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Crop or variety impact on *Pratylenchus thornei* populations

This paper deals with the impact of variety choice on the population dynamics of the root-lesion nematode *Pratylenchus thornei (Pt).* The trial was conducted at a site between Garah and Weemelah in northern NSW from 2010 to 2012. A previous paper dealt with the *Pt* impact on crop growth, yield and grain quality at the same site during winter 2011.

Pt populations in soil samples were analysed by two methods. PreDicta B – a DNA based soil test conducted by SARDI and manual counts performed at the Leslie Research Centre, Toowoomba.

March 2010

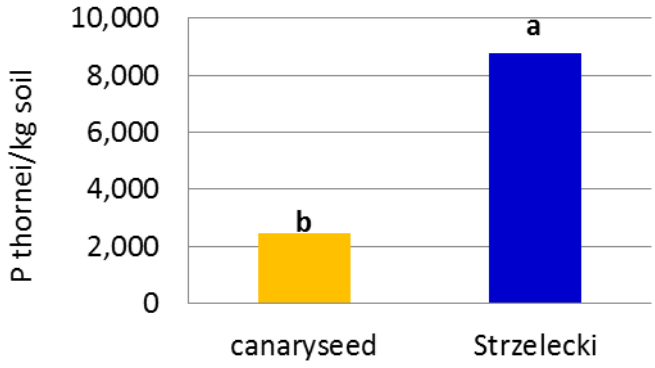
PreDicta B analysed soil samples showed *Pt* populations of ~1,600/kg soil in the 0-15 cm soil layer and ~3,100/kg soil in the 15-30 cm layer. Deep samples analysed by DEEDI manual counts showed uniform *Pt* populations of ~2,300-2,600/kg soil at 0-30 cm, 30-60 cm and 60-90 cm depths. *Pratylenchus neglectus* were not found in any sample. Commercial scale strips of canaryseed and Strzelecki wheat were sown in June 2010 with the aim of producing alternating strips of "low" and "high" *Pt* population.

Key point: Site initially had a *Pt* population close to industry threshold levels

March 2011

A series of four transects were sampled, at 0-15 cm, across all strips and analysed using PreDicta B. Mean *Pt* populations of ~2,500/kg soil were found following canaryseed production (range ~1300-5300/kg) and ~8,800/kg soil following Strzelecki (range~3300-16700/kg). The site appeared uniform for *Pt* population. Deep samples analysed by DEEDI manual counts showed *Pt* populations of ~600/kg soil at 0-30cm following canaryseed and ~3,000/kg soil following Strzelecki.

Mean *Pt* populations at 0-15 cm soil depth (March 2011)



Treatments sharing the same letter are not significantly different at p=0.05

Key point: *Pt* populations following Strzelecki were ~3-5 times higher than following canaryseed

Trials conducted 2011

Nine separate split plot 'crop trials' were sown across the canaryseed and Strzelecki strips in May 2011 with three replicates of all treatments and plot size 2 x 18m. Stubble loads (lucerne hay) were compared in four replicates but only on strips following Strzelecki production in 2010.

Layout 2011 (not to scale) → North

Stubble load	Linseed	Chickpeas	Field peas	Faba beans	Canola & *B juncea*	Early sown wheat	CR foliar fungicide wheat	CR x wheat varieties	Main cereal

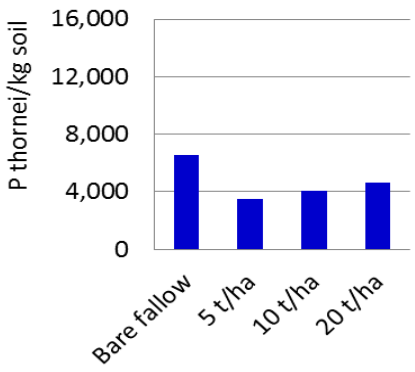
← 76m → ← 136m →

March/April 2012

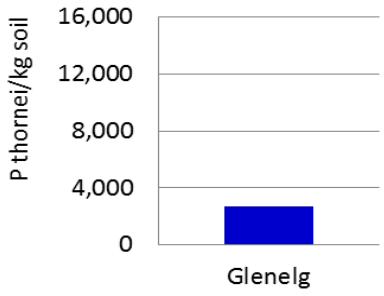
Soil sampling was not possible from November 2011 until mid-March 2012 due to extreme rainfall and periods of paddock flooding. The northern end of the site was most prone to flooding. PreDicta B analysis was conducted on soil samples from 0-30 cm depth. Chickpeas, field peas, linseed, canola and *Brassica juncea* were all sampled on the 21/3/2012 with faba beans, stubble load and cereals sampled on the 30/4/2012 and 1/5/2012. Valid statistical comparison is only possible within each of the individual trials. NB: All graphs use the same scale to assist identifying general trends in *Pt* populations between trials or crops.

