SOUTHERN
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GRDC GROWNOTES™

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

CANOLA

SECTION 8

NEMATODE MANAGEMENT

CEREAL CYST NEMATODES | ROOT-LESION NEMATODES

December 2015

SECTION 8

Nematode management

8.1 Cereal cyst nematodes

Only one race of cereal cyst nematode (CCN), *Heterodera avenae*, occurs in Australia and it causes cereal crop damage in South Australia, Southern NSW, Victoria and Western Australia.

Canola is a valuable break crop for CCN which affects wheat, barley, oat and triticale varieties and can cause yield loss of up to 80% in intolerant varieties.

Where CCN levels are moderate to high the best choice is two years of resistant and tolerant cereal or non-host crops such as canola.

While two years is generally accepted to reduce CCN to low levels, exceptions do occur. Monitoring paddocks and the use of diagnostic services to check CCN levels is encouraged. Less than five eggs per gram of soil can produce yield loss for intolerant cereals.

Key management strategies:

- Choose varieties with high resistance ratings, which result in fewer nematodes remaining in the soil to infect subsequent crops.
- Reducing RLN and CCN can lead to higher yields in following cereal crops.
- Healthy soils and good nutrition can, to some extent, ameliorate RLN and CCN damage through good crop establishment, and healthier plants recover more readily from infestation.
- Observe crop roots to monitor development of symptoms.
- Weeds can host parasitic nematodes and control of host weed species and crop volunteers is important.

More information

GRDC Podcast

GRDC Fact Sheet: Managing cereal cyst and root lesion nematodes

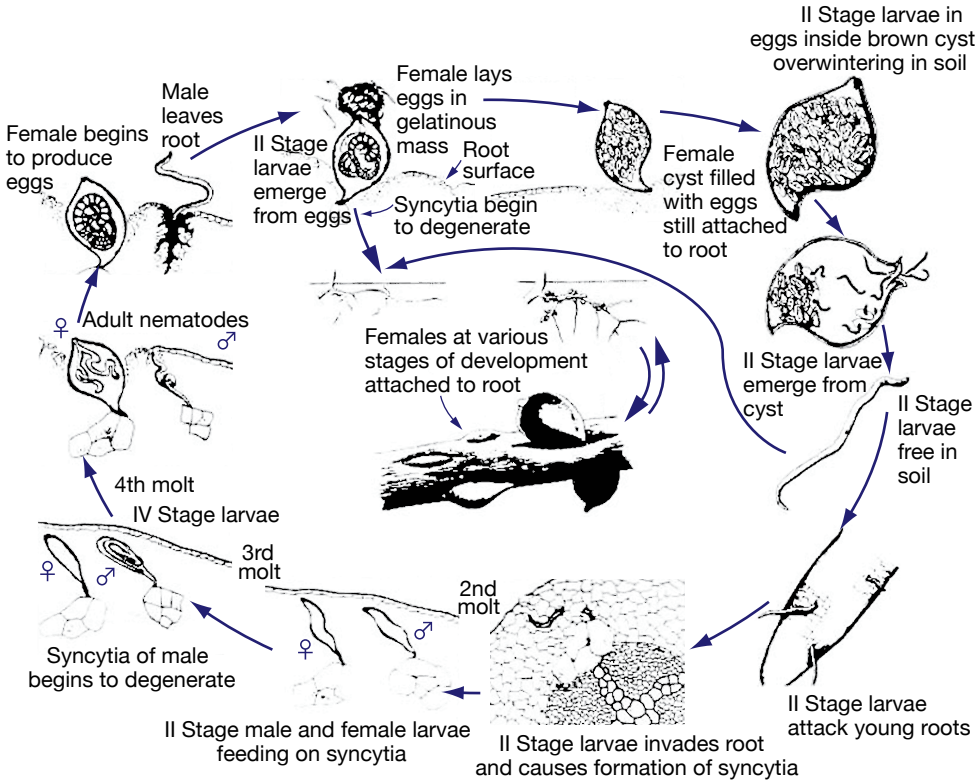

Figure 1: Cereal cyst nematode life cycle.

CCN has one life cycle per season (Figure 1) whereas RLN is polycyclic with three to five generations per year.

