Root lesion nematode has a picnic in 2013

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Key messages

- Three major root lesion nematode (RLN) species (*Pratylenchus neglectus, P. teres and P. thornei)* are found in 5.3 million hectares – or about 60% – of WA's cropping area. Populations are yield-limiting in at least 40% of cropping paddocks.
- Conditions in the 2013 growing season favoured RLN and damage was widespread.
- RLN species were found in 90% of 130 paddocks surveyed and RLN levels were high enough to cause between 15 and 50% yield loss in 48% of the paddocks assessed.
- In some areas, a green bridge of volunteer crop species, pasture and weeds after March rains may have allowed RLN numbers to increase before crops were sown. Plant stress from the prolonged dry spell in early winter may also have left crops more susceptible to RLN infestation.
- Currently, there are no practices that can be applied after a crop is sown so RLN management is based on:
    - Rotation with a resistant break crop or pasture to inhibit or reduce nematode reproduction.
    - In the cropping year, use varieties of wheat or barley which are tolerant to the RLN species in your paddock as these suffer little or no yield loss when low or moderate populations of RLN are present in the soil. However, tolerant varieties may still increase RLN numbers.
- Make use of available testing services to determine nematode species and levels, but be aware that PreDicta-B™ cannot currently detect *P. teres* in WA crops.
- AGWEST Plant Laboratories can conduct in-season nematode diagnoses.

Methods

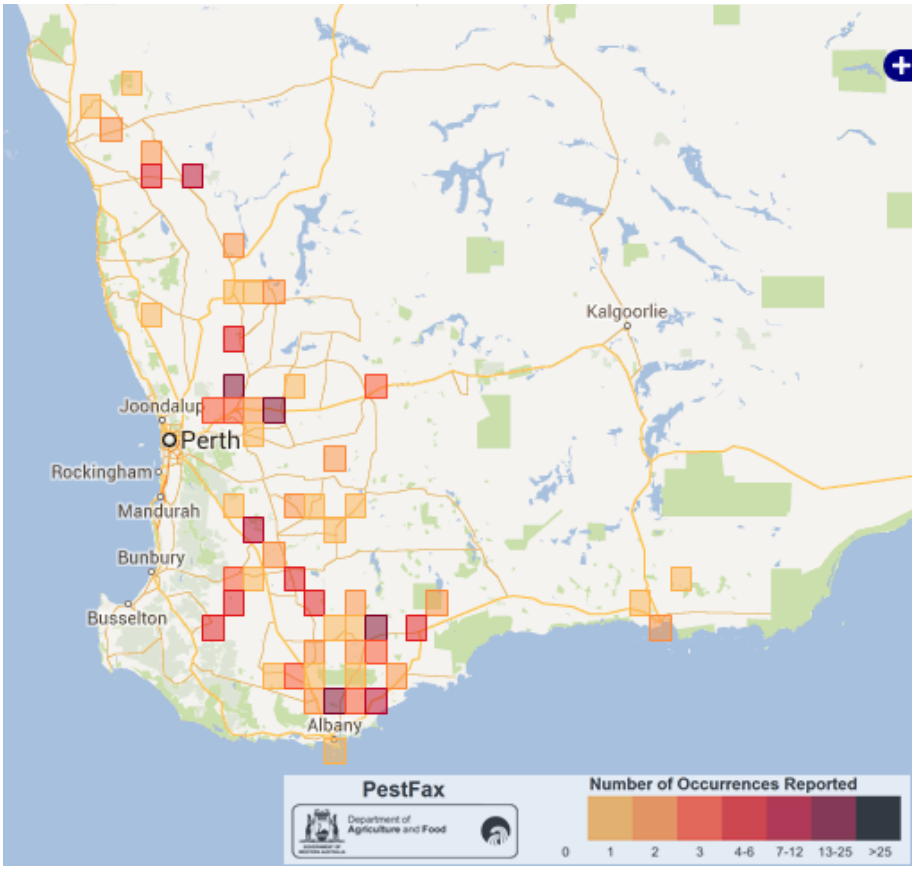
RLN levels in a range of crops growing from Northampton in the north to Albany and Esperance in the south were assessed in 2013 at DAFWA trial sites and in response to grower queries. Data was also collected from Focus Paddocks (50 samples assessed by DAFWA, Nematology) and from samples sent to AGWEST Plant Laboratories. This data was summarised to determine the proportion of paddocks containing plant parasitic nematode species and the severity of infestations. RLN resistance information from glasshouse and field trials were used to inform recommendations on the best and worst crops and varieties to plant in areas with damaging infestations of one or more RLN species.

