Failure to Transmit Citrus Exocortis and Crinkly-Leaf Viruses by Nematodes

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THIS PAPER reports the results of studies on nematode populations in soil in which virus diseased citrus trees were growing, and on the failure of certain nematodes to vector exocortis and crinkly-leaf viruses. Nigh and Allen (1) also failed to transmit exocortis virus to Etrog citron by *Xiphinema americanum* Cobb, 1913 and *Longidorus elongatus* (De Man, 1876; Thorne & Swanger, 1936) Hooper, 1961.

Materials and Methods

The source trees were a 30-year-old tree of sweet orange, variety Biondo Comune, on trifoliate orange rootstock, with exocortis symptoms, and a 25-year-old tree of sweet orange, variety Biondo Comune, on sour orange rootstock, with crinkly-leaf symptoms.

The flotation method was used to collect nematodes from soil taken from around the feeder roots of the source trees.

Test plants consisted of seedlings growing in sterilized soil in pots; they were kept on a cement bench in a greenhouse. Nematodes to be tested were added to the water supplied to the seedlings, the number added being determined by the number present in the soil around the source tree roots.

Indexing for exocortis virus was done by budding Etrog citron into the test seedlings 6 and 12 months after they had been infested with nematodes. Presence or absence of crinkly-leaf virus was judged by presence or absence of crinkly-leaf symptoms in their leaves.

Experimental Results

EXOCORTIS.—Two pots were used for each of 5 genera of nematodes taken from the exocortis virus source tree. The genera and numbers of nematodes added to each pot were as follows: *Rotylenchus,* 88 and 87; *Criconema,* 26 and 26; *Criconemoides,* 8 and 5; *Tylenchulus* lv., 295 and 298; *Xiphinema,* 35 and 34. The experiments were started in May 1965, the plants being examined periodically thereafter.

No exocortis symptoms developed on the sprouts growing from the citron buds in the test seedlings, indicating that none of the nematodes transmitted exocortis virus.

PSOROSIS.—In the first experiment, the nematode genera obtained from the source plant were each transferred to a single test seedling of sweet orange and a single test seedling of sour orange. The numbers of nematodes of each genus added to each test seedling were as follows: *Tylenchulus* lv., 300 and 300; *Rotylenchus,* 37 and 36;

Criconemoides, 100 and 70; *Trophurus*, 42 and 40. The experiment was begun in May 1965. None of the test seedlings developed crinkly-leaf symptoms. None of the nematodes, therefore, transmitted crinkly-leaf virus.

In the second experiment, each genus of nematodes was added to the soil in pots in which 2 seedlings of sweet orange or sour orange, 1 healthy and the other with symptoms of crinkly leaf, were growing. The checks consisted of similar potted plants to which no nematodes were added. The number of nematodes of each genus transferred to the pots containing sweet orange and sour orange seedlings, were, respectively: *Tylenchulus* lv., 300 and 300; *Rotylenchulus*, 36 and 37; *Criconemoides*, 100 and 70; *Trophurus*, 29 and 35. No crinkly-leaf symptoms developed in the previously healthy plant in any pot, indicating that the virus had not been transferred from the diseased seedling in the pot to the healthy one.

EFFECT OF THE NEMATODES.—One year after they had been infested with *Tylenchulus* sp., the sweet orange seedlings became chlorotic and declined. In 2 years, they died. At the same time, sour orange seedlings infested with *Tylenchulus* spp. had severely yellowed leaves, but were alive, being apparently more tolerant than sweet orange.

Seedlings of both sweet orange and sour orange infested with *Rotylenchus* spp., *Criconemoides* spp., and *Trophurus* spp. remained stunted as compared with noninfested seedlings.

Seedlings of trifoliate orange were not damaged by the nematodes. These observations confirm the resistance of trifoliate orange to *Tylenchulus semipenetrans* Cobb, 1913, and certain other parasitic nematodes.

Literature Cited

1. NIGH, E. L., Jr., and ALLEN, R. M. 1967. Failure of nematodes to transmit citrus exocortis virus. Phytopathology 57: 100.