

Nematodes in Australian vineyard soils

Current topics in this Nematodes in Australian Vineyard soils VitiNotes series include:

1. Nematodes in Australian vineyard soils
2. A sampling method for nematode monitoring

Nematodes are microscopic roundworms. Some species have become parasitic pests of grapevines in Australia. Although they are difficult to detect and there is no clear solution to the problem of nematode infestations, routine monitoring and careful consideration of vineyard practices - especially when planting new vines - can help reduce yield losses.

Nematode infestation is verified by analysis of soil samples by a specialist laboratory. The risk of yield loss from nematodes is determined by the number of nematodes found in a soil sample of a given size.

Types of nematodes

The following Nematodes affect Australian grapevines:

- Root-knot nematode (*Meloidogyne spp.*)
- Citrus nematode (*Tylenchulus semipenetrans*)
- Root lesion nematode (*Pratylenchus spp.*)
- Dagger nematode (*Xiphinema spp.*)

OCCURRENCE, SYMPTOMS AND RISK OF YIELD LOSS

Root-knot Nematode:

The presence of root-knot nematodes in the roots induces galls that restrict nutrient and water uptake and vine growth, while also facilitating fungal infections.

Root-knot nematodes are the most significant nematode pest of Australian grapevines and can cause up to 60% yield loss.

Risk of yield loss ranking	Nematode population density (Nematodes/ 200ml soil)
Low	<40
Medium	40-400
High	>40

Citrus Nematode:

This nematode species is quite common and damaging in medium-textured soils in areas where grapes are grown in association with citrus, or where vineyards are established on old citrus orchard sites. Citrus nematodes cause stunting of grapevines and general deterioration of roots.

Risk of yield loss ranking	Nematode population density (Nematodes/ 200ml soil)
Low	<100
Medium	100-800
High	>800

Root Lesion Nematode:

This species can cause poor growth in grapevines, with significant suppression of root and shoot growth.

Root lesion nematode has been found in soil and root samples from vineyards of all major viticultural regions of Australia.

Risk of yield loss ranking	Nematode population density (Nematodes/200ml soil)
Low	<40
Medium	40-400
High	>40

Dagger Nematode:

Dagger nematodes can spread a number of viruses, some of which can affect grapevines, eg. grape fanleaf virus. This nematode-virus link causes significant economic damage in Californian vineyards.

Dagger nematode is present in all major grape growing regions of the world, including Australian grape growing areas. Dagger nematodes are fairly common, but their economic importance in Australian vineyards is less than that of other more damaging nematodes.

Testing soil for nematodes

Vineyards should be routinely monitored for nematodes. The information collected can be used to make informed vine management decisions and results can be compiled with other vineyards in the area to give a regional picture. For a full description of sampling methods see the Viti-note *A sampling method for nematode monitoring*.

Development of a DNA test for nematodes

An easy and accurate commercial DNA test for root-knot and other nematode species is currently under development. The test aims to also allow identification of a range of soil-borne organisms, including nematodes from a single soil sample.

MANAGING NEMATODE INFESTATIONS

Chemical controls (nematicides)

There are limited chemicals registered for viticulture use that are effective against nematodes. Only nematicides registered for application to grapevines can legally be used and should only be applied when infestation levels are high enough to justify treatment.

Application should be concentrated to the areas of the vineyard where nematode populations are highest – usually along the vine rows, rather than in the inter-row strip.

Resistant rootstock varieties

The best vineyard soil, in terms of nematodes, is one that testing shows is free of these pests. However, this is not always the case so resistant rootstocks can be used to help protect vines from some species of nematodes, particularly root-knot nematode.

If nematodes already exist in the soil prior to vineyard establishment, or if there is any potential for these pests to become established in the future (nematodes can be spread on grapevine planting material from region to region) rootstocks such as Ramsey can be safely planted. The rootstock variety 3309C should be avoided if nematodes are a problem because it has a low tolerance to these pests. However, when considering rootstocks the characteristics imparted to grafted vines by each rootstock variety should also be taken into account, as the viticultural impacts may not be desirable for a given vineyard situation. For example Ramsey often imparts high vigour to vines, which could be undesirable or require additional management on inherently high vigour sites.

Biological control agents

A wide range of fungi, bacteria and invertebrates parasitise, or prey on, nematodes. Potential biological control agents include the bacterium *Pasteuria penetrans*, which occurs naturally in many soils and may provide some natural suppression in long established vineyards.

Healthy soils

Promoting well-structured soils, rich in organic matter will lead to a diverse soil ecology, which may allow for the natural suppression of a range of pest organisms, including nematodes. The common practice of incorporating organic matter into the soil in the inter-row area, such as slashing a seasonal cover crop, may have minimal or no impact on nematode population density under the vine row.

Cover Crops

Some cover crop species discourage the presence of certain nematodes. However, research has shown that growing these plants in the inter-row area may be ineffective or have limited impact in the management of nematodes as, in general, there is a low density of vine roots in the inter-row strip. Growing suppressive plants closer to the vine row may be more effective, but this is to be evaluated.

Reference

Stirling G, Nicol J, Reay F 2002 Advisory services for nematode pests- Operational guidelines. Rural Industries Research and Development Corporation.

Available at:

www.rirdc.gov.au/reports/Index2-96-00.htm

Further information

Product or service information is provided to inform the viticulture industry about available resources, and should not be interpreted as an endorsement.

Useful references on this topic include:

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Contacts for further information

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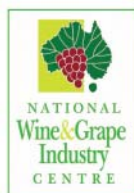
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