Effects of *Macroposthonia xenoplax* on the Growth of Concord Grape[1]

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Abstract: Concord grape (*Vitis labrusca*) plants were inoculated with *Macroposthonia xenoplax* at levels of 100, 1,000, and 10,000 nematodes. After 4 months, plants inoculated with 10,000 *M. xenoplax* were stunted, and root systems were darker and had fewer feeder roots than those in other treatments. The lower nematode inoculation levels suppressed top growth but did not affect root growth. *M. xenoplax* reproduced well on Concord grapes. *Key Words: Vitis labrusca,* ring nematode, reproduction.

Surveys conducted in Concord grape (*Vitis labrusca* L.) vineyards in central Washington during 1974-1975 showed that plant-parasitic nematodes were consistently associated with grapevines exhibiting poor growth. Genera of suspected importance were *Gracilacus, Paratylenchus, Pratylenchus, Xiphinema, Meloidogyne, Macroposthonia, Tylenchorhynchus,* and *Helicotylenchus*. Species of *Pratylenchus, Xiphinema,* and *Meloidogyne* are importan on grapes in California, and species of *Macroposthonia, Paratylenchus,* and *Helicotylenchus* are of suspected importance (6). *Helicotylenchus pseudorobustus* is a weak pathogen of 'Thompson seedless' grape (*V. vinifera* L.) (4), and *Macroposthonia xenoplax* is also parasitic on 'Thompson seedless' grape (3, 7). *Xiphinema americanum* and *M. xenoplax* Raski are associated wth 'grapevine degenertion' on Concord grapes in Michigan (5). Klinger (2) has observed the parasitic activity of *M. xenoplax* on *V. vinifera* var. Blauburgunder and demonstrated that *M. xenoplax* suppressed top and root growth.

The purpose of this study was to determine the effects of the ring nematode, *M. xenoplax,* on the growth of Concord grapes.

MATERIALS AND METHODS

A population of *M. xenoplax,* originally isolated from Concord grape, was increased and maintained on the same host. Nematodes for inoculum were extracted by sieving and decanting. Inoculations were made by pipetting the desired number of nematodes into 50 ml of water and pouring them around the roots of the plants.

Dormant, three-node grape cuttings were rooted in peat moss. Rooted cuttings were transplanted to methyl bromide-fumigated, sandy loam soil in 10-cm plastic pots. Established eight-week-old plants were transferred to 7.5-liter plastic pots.

The plants were then inoculated and arranged in 10 randomized blocks in a greenhouse. Treatments were: control (50 ml water only); a second control to test the

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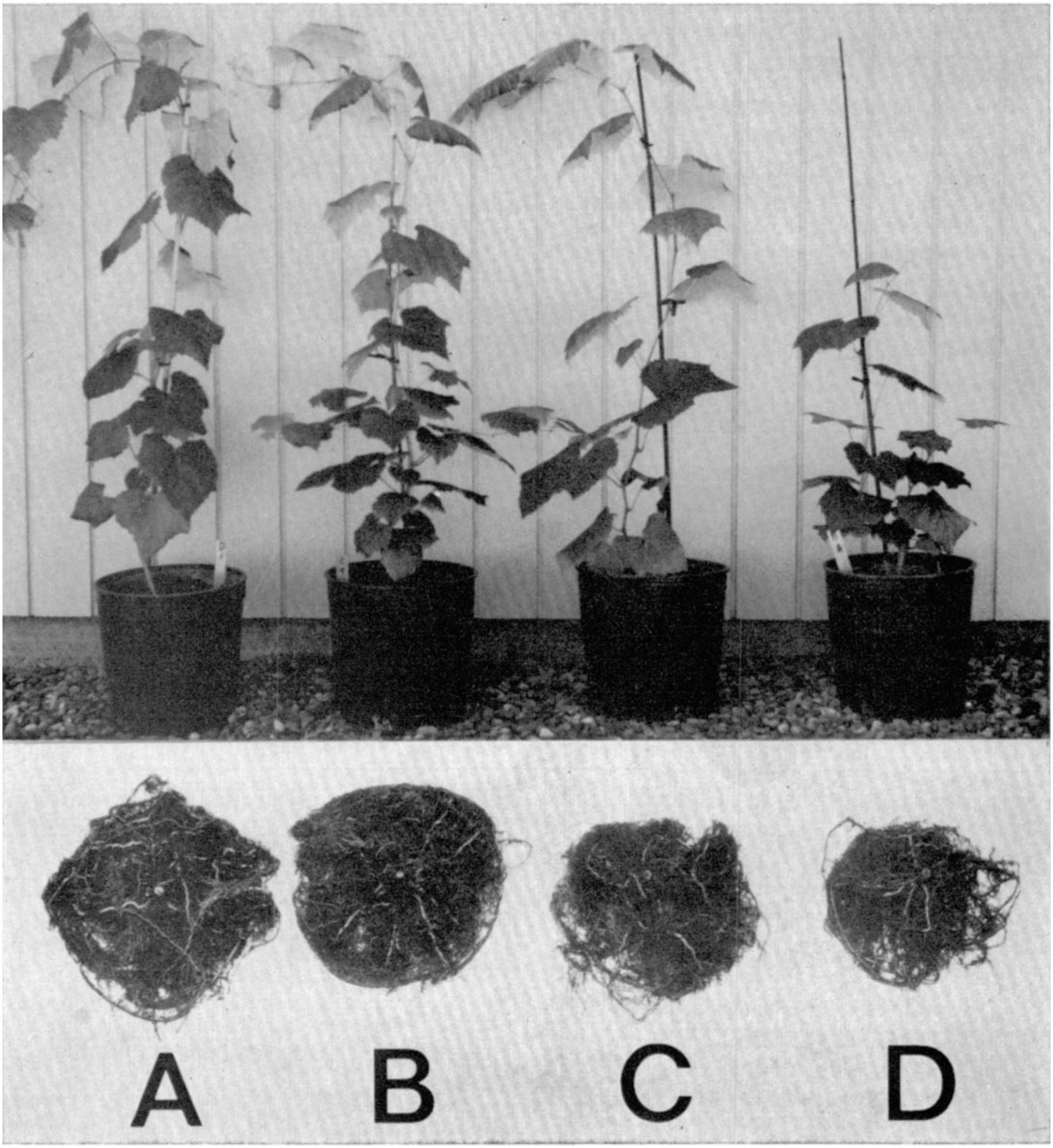