In 2012, a trial site for *Pratylenchus teres* was identified in Esperance in response to grower observations of yellowing and poor growth in a 40 ha paddock of wheat. We confirmed high levels of *P. teres* (11 000 /g root) which caused approximately 46% yield loss. The trial area was planted in 2013 using a randomised block design with canola (cv. Cobbler) to increase *P. teres* and lupins (cv. Jennabillup) to decrease *P.teres* populations. The remainder of the paddock was sown with a soft seeded serradella (cv. Cadiz) known to be moderately resistant to *P. neglectus*. At the end of the cropping season, trial plots and a representative area of the serradella pasture were sampled to determine if nematode levels had been successfully manipulated. This site will be used in 2014 for tolerance assessments of cereal varieties.

Results and discussion

RLN was identified across all cropping zones in 2013 (Figure 1). RLN species were found in 90% of the 130 paddocks surveyed. *Pratylenchus neglectus* and *P. teres* were the most common species in 68% and 24% of paddocks, respectively (Table 1). Two or three RLN species were found together in 18% of paddocks, with the most common combination being *P. neglectus* and *P. teres* (13%). RLN was not detected in 10% of paddocks. Of those infested with RLN, 48% had population densities with the potential to cause yield losses of between 15-50% in wheat. In 18% of paddocks, growers may not have seen visual effects in the crop, but RLN populations densities were sufficient to cause yield losses of up to 15%. Only 24% of the 130 paddocks tested contained a low level of RLN, which would not impact yield but could increase to damaging levels in susceptible cropping sequences.

Figure 1 Occurrence of root lesion nematodes in paddocks surveyed during 2013 in WA (Map adapted from Pestfax Database DAFWA).



A number of paddocks visited in 2013 for diagnostic assessment had both *Rhizoctonia* and RLN. These are commonly found together in WA and in combination may be synergistic in causing yield losses.

RLN has the ability to desiccate over dry periods, re-hydrating when moisture becomes available. The nematodes then enter roots of available susceptible plants and continue their lifecycle. When summer and early autumn rains maintain a green-bridge of volunteer crop and pasture species, as occurred in a number of areas in 2013, RLN may have had the opportunity to multiply in the soil before crops were sown. In paddocks assessed by DAFWA Nematology in response to grower queries, late spray-out for susceptible pasture, green bridge or volunteer weeds and crop species, had occurred in most of the paddocks with conspicuous RLN damage.

Table 1 Severity of infestation, total number of paddocks infested and number of paddocks infested with each *Pratylenchus* species in each severity category from samples taken across the broadacre cropping zones of Western Australia in 2013 (April-Oct, n=130).

Severity of infestation[1]	Total paddocks	*P. neglectus*[2]	*P. teres*	*P. thornei*	*P. penetrans*	spp.[3]	No RLN
0	13 (10%)						13
1	31 (24%)	19	7	0	0	11	
2	24 (18%)	26	8	2	0	0	
3	53 (41%)	37	14	6	2	0	
4	9 (7%)	7	2	0	0	0	
Total with RLN	117 (90%)	89 (68%)	31 (24%)	8 (6%)	2 (2%)	11 (8%)	

[1] Severity ratings; 0 = nil, 1 = < 0.2 /mL soil or 0- 200 /g dry root, 2 = 0.2-1 /mL soil or 200-1000 /g dry root, 3 = 1-10 /mL soil or 1000 - 10 000 /g dry root, 4 = > 10 /mL soil or > 10 000 /g dry root.
[2]Number does not sum to total number of paddocks sampled as some paddocks contained more than one RLN species.
[3]No adult Pratylenchus in sample, therefore species could not be confirmed.

If there are high to very high RLN levels in a paddock, >10 nematodes/mL of soil or >10 000 nematodes/g dry root (severity score 3 & 4), we recommend growing a MR-R crop or pasture for one to two cropping seasons to reduce nematode numbers to a level that is not yield limiting.

Robust resistance information is available for *P. neglectus* from glasshouse and field trials. For a paddock infested with high levels of *P. neglectus* we recommend growing lupin (cv Tanjil), field pea (cv Kaspa), serradella (cv Charano yellow, Yelbini yellow, and Margurita French) or sulla (cv Flamenco). We **do not** recommend growing wheat, barley, canola, chickpea, mustard, *Trifolium* spp., *Medicago* spp. or *Biserulla* spp. The resistance of various pasture cultivars to *P. neglectus* is shown in Table 2 and is particularly relevant for growers who rotate cereal and pasture.

