

## NEMATODES IN GRAPES

### COMMON NAME; SCIENTIFIC

**ROOT KNOT NEMATODES: *MELOIDOGYNE INCognITA, M. JAVANICA, M. ARENARIA, AND M. HAPLA***

**DAGGER NEMATODES: *XIPHINEMA AMERICANUM AND X. INDEX***

**LESION NEMATODE: *PRATYLENCHUS VULNUS***

**RING NEMATODE: *MESOCRICONEMA (=CRICONEMELLA) XENOPLAX***

**CITRUS NEMATODE: *TYLENCHULUS SEMIPENETRANS***

Of the many genera of plant parasitic nematodes detected in soils from California vineyards, root knot, dagger, citrus, lesion, and ring nematodes are the most important ones. Other nematodes associated with grape in California include stubby root nematode, *Paratrichodorus minor*; spiral nematode, *Helicotylencus pseudorobustus*; and needle nematode, *Longidorus africanus*. Of these, only needle nematode has been found to be damaging to grapes in California.

Pin nematode, *Paratylenchus hamatus*, is frequently found in vineyards but is not thought to cause damage to this crop.

### DAMAGE

Plant parasitic nematodes feed on roots, reducing vigor and yield of the vine usually in irregular patterns across the vineyard.

Damage patterns are frequently associated with soil textural differences. Root knot nematodes penetrate into roots and induce giant cell formation, usually resulting in root galls. Giant cells and galls disrupt uptake of nutrients and water, and interfere with plant growth. The dagger nematode, *Xiphinema index*, can cause yield reduction in some varieties, but is more important for its transmission of grapevine fanleaf virus. *Xiphinema americanum*, another species of dagger nematode, weakens vines by feeding near the root tip and is a specific vector of yellow vein virus (also known as tomato ringspot virus or 'Unfruitful Carignane').

### FIELD EVALUATION

It is important to know the nematode species present and to estimate their approximate population. If a previous orchard or vineyard had problems caused by nematodes that are listed as pests of grape, population levels may be high enough to cause damage to the young vines.

If nematode species have not previously been identified, take soil samples and send them to a diagnostic laboratory for identification. The best time to sample differs according to region, type of nematode, and variety of grapes. Nematode populations, also vary by bloom date and harvest times. In the San Joaquin Valley, *X. index* populations are most likely to be detected in November through February. Root knot nematode numbers build through the summer and are more likely to be found at any time of the year.

To get the greatest numbers and the most reliable indication of nematode populations, irrigate three days before sampling (or wait for three consecutive days of rain). Collect soil samples from 0 to 18 inch depth between the dripper spot and the vine trunk (as long as the emitter is halfway between the two vines). Roots encountered during sampling should be included.

Divide the vineyard into sampling blocks that are representative of cropping history, crop injury, or soil texture. Take samples of soil and symptomatic roots from around five randomly chosen vines per block, mix them thoroughly, and make a composite sample of about 1 quart (1 liter) for each block.

Place the samples in separate plastic bags, seal them, and place a label on the outside with your name, address, location, the previous crop/variety, and the current variety grown or that you intend to grow. See UC/ANR Publication 3343, *Grape Pest Management*, 2nd edition, for more details). Keep samples cool (do not freeze), and transport as soon as possible to a diagnostic laboratory. Look for nematode symptoms in the vineyard late in the growing season to prepare for future management.

## MANAGEMENT

**Cultural practices.** A fallow period of a vineyard site to significantly reduce the effects of *X. index* and grapevine fanleaf virus, it is necessary to forgo planting grapes for more than 10 years. This period of time is required to allow old roots to decompose and nematode numbers to decrease. This will increase the length of time before a new vineyard exhibits virus symptoms, but **will not prevent reinfestation.**

Try to rotate sites with crops or plant cover crops that are not hosts to nematodes. No single rootstock is resistant to all root knot nematodes and there are numerous other nematodes of concern. Broadest resistance is present in Ramsey, Freedom, Harmony, 1616C. Several "Phylloxera" rootstocks of European origin (Kober 5BB, SO4, Teleki 5C, 1103 Paulsen, 101-14Mgt, 140 Ru, Schwarzmann and to some extent 110R). Most promising are rootstocks in the new series GRN 1 through GRN 5 and possibly RS 3 and RS9.

Selection of a rootstock is an artful science, enhanced by field experience because of rootstock growth responses to environmental conditions, their limited breadth of resistance and to management. Consult your farm advisor, nursery person and other growers (and/or wineries) for input on the appropriate rootstock selection for a site and the cultural practices associated with each rootstock.

Manures, composts and other soil amendments can improve soil conditions, vine vigor and frequently reduce the effect of nematode infestation. To reduce stress on vines, take measures to prevent soil compaction and stratification, to improve soil tilth and drainage, and to control other pests.

Proper irrigation and fertilizer application also reduce stress on vines and help lessen the effect of nematodes especially root knot species.

**Chemical.** Vineyards established in pre-plant fumigated ground are known to have generally improved growth and yields compared to those planted on non-fumigated ground. Contact your PCA or farm advisor to discuss the most effective application method and timing when making a post-plant application.

### Current California Registered Materials (March 2013 DPR site code 1014)\*

Azamax	azadirachtin	III	foliar
Debug Turbo	azadirachtin & oils	III	drip
Ditera DF	<i>M. verrucaria</i>	III	drip
MeloCon WP	<i>P. lilacinus</i>	III	drip or inject
Quillaja Extract	Quijilla extract	II	soil or foliar
Metam CLR 42%	metahm sodium	I	fumigant
Methyl Bromide 100 (only existing stock)	methyl bromide	I	commodity fum only
Telone C-15	1,3 DCP & chloropicrin	I	fumigant
Terr-o-Gas 98	methyl bromide	I	fumigant
Tri-Cal Trione II (only existing stock)	1,3 DCP	I	fumigant
Chloropicrin	trichloro(nitro)methane	I	fumigant
Movento	spirotetramat	III	foliar
ProGuard	thyme oil	III	drip-foliar

\*Consult with County Ag Commissioner office, as this can change any time.  
Registered Trade Names.

Adapted from Grape Pest Management Guidelines, UCIPM [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu)