***Fact Sheet Template***

# General Information

## Epidemiology and Management of Plant-parasitic Nematodes in Winegrapes

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## Completed project in 2005

## Abstract

## Nematodes are a natural component of the rhizosphere, the ecosystem comprising the space around and within a plant’s root system. These often microscopic animals are one of the world’s most diverse groups of organisms, occupying habitats ranging from the tropics to deep sea trenches to the polar ice caps. Nematodes are the most numerous multicellular animals on earth. A handful of soil may contain thousands of these so-called roundworms, many of them parasites of insects, plants or animals.The nematode species that feed in and around grapevine plants are generally too small to see with the naked eye. They are, however, ubiquitous in the vineyard, and it is most unusual to find a soil sample that does not contain at least some nematode species.

## In addition to vectoring important virus diseases (Grapevine Fanleaf Virus, for example), nematodes are one of many factors that must be considered when evaluating the cause of poor vineyard performance. Like other grapevine pests and pathogens, nematodes can be considered opportunistic organisms, with harmful populations becoming established around vines that are under stress. This stress may be the result of management practices and/or other biological pressure. Any event that weakens the plant renders the vine more susceptible to the establishment of harmful nematode populations. Parasitic nematodes impact grapevines by reducing root efficiency and acting as a sink for photosynthates. Not only do nematodes reduce root efficiency and vector harmful viruses, but their activities render otherwise healthy vines susceptible to root-colonizing pathogenic fungi, such as Pythium, Fusarium, Rhizoctonia and Phytophthora. The most important nematode parasites of grapevines are root-knot (Meloidogyne spp.), dagger (Xiphinema index), lesion (Pratylenchus vulnus) and ring (Criconemella xenoplax). There are several other species that are mildly parasitic, including pin and dagger (Xiphinema americanum), but these are not considered to cause significant root damage and yield reduction.

## Root-knot and lesion nematodes are endoparasites: they invade the roots and live within the root tissues, thus disrupting the water and nutrient-conducting function of the roots. Ring and dagger nematodes have similar life cycles except they feed only at the root surface (ectoparasites) via an epidermal-penetrating stylet and cause only minor disruption to the internal structure of the roots. Reports suggest that root-knot and lesion nematodes cause the greatest physical damage to grapevine roots, resulting in up to 20 percent yield reductions in experimental plantings in California. In comparison, minimum yield reductions of 5 to 15 percent were recently estimated for nematode-infested vineyards in the Murray-Darling basin of Australia (Walker and Stirling, 2008).

## Field experiments were established in May 2002 (Trial 1) and May 2003 (Trial 2) in a vineyard in the Yakima Valley that was replanted in nematode infested soil after the 1996 freeze. Vines were slow to establish and soil tests revealed populations of six different plant-parasitic nematode genera.

## Changes to standard production practices and new grower recommendations:

All applications except Enzone were made by placing each of the nematicides in cups suspended under each drip emitter in plots (2 emitters per vine). Irrigation water, delivered for 3 hours (1.5 gallons), diluted the nematicide and delivered it to the root zone. Enzone was mixed in a bucket with 3 gallons of water and allowed to slowly drain into the soil at each emitter. Soil samples were collected for nematode analysis in April (pre-treatment), August and after harvest each year. Yield estimates were made by harvesting and weighing fruit in each plot. There was a great degree of variability in the distribution of nematodes and in vine vigor across the vineyard. Because of this variability, treatment differences between population densities of nematodes and of fruit yields often were not significantly different. However, in some cases both significance and consistent trends were observed.

## Production Tips: Nemacur was the most effective nematicide in this study. However, it will not be available after 2006. A nematicide is needed to replace Nemacur for treating nematode infestations in established vineyards. So far, Ditera appears to be the most promising bio-nematicide.

## Economic Impact: Nematodes are a significant threat to the economic health of vineyards with anywhere from 5-20% reduction in yield and/or vine establishment. This number represents a growers average profit from a traditional vineyard and as such a remedy for effectively controlling nematodes is required. As grapegrowing regions continue to respond to environmental improvements bio-nematicide controls are becoming increasingly preferred over synthetic applications.

## [Click here](https://docs.google.com/document/d/1L7TSXwusKlWKaPkXFjnEkqv1sxGJEurh/edit) to read the full technical report.

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**Desired Keywords or phrases: (please provide all related keywords)**

**Nematodes, epidemiology, biological control, biological management, Washington vineyards**

Related Research:

# Internal Database Notes:

**Project Length**: 1, 2, or 3 years

**Commodity/Crop**: Wine Grapes

**Area of Research (Technical Working Group)**: Viticulture

**Regional Application of Research**: Oregon and Washington irrigated winegrowing regions.