Table 2 Resistance of pastures to *Pratylenchus neglectus* in a glasshouse trial[1]

Cultivar	Species	Resistance Rating[2]
Tanjil lupin	*Lupinus angustifolius*	R
Charano yellow serradella	*Ornithopus compressus*	R
Flamenco sulla	*Hedysarum coronarium*	R
Yelbini yellow serradella	*Ornithopus compressus*	R
Margurita French serradella	*Ornithopus sativus*	R
Cadiz French serradella	*Ornithopus sativus*	MR
Santorini yellow serradella	*Ornithopus compressus*	MR
Erica French serradella	*Ornithopus sativus*	MR
Hykon rose clover	*Trifolium hirtum*	MS
Electra purple clover	*Trifolium purpureum*	MS
Sceptre lucerne	*Medicago sativa*	MS
Mauro biserrula	*Biserrula pelecinus*	S
Casbah biserrula	*Biserrula pelecinus*	S
Caprera crimson clover	*Trifolium incarnatium*	S
Cefalu arrowleaf clover	*Trifolium vesiculosum*	S
Sothis eastern star clover	*Trifolium dasyurum*	S
CFD27 bladder clover	*Trifolium spumosum*	S
2002ESP4 biserrula	*Biserrula pelecinus*	S
Coolamon sub clover	*Trifolium subterraneum*	S

Machete wheat	*Triticum aestivum*	S
Nitro Plus Persian clover	*Trifolium resupinatum*	S
Frontier balansa clover	*Trifolium michelianum*	S
Dalkeith sub clover	*Trifolium subterraneum*	S
Caliph barrel medic	*Medicago trucatula*	S
Urana sub clover	*Trifolium subterraneum*	S
Santiago burr medic	*Medicago polymorpha*	VS
Prima gland clover	*Trifolium glanduliferum*	VS

[1]This table is adapted from V. Vanstone, A. Bhatti and M. Pei You (2008) The role of pastures in hosting Root Lesion Nematode (RLN, *Pratylenchus* neglectus) Northam Crop Updates (p28).
[2]R = resistant; MR = moderately resistant; MS = moderately susceptible; S = susceptible; VS = very susceptible

Limited information is available on the resistance of crops to *P. teres*. However, lupins are generally resistant, whilst wheat, barley and canola are generally susceptible.

In 2013, *P. penetrans* caused visible symptoms in paddocks growing canola and pasture. Crops that are resistant to *P. penetrans* are often highly susceptible to *P. neglectus* or *P.teres* highlighting the importance of knowing which species of RLN is present, as management of one RLN species may be causing an increase in another. Limited glasshouse and field trials suggest that barley is the most resistant crop to *P. penetrans* and may be the best crop to grow in highly infested areas. Lupins and chickpeas are the most susceptible crops and should not be grown.

Resistant crops reduce nematode numbers and may allow a tolerant wheat crop to be planted in the future. Paddocks can be sampled at the end of the season to determine if RLN populations have been sufficiently reduced. It is important when planting resistant crops to ensure that susceptible weeds and volunteers are completely removed as, even at low densities, these may provide enough roots for RLN to multiply and remain at damaging levels. Do not sow susceptible crops where RLN populations are at damaging levels. Where there are low or moderate levels of RLN in a paddock then resistant crops, or tolerant cultivars of a susceptible or moderately resistant crop, may be suitable (refer to Crop Variety Sowing Guides). However, susceptible and moderately resistant crops are likely to increase RLN populations and adversely affect yield of subsequent crops.

The importance of crop selection to manipulate RLN levels was demonstrated at a trial site in Esperance, 2013 (Table 3). In areas planted with serradella and lupin there was a decrease in *P. teres* levels and in areas planted with a more susceptible canola crop there was an increase in *P. teres* numbers. This demonstrates the effectiveness of crop selection to control RLN populations and highlights the potential of pasture to reduce nematode levels.

Table 3 *Pratylenchus teres* multiplication rate at a trial site in Esperance (2013). Canola was planted to increase and lupin to decrease RLN levels and serradella was planted around the trial site to decrease RLN outside the trial.

Crop	Beginning of season (*P. teres* /mL soil)	End of season (*P. teres* /mL soil)	Multiplication rate
Canola	4	7	1.75
Lupin	5	2	0.40
Serradella	4	1	0.25

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