More information

Cereal Root Diseases

8.2 Root-lesion nematodes

Root-lesion nematodes (RLN) can have an impact on canola growth (Figure 2). However, following harvest, levels of the RLN *Pratylenchus neglectus* (*Pn*) have been found to decline rapidly, due to the release of isothiocyanates from the decomposing root tissue. Sulfur-deficient or stressed crops are more likely to host increasing nematode numbers during the season and have less effect on their decline at the end of the season. [1]

The hosting ability of canola is low–medium for *P. thornei* (*Pt*) and medium–high for *Pn*.

Testing soil is the only reliable way to determine whether RLN are present in a paddock. Before planting, soil tests can be carried out by PreDicta B (SARDI Diagnostic Services) through accredited agronomists to establish whether crops are at risk and whether alternative crop types or varieties should be grown. Growing-season tests can be carried out on affected plants and associated soil; contact local state departments of agriculture and PreDicta B. [2]

More information

Managing root lesion nematodes: how important are crop and variety choice?

GRDC Tips and Tactics: Root-lesion nematodes

[1] L. Serafin, J Holland, R Bambach, D McCaffery (2005) Canola: northern NSW planting guide. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0016/148300/canola-northern-NSW-planting-guide.pdf

[2] GRDC (2015) Root-lesion nematodes. GRDC Tips and Tactics, February 2015, http://www.grdc.com.au/TT-RootLesionNematodes

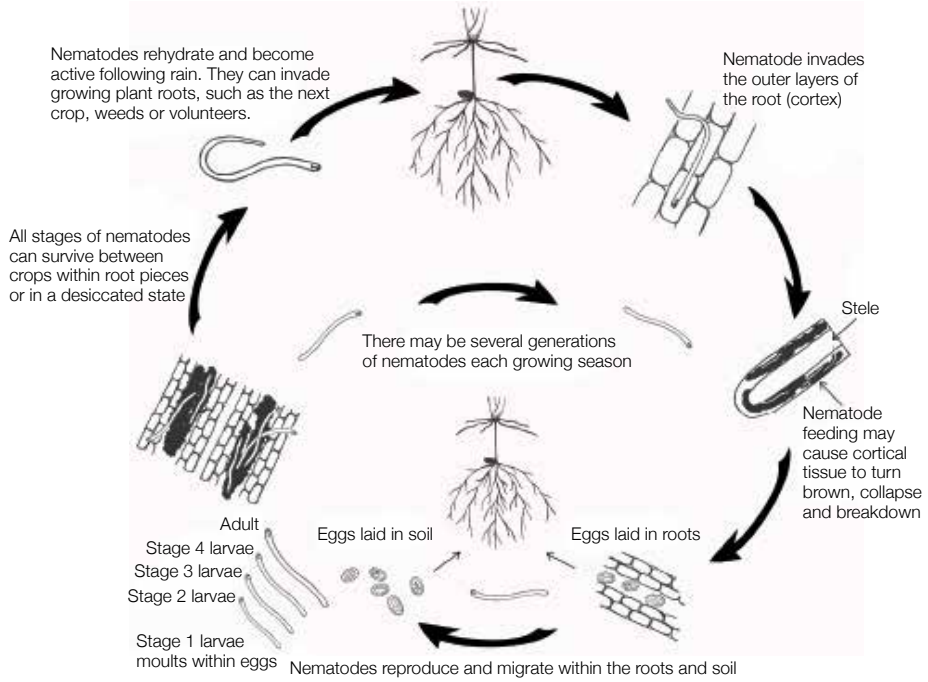

Figure 2: Disease cycle of root-lesion nematode. Adapted from: GN Agrios (1997) Plant pathology, 5th edn. (Illustration by Kylie Fowler)[3]

8.2.1 What are nematodes?

Nematodes (or roundworms) are one of the most abundant life forms on earth. They are adapted to nearly all environments. In cropping situations, they can range from beneficial to detrimental to plant health.

