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College of Agricultural, Consumer and Environmental Sciences

report on
PLANT
DISEASE

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DEPARTMENT OF CROP SCIENCES
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ROOT-KNOT NEMATODES

Root-knot, caused by the nematodes *Meloidogyne* spp., is an important disease of stone fruits in light soils and warm areas. Root-knot nematodes were first observed associated with peach in 1885 in Europe and in 1889 in the United States. At least four species, including *Meloidogyne incognita*, *M. javanica*, *M. arenaria*, and *M. hapla* have been reported to be important pathogens on stone fruits.

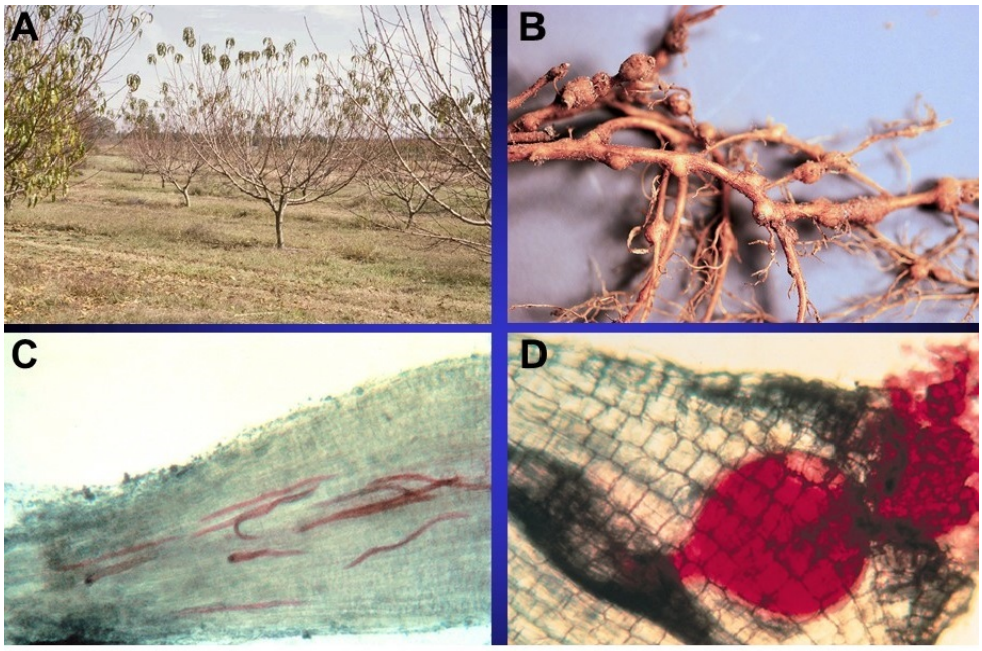

Figure 1. *Peach trees with root-knot nematodes.* (*Courtesy*: *A and B, Louisiana State University; and C and D, The American Phytopathological Society*).

Symptoms

Meloidogyne nematodes are soilborne pathogens and infect roots. Major symptom caused by root-knot nematodes is gall formation in the roots (Figure 1). As infection by the nematode progresses, the size of the galls and degree of root deformation increase. Gall size varies with the nematode species. Root-knot nematodes disrupt normal root growth and nutrient and water uptake. These changes result in an altered host physiology, reduced root and shoot growth, small shoot and root biomass, leaf chlorosis, low fruit yield, poor fruit quality, and sometimes tree death

Life cycle

Like other plant parasitic nematodes, root-knot nematodes have an egg stage, four larval (juvenile) states, and adults. Female nematodes lay eggs. The first molt occurs in the egg; second-stage juveniles

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hatch from eggs and penetrate root tissue just behind the root tip. The nematode migrates to the parenchyma tissue and form giant cells called syncytia. Once the giant cell is formed, the nematode feeds and enlarges into a sausage stage. The nematode proceeds through three molts before becoming an adult female. Preadult males undergo a complete metamorphosis within the fourth-stage cuticle and emerge as migratory, vermiform males. The female deposits 200 to more than 1,000 eggs in a gelatinous matrix outside the posterior region of her body. The life cycle of a root-knot nematode requires four weeks optimally or longer if the temperature and host environment are not favorable for nematode development.

Disease management

Precautions must be taken not to introduce infected materials into a new orchard. Rootstocks of peach with resistance to root-knot nematodes are available. Certified nematode-free rootstocks or seedlings should be used in new orchards.

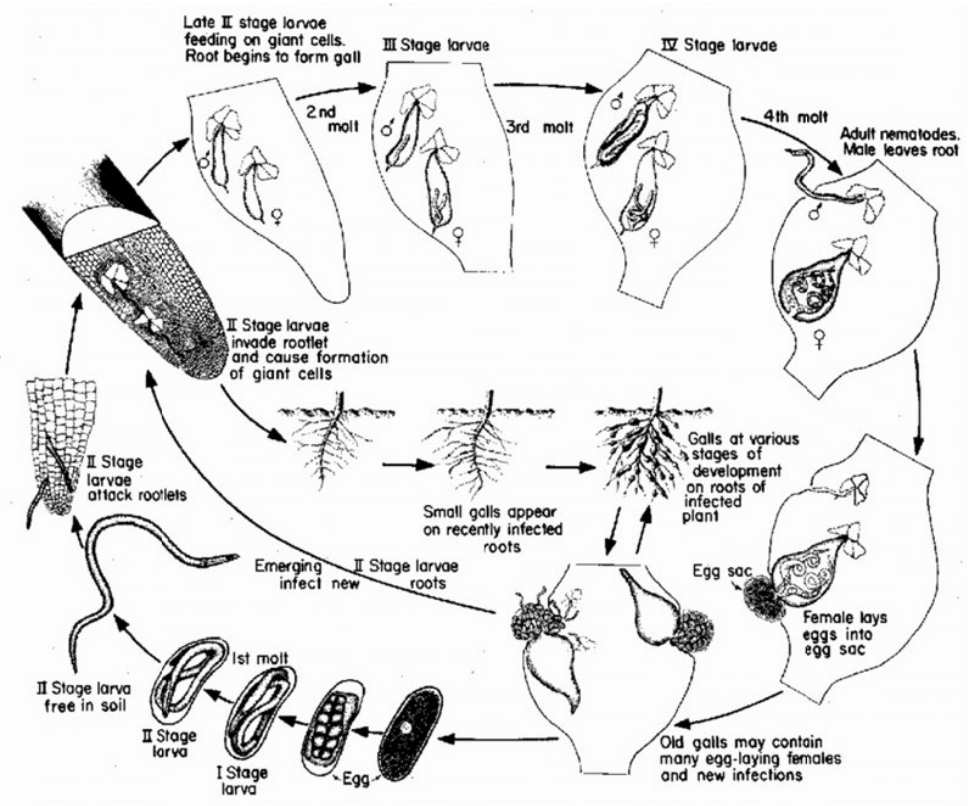

Figure 2. *Life cycle of root-not nematodes.*

Fumigant and nonfumigant nematicides have been used for control of root-knot nematodes. Soil fumigants are applied preplant on a broadcast, row, or tree site basis. Use of nematicides should be based on the results from local research studies. When replanting an orchard, old trunks and roots from the previous orchard should be removed.