ROOT LESION NEMATODE

Key points

- Root lesion nematodes (RLN) are microscopic worm-like animals that extract nutrients from plants causing yield loss.
- Common examples of susceptible crops are wheat, canola, chickpea and mustard.
- Rotations can effectively keep major RLN species to a minimum (e.g. narrow-leafed lupin, faba bean, field pea).
- Select resistant crops or varieties once the predominant RLN species present has been identified.
- Sow early where possible to “get ahead” and maximise yield.
- Manage fertility to maximise nutrition, particularly early in the growing season.
- Control volunteer hosts and weeds during late summer/early autumn and in break crops.

Background

Root lesion nematodes (RLN) are microscopic worm-like animals that use a syringe-like “stylet” to extract nutrients from the roots of plants (figure 1), such as wheat and canola. *Pratylenchus neglectus* and *P. thornei* are the most common RLN species in Australia, although populations of *P. teres* and *P. penetrans* are also found in Western Australian soils where they have been shown to cause significant yield losses. Overall, RLN’s affect all cropping regions of southern Australia, and are an increased risk in areas where minimum tillage has been adopted. Under conventional tillage operations, disruption of dry topsoil is sufficient to kill many RLN’s over-summering in a “dehydrated” state.

Commercial pre-season testing of soil by the Predicta-B™ root disease testing service determines levels of *P. neglectus* and *P. thornei* present using a DNA detection technique. Currently, this test is limited in its ability to detect levels of *P. penetrans* and *P. teres* in the soil, and any results from Western Australian soils using Predicta-B™ should be confirmed by traditional laboratory extraction and microscopic examination. During the season, plants with suspected RLN infections should be sent to a laboratory for extraction and identification.

Symptoms and detection

Nematode symptoms are commonly confused with nutritional or other disease problems so due care is recommended when diagnosing problematic areas. Above ground crops appear patchy with unthrifty and/or yellowed plants, not unlike the symptoms of water or nitrogen deficiency (figure 2). Below ground early infection symptoms show brown root discoloration, with fewer and shorter root branches (figure 3). In severe cases, plants are easily pulled from the ground as a result of root destruction.

**Figure 1**: Microscope image of a root lesion nematode. Notice the syringe-like “stylet” at the head end, which is used for extracting nutrients from the plant root. This nematode is less than 1 mm long. (Photo by Sean Kelly, DAFWA, Nematology.)

**Figure 2**: Patchiness in crop caused by RLN. (Photo by Vivien Vanstone, DAFWA, Nematology.)
Management

Prior to the growing season, RLN’s are best managed by ensuring volunteer host crops and weeds are kept to a minimum, and resistant crop varieties are seeded where possible (table 1). Crops that are not susceptible to RLN (e.g. narrow-leafed lupin, faba bean, field pea and triticale) should be used as a break-crop where a medium threat is detected. While some of these suggested break-crops are susceptible to *P. penetrans*, it is *P. neglectus* that is most prevalent in crops and should be taken into consideration first. If RLN levels are high it may be necessary to use two consecutive resistant crops to reduce numbers sufficiently. Early sowing also allows the crop to establish a solid root system before RLN’s can have a significant effect, and good nutrition is very much related to this.

**Table 1:** Susceptibility of various crops to the most common and yield limiting species of RLN.

<table>
<thead>
<tr>
<th>RLN species</th>
<th>Susceptible</th>
<th>Moderately susceptible</th>
<th>Resistant</th>
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<tbody>
<tr>
<td><em>P. neglectus</em></td>
<td>wheat, canola, chickpea, mustard</td>
<td>barley, oat, medic, durum wheat, common vetch</td>
<td>field pea, narrow-leafed lupin, faba bean, triticale, safflower</td>
</tr>
<tr>
<td><em>P. thornei</em></td>
<td>wheat, chickpea, vetch</td>
<td>barley, canola, mustard</td>
<td>field pea, lentil, triticale, faba bean, lupin, oat,</td>
</tr>
<tr>
<td><em>P. teres</em></td>
<td>wheat, barley, oat, canola</td>
<td>narrow-leafed lupin, chickpea, durum wheat, triticale</td>
<td>unknown,</td>
</tr>
<tr>
<td><em>P. penetrans</em></td>
<td>wheat, oat, field pea, faba bean</td>
<td>barley, canola</td>
<td>unknown,</td>
</tr>
</tbody>
</table>

*Results for *P. teres* and *P. penetrans* are based on preliminary trials and from observations of samples submitted to AGWEST Plant laboratories. Results from further testing will be presented in future DAFWA publications.*

Further reading and references

Vanstone V (2007) Root Lesion and Burrowing Nematodes in Western Australian cropping systems. Department of Agriculture and Food, Western Australia Bulletin 4698. (online)


MacLeod B, Vanstone V, Khangura R and Beard C (2008) Root disease under intensive cereal production systems. Department of Agriculture and Food, Western Australia Bulletin 4732. (online)

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