When good pulses turn bad

Root-lesion nematodes in the northern grain region of Australia

Kirsty Owen
Root-lesion nematode
Pratylenchus thornei

• **Parasitic**: damage plant roots as they feed and reproduce
• **Several generations in-crop**: exponential increase in populations
• **Survival**: in fallow periods, deep in soil profile
P. thornei is a big problem in the northern grain region.
Northern grain region:
77% of paddocks have root-lesion nematodes
(2010-2013, 604 paddocks)

- No RLN detected: 23%
- *P. neglectus* only: 5%
- *P. thornei* alone: 44%
- *P. thornei* and *P. neglectus*: 28%

Neil Robinson, survey data, USQ
Linear, negative relationship between *P. thornei* and yield of intolerant wheat

**Up to 63% yield loss**

\[ Y = 9208 - 872.2x \]

\[ R^2 = 0.82*** \]

\[ n = 96 \]

(Owen *et al.* 2014 *Crop and Pasture Science*, 65, 227-241)
The Solution: Integrated Management

- Diagnosis
- Tolerant crops – high yields
- Resistant crops – low reproduction
The right rotations produce brilliant results:

Intolerant wheat cv. Strzelecki

3.4 t/ha
350 *P. thornei*/kg soil
After five resistant crops

1.6 t/ha
12,000 *P. thornei*/kg soil
After one resistant crop
The problems:

• No nematicides
• Need 2-3 consecutive, resistant crops to decrease damaging populations of *P. thornei*
• Pulses susceptible to *P. thornei*:
  • Chickpea
  • Mungbean
  • Faba bean
Chickpea – a range of *P. thornei* populations after harvest

![Graph showing *P. thornei/kg soil* over soil depth (cm). Lines represent Kyabra, unplanted, and PBA Hat Trick.]
Chickpea – *P. thornei* at 0-30 cm soil depth after harvest

![Graph showing *P. thornei* density in soil depth after harvest]
Chickpea – moderate intolerance

6.5% yield loss overall
Mungbean: build-up of *P. thornei* wheat (S):wheat (S):mungbean (S)
Mungbeans increase or maintain high populations of *P. thornei*
*P. thornei* increased after growing mungbean cultivars
Faba bean – very susceptible

P. thornei/kg soil

Soil depth (cm)

- Pre-plant
- Rossa
- Doza
Faba bean: glasshouse results

- CPI133872 (R-MR)
- IX553Rc-2-5
- PBA Warda
- IX486/7-6
- PBA Rana
- PBA Samira
- IX474/4-3
- Fiord
- IX474/4-12
- IX556Rf-3-8
- IX5611-4-2
- IX556a-2-2
- Cairo
- Chara (MR-MS)
- IX504/2-4
- IX220d/2-5
- IX552Rb-3-6
- IX506/1-9
- Doza
- Catalina (S)

Reproduction factor
Key messages

• Northern grain region growers need resistant crops to reduce the burden of *P. thornei*

• Chickpea, faba bean and mungbean are susceptible to *P. thornei* ... but there are some cultivars with moderate resistance to *P. thornei*

• The solution: We need to work with breeders to produce more resistant cultivars
Acknowledgements

- **Co-authors:** Tim Clewett, John Thompson (USQ), Kerry Bell and Michael Mumford (DAFQ biometry)
- Grain Research and Development Corporation and Queensland Department of Agriculture and Fisheries
- Col Douglas (DAFQ, Mungbeans), Kristy Hobson and Kevin Moore (NSW DPI, Chickpeas), Kedar Adhikari (Syd University, Faba beans).
- Gwynne family for generous use of their farm for our research