Mean *Pt* populations at 0-30 cm soil depth (March/April 2012 following Strzelecki in 2010)

Stubble load



Linseed



There was no significant difference in *Pt* counts within the range of stubble load treatments evaluated. NB: only one linseed variety evaluated

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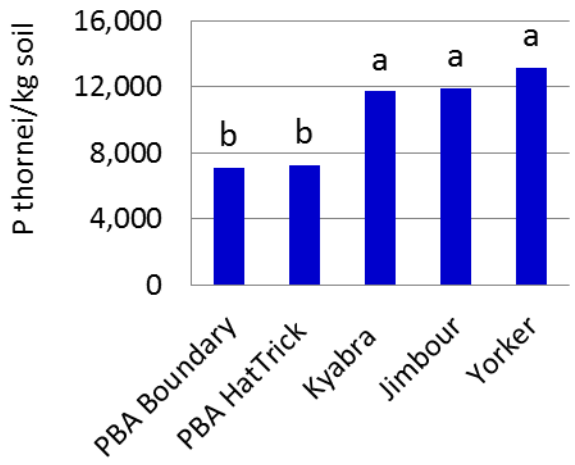
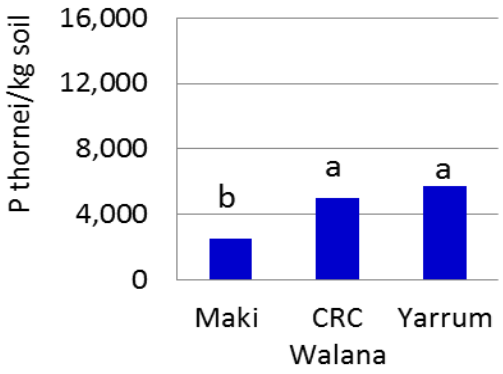
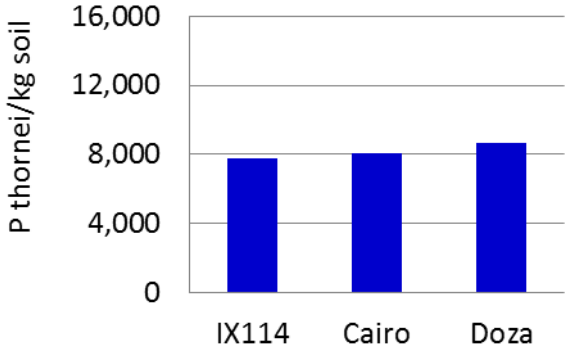
Chickpeas



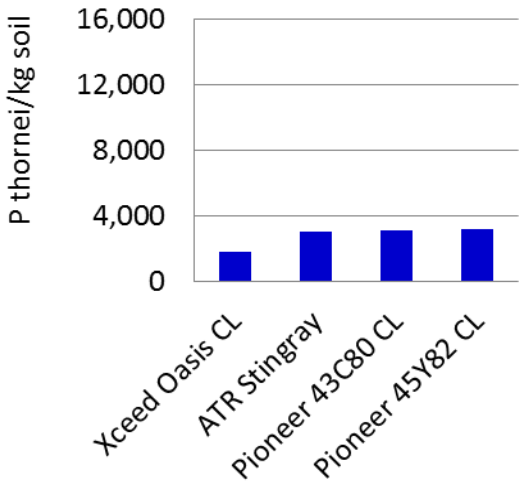
Field peas



Faba beans



Canola & *B juncea*



Xceed Oasis CL is a *Brassica juncea*

Varieties sharing the same letter are not significantly different at p=0.05. No significant difference in *Pt* counts within either the brassica or faba bean varieties evaluated

