pt*/g soil are considered high risk for yield loss in intolerant crops or varieties in the northern region. This could have serious consequences for production following *Pt*- or *Pn*-intolerant crops and/or varieties within the rotation, with some varieties maintaining medium risk RLN populations at this site in 2014. The worst of the varieties increased the *Pt* population from ~2.3 *Pt*/g at sowing in 2014 to 8.1 *Pt*/g soil as measured before sowing

in 2015. Very susceptible varieties should be avoided in paddocks with known RLN populations as they can dramatically increase the population to medium or high risk levels in one season.

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