

Nematode Pests of Grapes in the North Central Region

Root-knot nematode, dagger nematode, lesion nematode, ring nematode

- Nematode damage can be minor to moderate in vineyards.
- Damage is likely to be seen during the first few years following planting.
- Root-lesion nematodes penetrate into the roots, tunneling and feeding in the root tissues causing permanent damage to the vine. This activity predisposes grape roots to invasion by other plant pathogens.
- Nematodes can currently be controlled before and after planting using chemicals.

Plant-parasitic nematodes are microscopic roundworms that live in the soil and feed on plant roots. In addition to being directly damaging to grapevine roots, some nematodes are important as vectors of viruses. Nematode damage can also predispose roots to root rots. In newly established vineyards, nematodes may be responsible for poor establishment and weak growth of young vines, especially on sandy sites. Nematodes seldom kill vines, but cause a steady decline in vigor. Above-ground symptoms are not characteristic, e.g., poor growth, low yields, and “off” color. Infected plants are more susceptible to environmental and other stresses. Symptoms may also resemble certain nutrient deficiencies or virus diseases. Below-ground symptoms are poor root development, dark-colored root lesions, and stunting or death of feeder roots. Root-knot nematodes characteristically cause small swellings (galls) on young feeder roots or secondary roots. Nematodes are spread via infected planting material or movement of soil on farm equipment and in run-off or irrigation water. Once established in a vineyard, nematode infestations tend to be permanent, so care must be taken to prevent new infestations.

Dagger nematodes are widely distributed in IL. The nematode transmitted virus, peach rosette virus is a problem in some vineyards in MI and the current strategy is to pull out the vineyard and fumigate the land (Telone) and replant. Vineyards are typically not tested for nematodes unless vines are unthrifty. This often occurs after easy solutions are ruled out or if symptoms of viruses are evident suggesting the presence of nematodes. Submission of soil samples for nematode analysis prior to planting is essential, and should be done whenever symptoms suggest a potential for nematode infestation.

- **. Organophosphate nematicides currently used:**
 - fenamiphos (Nemacur 3)
 - Efficacy: Fair - Good
 - the only registered OP nematicide available in Michigan
 - the only non-fumigant nematicide registered for bearing vines
- **B2 carcinogenic nematicides currently used:**
 - dichloropropene (Telone II, Telone C-17) (fumigant)
 - Efficacy: Good - Excellent
 - soil fumigation equipment required
 - pre-plant only

- metam sodium (various) (fumigant)
 - Efficacy: Good
 - must be diluted three to one or more with water
 - soil fumigation equipment required
 - pre-plant only.

- **Non-chemical alternatives currently used:**

- Raising a nematode-suppressing cover crop in vineyard before new vineyard establishment
- Work on soil organic matter and overall soil quality

PIPELINE:

- Misc. soil amendments and biological agents

"To do" list for nematodes:

Research needs:

- Replanting strategies to minimize the impacts of nematodes in new vineyards.
- Resistant or tolerant varieties, rootstocks
- Diagnostic techniques, such as PCR, to determine if dagger nematodes harbor viruses.
- Companion plantings in replant situations to build soil quality, decrease harmful nematode populations, increase natural enemies
- Necessity for post-plant nematicides, as well as other post-plant nematode control procedures
- Nematode distribution surveys (to know what's out there)

Regulatory needs:

- Clean plant source certification
- Keeping NemaCur registered, or getting other effective compounds labeled on grapes (post-plant)

Education needs:

- Education on how to deal with nematode-infested vineyards (shallow and deep fumigation, how and when to collect samples, etc.)
- Choosing reputable nurseries for vines
- Necessity of knowing type of nematodes present at a location (sending in samples to Diagnostics, previous planting history, etc.);
- Necessity of nematode management pre-planting and not post-planting, along with what to do when you are planting;
- Minimizing conditions in vineyards that encourage nematodes (pH, metals, eliminating broadleaf and other weeds, etc.)

Table 5. Efficacy Ratings¹ of Pest Management Tools for the Major Nematode Pests of Grapes in the North Central Region.†

Management Tools	Nematodes in Vineyards			
	Root knot nematode	Dagger nematode	Lesion nematode	Ring nematode
Organophosphates registered in MI				
Fenamiphos (Nemacur 3)	G	F	G	F
Carbamates registered in MI				
None				
Alternative products registered in MI				
1,3-D (Telone)	E	G	E	G
Methyl bromide (Nursery Stock)	E	E	E	E
Metam sodium	E	G	E	G
Cultural Controls				
Cover crops	G	G	F	G
Soil Organic Matter	G		G	
Nematode free rootstocks	E		E	

¹ Efficacy rating symbols: E = excellent, G = good, F = fair, P = poor, N = Not labeled or no activity against this pest.

† From Michigan State University 2007 Fruit Management Guide (Bulletin E-154)