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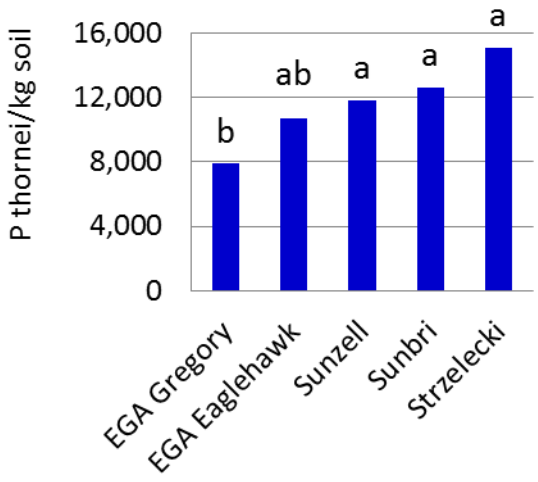
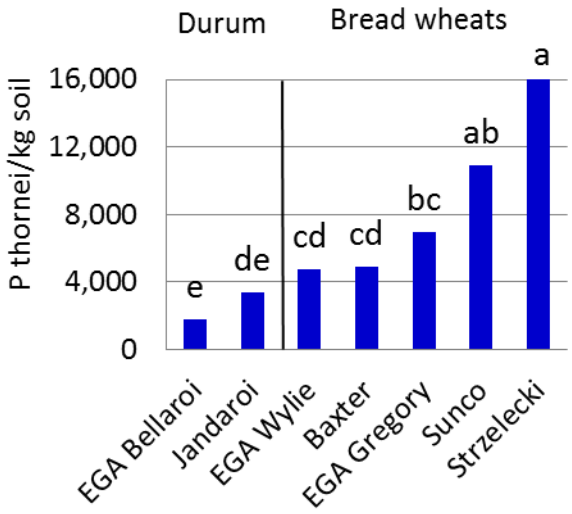
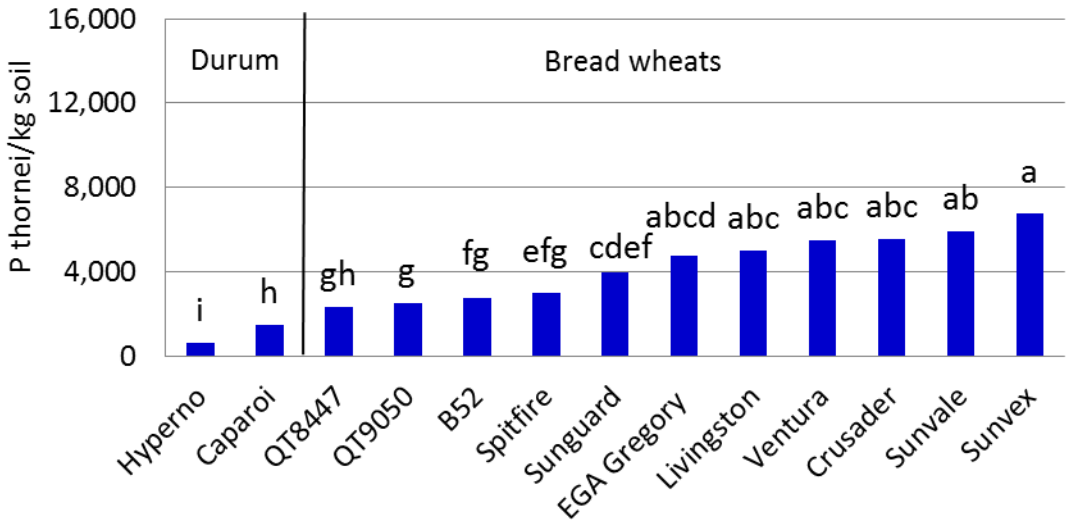
Early sown wheat



Main sown crown rot x varieties



Main sown cereal trial – durum v bread wheat



Varieties sharing the same letter are not significantly different at p=0.05. Early sown wheats planted 2/5/2011, main sown cereals planted 18/5/2011. NB: EGA Gregory included in all 3 trials as a check, Strzelecki included in early sown wheat and main sown crown rot x varieties as an additional check.

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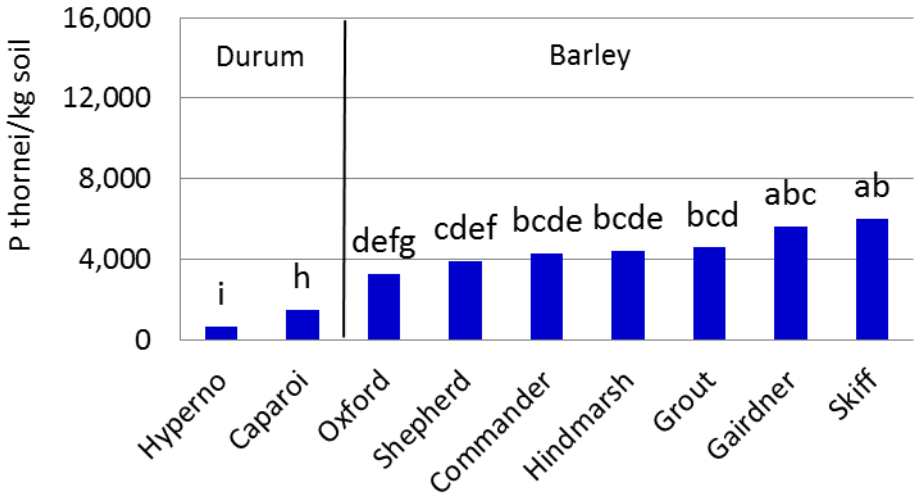
Main sown cereal trial – durum v barley



