viti-notes

[pests and diseases]

Research to Practice

Nematodes in Australian vineyard soils

Viti-note Summary:

- Types of nematodes
- Occurrence and description
- Testing soil for nematodes
- Development of a DNA test for nematodes
- Managing nematode infestations
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Figure 1. Ring nematode - Criconemella xenoplax *(Image courtesy of Dr Greg Walker)*

Nematodes are microscopic roundworms. Some species have become parasitic pests of grapevines in Australia. Although they are difficult to detect and there is not a 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 are thought to be the most important in Australian vineyards:

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

Other topics in this Viti-Notes series include:

- *Nematodes in Australian vineyard soils*
- Nematodes: A sampling method for nematode monitoring

Occurrence and description

Root-knot nematode: The presence of root-knot nematodes in the roots induces galls that restrict nutrient and water uptake and growth of the vine, as well as facilitate fungal infections. Root-knot nematodes are the most significant nematode pest of Australian grapevines and may cause up to 60% yield loss.

Dagger nematode: Dagger nematodes can spread a number of viruses, some of which can affect grapevines, e.g. grapevine fanleaf virus. This nematode-virus link causes significant economic damage in California vineyards. Dagger nematode is present in all major grapevine-growing regions of the world and in some 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.

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.

Root-lesion nematode: Some 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.

Ring nematode: Some ring nematodes are widely distributed, feeding on root cortical cells and root tips, leaving vines debilitated.

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 those of other vineyards in the area to give a regional picture. For a full description of sampling methods see the Vitinote 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 aim is that the test will also allow identification of a range of soil-borne organisms, including nematodes, from a single soil sample.

Managing nematode infestations

Chemical controls

Chemicals effective against nematodes (nematicides) which are registered for use in viticulture are limited. Only those nematicides registered for application to grapevines can legally be used, and are best applied only if infestation levels are high enough to justify treatment. Application should be concentrated in the areas in the vineyard where nematode populations are highest – this is 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 soil testing shows is free of these pests. This is not always the case however, 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, e.g. 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 which might 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 might 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 might, however, 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 might 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 has not yet been evaluated.

Acknowledgement

The Australian Wine Research Institute would like to acknowledge:

- Cooperative Research Centre for Viticulture (CRCV) and all involved in the VitiNotes series (1996 - 2006).
- Dr Gregory Walker (South Australian Research and Development Institute) in the preparation of this document.

Further information

Training

For regional specific training in pest and disease control, the AWRI is running Research to Practice: Integrated Pest Management for changing viticultural environments.

Contact

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Agrochemical information

Agrochemicals registered for use in Australian Viticulture - updated annually.

Visit www.awri.com.au for the latest version.

Useful references

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For images of grapevine symptoms visit www.winetitles.com/diagnosis/index.asp.

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