The RLN are a genus (*Pratylenchus*) of microscopic, plant-parasitic nematode that are soil-borne, ~0.5–0.75 mm in length and will feed and reproduce inside roots of susceptible crops or plants. Of the two common species of RLN in the northern grains region, *Pt* and *Pn*, the former is often described as the cereal and legume RLN. [4]

Figure 2 is a simplified chart highlighting that the critical first step in the management of RLN is to test the soil and determine whether there is a problem to manage. Where RLN are present, growers should focus on planting tolerant wheat varieties and on increasing the number of resistant crops or varieties in the rotation. [5]

[3] GRDC (2015) Root-lesion nematodes. GRDC Tips and Tactics, February 2015, http://www.grdc.com.au/TT-RootLesionNematodes

[4] B Burton (2015) Impact of crop varieties on RLN multiplication. GRDC Update Papers, 1 March 2015, http://grdc.com.au/Research-and-Development/GRDC-Update-Papers/2015/03/Impact-of-crop-varieties-on-RLN-multiplication

[5] B Burton (2015) Impact of crop varieties on RLN multiplication. GRDC Update Papers, 1 March 2015, http://grdc.com.au/Research-and-Development/GRDC-Update-Papers/2015/03/Impact-of-crop-varieties-on-RLN-multiplication

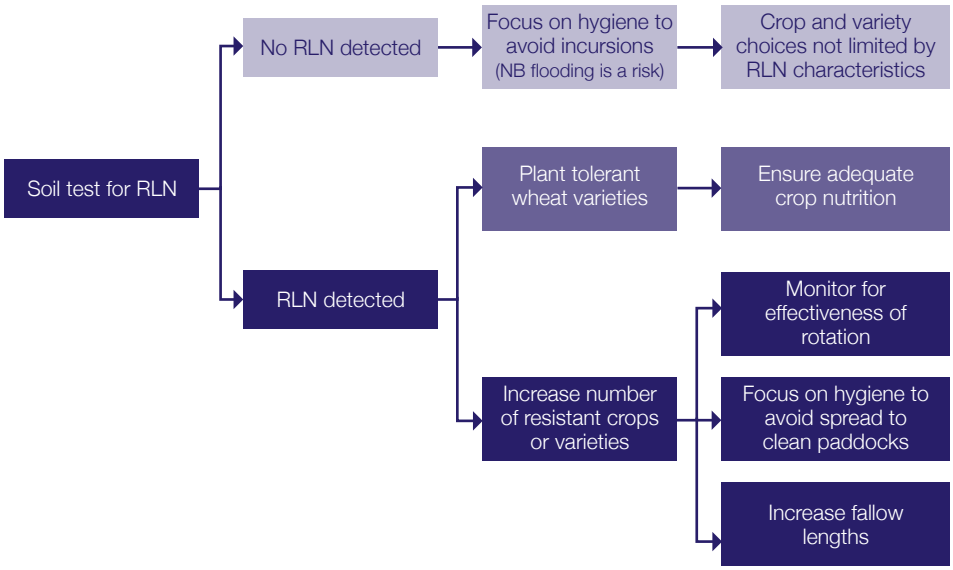

Figure 3: Management flow chart for root-lesion nematode.

More information

Variety choice and crop rotation key to managing root lesion nematodes

Impact of crop varieties on RLN multiplication

8.2.2 Management of RLN

- Nematicides. There are no registered nematicides for RLN in broadacre cropping in Australia. Screening of candidates continues, but RLN are a very difficult target with populations frequently deep in the soil profile.
- Nutrition. Damage from RLN reduces the ability of cereal roots to access nutrients and soil moisture and can induce nutrient deficiencies. Under-fertilising is likely to exacerbate RLN yield impacts; however, over-fertilising is still unlikely to compensate for a poor variety choice.
- Variety choice and crop rotation. These are currently the most effective management tools for RLN. Note that the focus is on two different characteristics: *tolerance*, which is the ability of the variety to yield under RLN pressure; and *resistance*, which is the impact of the variety on the build-up of RLN populations. Varieties and crops often have different tolerance and resistance levels to *Pt* and *Pn*.
- Fallow. RLN populations will generally decrease during a 'clean' fallow, but the process is slow and expensive in lost 'potential' income. Additionally, long fallows may decrease levels of arbuscular mycorrhizal fungi (AMF) and create more cropping problems than they solve. [6]

[6] B Burton (2015) Impact of crop varieties on RLN multiplication. GRDC Update Papers, 1 March 2015, http://grdc.com.au/Research-and-Development/GRDC-Update-Papers/2015/03/Impact-of-crop-varieties-on-RLN-multiplication