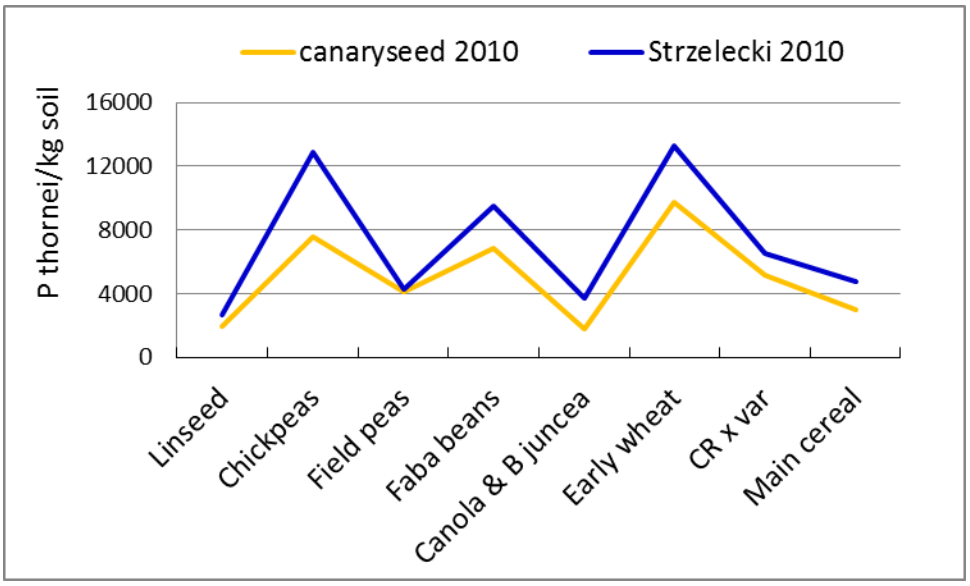
Varieties sharing the same letter are not significantly different at p=0.05

Key points:

1. Significant differences in final *Pt* population were seen between varieties in all crops other than the brassica and faba bean varieties evaluated
2. **Linseed**, **field peas** , **canola** and ***B juncea*** showed **moderate to high levels of resistance** with lower final *Pt* populations
3. **Chickpeas, faba beans** and the **cereals** in general were more **susceptible** with increased final *Pt* populations. On average, chickpeas and faba beans had ~2.5-4 times the final *Pt* population found in canola and *B juncea* plots
4. All **durum** varieties tested appeared to have at least **moderate levels of resistance**
5. The majority of **bread wheat** and **barley** varieties resulted in similar final *Pt* populations
6. There was drop off in *Pt* population particularly at the northern end of the site – suspected to be due to flooding (evident in EGA Gregory results)

Mean *Pt* populations following canaryseed or Strzelecki in 2010

The following graph shows the overall *Pt* populations in strips sown to canaryseed or Strzelecki in 2010. Even 18 months after the canaryseed and Strzelecki were sprayed out (September 2010) there was still a clear trend to increased *Pt* populations in strips where Strzelecki had been grown.



Key point: Final *Pt* populations were still being influenced by the crop choice in 2010

Overall summary

Cereals: This large data set supports previous NGA activity showing significant differences within cereal varieties in the build-up of *Pt* populations in replicated field trials. There are a number of bread wheat varieties that result in high levels of build-up of *Pt* and these should be avoided in paddocks where *Pt* is known to be present eg Strzelecki, Sunvex and Sunco. Durum varieties have improved *Pt* resistance and have consistently resulted in lower *Pt* populations than other winter cereals in these trials.

Broadleaf crops: Linseed, field peas, canola and *B juncea* are all rated as *Pt* resistant and results in this trial support those ratings. In contrast, chickpeas and faba beans are *Pt* hosts and will leave higher *Pt* populations. Significant variety differences were apparent within the chickpeas evaluated but the best varieties still resulted in 2-3 times the *Pt* population found in canola and *B juncea* treatments.

Population management: This data highlights that management of *Pt* is a long term process. Even when linseed, canola or *B juncea* followed canaryseed in 2010 (two consecutive resistant crops) there were still concerning levels of *Pt*. However the *Pt* populations in these situations were ~85% lower than when a very susceptible variety such as Strzelecki was grown following canaryseed.

Very susceptible crops or varieties need to be avoided when *Pt* is present to avoid population 'blow-outs' and the prolonged period for population decline, even when *Pt* resistant crops are sown.