

CITRUS NEMATODES

The following edited excerpt is from the University of California Citrus IPM book:

“Nematodes are small worms that live in soil, water, and plant tissues. Some damage plants, other feed on fungi, bacteria, or other nematodes. The major species attacking citrus is the citrus nematode, *Tylenchulus semipenetrans*, which is present in about 50 to 60% of mature citrus orchards and can reproduce in all soil types. The host range includes citrus, grape, lilac, olive, and persimmon.

DAMAGE: Rootstock susceptibility, nematode population density, and the age and health of trees largely determine the damage caused by a citrus nematode infestation. Susceptible trees planted in lightly infested soil may grow for many years without apparent damage and then decline slowly. Resistant rootstocks generally do well even in heavily infested soils. If, however, a heavily infested orchard site is replanted with a susceptible rootstock without soil fumigation, the roots of the young trees will soon be heavily parasitized, tree growth will be stunted, and fruit production reduced.

Young citrus trees suffer more from a nematode infestation than mature trees, which can tolerate many of these small root parasites. Adverse effects become apparent when trees are already weakened by other stress factors, such as Phytophthora root rot or water excess.

The aboveground symptoms of a nematode infestation are difficult to diagnose. Reduced fruit size and yield or, in severe cases, twig dieback, and small leaves and fruit may be caused by nematodes but also symptoms caused by soil pathogens or adverse soil conditions. The below ground symptoms are similar to those caused by a Phytophthora infection: “dirty” appearance of the feeder roots and, in severe infestations, the lack of feeder roots. Often Phytophthora root rot and citrus nematodes occur together in roots, and both may contribute to the damage symptoms.

GUIDELINES FOR MANAGING NEMATODES

MONITORING: Before planting or replanting a citrus orchard, obtain a professional soil analysis; the analysis will help you determine the potential for nematode damage and plan a management strategy. In an established orchard, a soil analysis will confirm visible symptoms that may be present. Some laboratories collect samples, or you may have to do it yourself. Consult your farm advisor.

INTERPRETING SOIL ANALYSIS: Although it will vary greatly with soil moisture, soil type, and temperature, the number of nematodes in the soil, as determined by soil analysis, can give some indication about the damage potential of an infestation. Samples cannot provide an accurate prediction of yield at the end of the season since many other factors, including alternate bearing habit of citrus and other pest problems, may influence yield. A preplant treatment is recommended at all levels when replanting an orchard with either a tolerant or a susceptible rootstock. At low levels in an established orchard, a treatment is not economical, but you should continue sampling at least once a year to see if the population remains low. At medium levels, treatment may be advantageous if the site has a history of nematode damage. At high levels, a treatment can prevent substantial reduction in fruit size and yield, but healthy, vigorous trees can often tolerate high population without apparent damage. In both cases successful treatment requires precise and repeated applications. Available postplant nematicides are expensive; you have to weigh treatment costs and age and condition of the orchard as well as projected crop loss.

PREVENTION AND CONTROL: Before planting a citrus orchard, consider the cropping history of the site and the drainage from surrounding orchards. If the site has recently been cleared of citrus or other host plants, or if runoff from an infested orchard has entered the property, the soil is likely to be infested with the citrus nematode; it is a poor site for a new citrus planting unless a resistant rootstock is used or other management actions are taken.

Choosing a resistant or tolerant rootstock is a strategy, whether or not the soil is infested with nematodes. Trifoliate orange is tolerant but may eventually become infected as new biotypes of the citrus nematode develop. Where a resistant rootstock cannot be used, rotation to an annual crop for 1 to 3 years and subsequent fumigation can reduce the population of the citrus nematode so that young trees are better able to establish themselves. The rotation allows the decay of woody roots that harbor nematodes. For the most effective fumigation, carefully observe labeling instructions concerning land roots, dosages, and waiting periods between treatment and planting.

Good sanitation practices are important in preventing a nematode infestation. Buy your trees from a nursery that sells nematode-free material. Clean equipment thoroughly when moving into another orchard. Do not irrigate with runoff water from areas infested with nematodes.

Little is known about how to use cultivation and irrigation practices to prevent a buildup of nematode populations in an orchard. In general, any practices that favor root growth and reduce tree stress help trees cope better with nematodes. Nematode-trapping and parasitic fungi, predaceous nematodes, and soil mites, may play a significant role in reducing populations of the citrus nematode. Such natural enemies build up in many soils over time and are often found in substantial numbers along the surface of citrus feeder roots, suggesting that citrus nematodes might be more damaging if they were not present and that a substantial level of biological control occurs naturally. In general, loam soils high in organic matter have a greater diversity of natural enemies and high populations of individual species than sandy soils low in organic matter. Nematode-trapping fungi especially are remarkably widespread in mature citrus orchard soils. Nematicides, particularly preplant fumigants, largely eliminate these beneficial organisms.

Once you detect nematode damage in a citrus orchard, control options are limited. Postplant nematicides are available but are expensive and require precise and repeated application to be effective; you have to weigh projected loss against age of the orchard, infestation level, and treatment cost.”

TO SUMMARIZE: If ground to be planted is following citrus, grapes, olives, persimmons or has received runoff from established plantings of same, soil samples should be taken, analyzed, and a fumigation plan implemented. New trees going into ground not expected to harbor citrus nematode may give a growth response to fumigation regardless because the fumigant may also kill pathogenic fungi (e.g. phytophthora) Blanket fumigation is certainly the best preplant approach to controlling citrus nematode. However, strip fumigation may also be an option. Giving the young tree pathogen free soil during the critical developmental years is imperative. If in conjunction with strip fumigation, the non-fumigated soil can be maintained in a dry state for as long as possible, it will help minimize reinfestation and/or the rate at which it will occur. The use of nematode resistant rootstock will also contribute greatly to a trees' long life of top production.