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Impact of cereal varieties on the build-up of *Pratylenchus thornei* across three sowing dates – Narrabri 2013

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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.

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 the resulting *Pt* population left in the soil, the greater the potential for a negative impact on the yield of subsequent crops.

A winter cereal variety trial (durum, bread wheat and barley) trial examining yield response across three sowing dates was conducted near Narrabri in northern NSW in 2013. The harvested plots were left intact and soil cores were taken in March 2014 to assess the effect of winter cereal crop type and variety choice on the build-up of *Pt* in the soil under the 2013 plots. This type of testing evaluates the relative *resistance* of each variety to *Pt* under field conditions.

Site details

Location:	**'Myall Vale' Narrabri**
Co-operator:	**Peter and Sarah Leitch**
Sowing dates:	**TOS 1: 24 April 2013, TOS 2: 1 June 2013, TOS 3: 25 June 2013**
Fertiliser:	**180 kg/ha urea and 70 kg/ha Granulock Supreme Z at sowing**
Starting N:	**175 kg/ha nitrate N to 1.2 m**
Starting water:	**~170 mm (0–180 cm)**
In-crop rainfall:	**~120 mm**
PreDicta B®:	**2.5 *Pt*/g soil at sowing (0–30 cm) average of separate samples across the six ranges**

Treatments

- Seven durum wheat entries (3 released varieties and 4 numbered lines; Table 1).
- 23 barley entries (18 released varieties and 5 numbered lines; Table 1).
- 17 bread wheat entries (16 released varieties and 1 numbered line; Table 1).
- Three replicates of each entry split for sowing date.
- All plots cored (10 cores/plot at 0–30 cm on previous crop row) after harvest (March 2014) to determine final *Pt* populations for each variety across the three sowing dates.
- *Pt* populations determined by PreDicta B® analysis, a soil DNA service provided by the South Australian Research and Development Institute (SARDI), that provides the number of *Pt*/g soil.
- *Pt* data transformed for analysis $ln(x + 1)$ to determine significance and back-transformed values are presented in Table 1.

Results

- There was no significant effect of the three sowing dates (24 April to 25 June) on final *Pt* populations ($P = 0.734$) and no interaction between sowing time and variety ($F\ pr. = 0.754$). However, significant variety differences were evident ($P = <0.001$).

Table 1. *Final* Pratylenchus thornei *soil populations (0–30 cm) produced by 23 barley, 7 durum and 17 bread wheat entries averaged across three sowing dates – Narrabri 2013*

Varieties (across crops) followed by the same letter are not significantly different at 95% confidence level

Variety	*Pt*/g soil	Significance
Barley		
Compass(Φ)	2.2	bcdef
Grout(Φ)	2.5	bcdefgh
NRB121156	2.5	bcdefgh
Urambie(Φ)	2.6	bcdefghi
Commander (Φ)	2.9	cdefghijk
SY Rattler(Φ)	3.0	cdefghijk
Navigator(Φ)	3.1	defghijk
Oxford(Φ)	3.3	defghijkl
Flinders(Φ)	3.4	efghijkl
Bass(Φ)	3.4	fghijklm
IGB1140	3.4	fghijklm
Fathom(Φ)	3.5	ghijklmn
Westminster(Φ)	3.7	hijklmn
Wimmera(Φ)	3.8	jklmnop
Shepherd(Φ)	3.9	ijklmnopq
Fairview(Φ)	3.9	ijklmnopq
La Trobe(Φ)	4.0	jklmnopq
Scope CL(Φ)	4.1	klmnopq
IGB1139	4.1	klmnopq
GrangeR(Φ)	4.1	klmnopq
Gairdner(Φ)	4.2	klmnopq
Skipper(Φ)	4.2	klmnopq
Buloke(Φ)	4.7	lmnopqr

Variety	*Pt*/g soil	Significance
Durum		
Exp Durum	1.3	a
Caparoi(Φ)	1.6	ab
TD241046	1.9	abc
DBA Aurora(Φ)	2.0	abc
TD290564	2.1	bcd
TD290491	2.2	bcde
Jandaroi(Φ)	2.5	bcdefgh
Bread wheat		
Sunguard(Φ)	2.4	bcdefg
Suntop(Φ)	2.7	cdefghij
LRPB Spitfire(Φ)	3.0	cdefghijk
LRPB Lancer(Φ)	3.2	defghijkl
LRPB Viking(Φ)	3.2	defghijkl
Livingston(Φ)	3.5	ghijklmn
Sunvale(Φ)	3.8	hijklmno
EGA Gregory(Φ)	4.1	klmnopq
LRPB Dart(Φ)	4.1	klmnopq
Mitch(Φ)	5.1	mnopqr
EGA Eaglehawk(Φ)	5.2	nopqr
Elmore CL Plus(Φ)	5.2	nopqr
SUN663A	5.5	oqr
EGA Bounty	6.3	r
LRPB Crusader(Φ)	6.4	r
Sunvex	6.4	r
LRPB Impala(Φ)	6.7	r

- Final *Pt* populations in the top 30 cm of soil left by the root systems of the previous varieties ranged from 1.3 *Pt*/g of soil (Experimental durum) up to 6.7 *Pt*/g soil (LRPB Impala$^{\phi}$) which represents a five-fold difference in final populations (Table 1).
- The build-up in *Pt* populations was relatively modest at this site compared to the average starting population of 2.5 *Pt*/g soil (0–30 cm).
- Durum tended to leave relatively low *Pt* populations in the top 30 cm of soil ranging from 1.3 *Pt*/g (experimental durum) up to 2.5 *Pt*/g (Jandaroi$^{\phi}$).
- The bread wheat varieties produced the widest range of final *Pt* populations from 2.4 *Pt*/g (Sunguard$^{\phi}$) to 6.7 *Pt*/g (LRPB Impala$^{\phi}$).
- The range in final *Pt* populations was narrower with the barley varieties being from 2.2 *Pt*/g (Compass$^{\phi}$) to 4.7 *Pt*/g (Buloke$^{\phi}$).
- The difference between final *Pt* populations was not significant with the three released durum varieties examined but significant differences did exist within both released bread wheat and barley varieties (Table 1).

Conclusions

Cereal variety choice can have a significant impact on the build-up of *Pt* populations within paddocks, with around a five-fold difference in final populations between the highest and lowest variety at this site in 2013. These differences were due to the variety sown and did not significantly differ among a two month spread in sowing dates.

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