FIG. 1-(A-D). Influence of *Macroposthonia xenoplax* on the growth of Concord grapes. *A)* No nematodes; *B)* 100 nematodes; *C)* 1,000 nematodes; *D)* 10,000 nematodes.

effects of microorganisms associated with the nematodes in the absence of nematodes (nematodes were removed by sieving and hand-picking); and *M. xenoplax* at inoculum levels of 100, 1,000, and 10,000/pot of nematodes. Soil temperature in the pots during the experiment ranged from 18 to 24 C. Plants were watered with a volume large enough to moisten the entire soil mass whenever the soil surface appeared dry, and fertilized with Hoagland's nutrient solution every 2 weeks.

The experiment was terminated after 4 months. Fresh weights of tops and roots were determined, and nematode counts were made from soil. Nematodes were extracted by Jenkin's centrifugal-flotation technique (1).

RESULTS AND DISCUSSION

The fresh weights of tops and roots were inversely proportional to the initial inoculum level of *M. xenoplay* (Table 1). A regression analysis of the initial nematode numbers versus top and root weights showed that the decreases in weights were related to the increase in nematode inoculum ($P=0.01$). Roots of plants inoculated with 10,000 nematodes weighed less than those in the other treatments ($P=0.01$). There were no differences among the control groups and plants that received the lower inoculum levels. Tops of plants that received 10,000 *M. xenoplax* were more stunted than those in the other nematode

TABLE 1. Reproduction of *Macroposthonia xenoplax* and its effect on the fresh weight of Concord grape plants after 4 months' growth.

Treatment	Top weight[a] (gm)	Root weight[a] (gm)	Final number of nematodes/pot[a] (in 1,000's)
Control	69 ab	131 a	0
CMAN[b]	70 a	129 a	0
100[c]	58 bc	121 a	130
1,000	53 c	117 a	147
10,000	30 d	67 b	110

[a]Mean of 10 replicates. Values in each column not followed by the same letter differ significantly at the 1% level (Duncan's Multiple Range Test).
[b]Additional control testing the effect of microorganisms associated with the nematodes.
[c]Differs from control ($P=0.05$).

treatments. The tops of the second control group, which tested the effects of microorganisms associated with the nematodes, weighed more than tops of the plants exposed to the nematodes. The control group had more top growth than the plants in the 100 nematode treatment ($P=0.05$). Disease symptoms included stunting of tops and darker, smaller root systems with few feeder roots. Symptom expression was greatest at the highest inoculum level (Fig. 1).

Macroposthonia xenoplax reproduced well on Concord grapes (Table 1). The final numbers of *M. xenoplax* recovered were highest in the pots that received 1,000 nematodes. The rate of reproduction, however, was inversely proportional to the number of nematodes added. There was a 1,300-, 147-, and 11-fold increase in the nematode population from the low to high nematode inoculations, respectively. Raski and Radewald (7) observed increases in *M. xenoplax* population from 100 to 6,000 (60-fold) in 5 months on Thompson seedless grape.

Conceivably, the growth of plants that received 100 and 1,000 *M. xenoplax* might have been affected if the experiment had been prolonged. Likewise, a decrease in the rate of reproduction would be expected as competition for feeding sites increased.

Thus, *M. xenoplay* can stunt Concord grapes. Potentially, *M. xenoplax* may be of economic importance on Concord grapes in Washington.

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