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POPULATIONS OF *ROTYLENCHULUS RENIFORMIS*
AND *TYLENCHULUS SEMIPENETRANS* ON GRAPE SEEDLINGS
AS INFLUENCED BY COINCIDENT INFESTATION

by

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A survey carried out by us (unpublished) revealed the concomitant infestation of the citrus nematode, *Tylenchulus semipenetrans* Cobb, and the reniform nematode, *Rotylenchulus reniformis* Linford et Oliveira, on root samples of grapevine, *Vitis vinifera* L., in Egypt. Since the first is known as a serious pest of *Vitis* spp. (Seinhorst and Sauer, 1956; Sauer, 1969; Lamberti *et al.*, 1976) and the second is reported present in the rhizosphere of grapevine (Dasgupta and Seshadri, 1971; Riad, 1974), we thought it would be useful to study the interaction of populations of the two nematodes on grape seedlings.

MATERIALS AND METHODS

The original inoculum of *R. reniformis* was derived from rooted cuttings cv. Rumi Ahmar grapevine recently implanted in naturally infested field previously occupied with cowpea (*Vigna sinensis* Endl. « Fetriat »), and that of *T. semipenetrans* was obtained from lime (*Citrus aurantifolia* Swingle) orchards; both at the Faculty of Agriculture, Shubra El Khaima, Egypt. Each species was cultured by adding egg-masses to grape cuttings cv. Rumi Ahmar grown in steam sterilized sandy soil (83.7% sand, 6.2% silt, 7.3% clay) in 30 cm clay pots.

Large numbers of the juveniles and males of each nematode were obtained by placing washed feeder roots heavily infested with

egg-masses in Baermann funnels for 48 h. The number of nematodes per ml of suspension was determined by averaging the counts from five replicates of one ml each. Dilutions were made to obtain different levels of inoculum.

Grape seeds cv. Al-Zeiny were sown in steam sterilized sandy soil in flats and watered daily with tap water. Seedlings were transplanted singly in the same medium in 10 cm pots when 10 days old. Pots were watered daily with tap water and twice a month with a nutrient solution (Hoagland and Arnon, 1950).

To investigate the reciprocal effect of increasing levels of nematode inoculum on concomitant populations of *R. reniformis* and *T. semipenetrans*, three inoculum levels (250/500/1000 juveniles of each species per pot) were used separately and in combination. The nematodes were added to two month-old seedlings which were then kept out of doors for 35 or 70 days, starting in June. Each treatment was replicated three times.

At the end of the experiment, roots were washed, stained with acid fuchsin in cold lacto-phenol for not less than 24 h. Stained roots were rinsed in water and cut into pieces to facilitate counting juveniles and mature females per seedling by a dissecting microscope.

RESULTS AND DISCUSSION

Numbers of nematodes in separate or concomitant populations of *R. reniformis* and *T. semipenetrans* after 35 or 70 days are depicted in Fig. 1. Increasing the inoculum level of separate infections resulted in proportional increases in population levels, which were similar for each species; the number of nematodes approximately doubled between 35 and 70 days at each inoculum level. At the lowest inoculum level mixed infections increased at the same rate as separate infections, but at the higher inoculum levels mixed infections generally increased less than separate infections. Differences were significant ($P=0.05$) for the medium inoculum level only at 70 days, but at both 35 and 70 days at the highest inoculum level.

Previous studies revealed that the complete life cycle (egg to egg) of *R. reniformis* (Linford and Oliveira, 1940; Birchfield, 1962; Oteifa and Salem, 1972) is shorter (range 17-32 days) than that of *T. semipenetrans* (Van Gundy, 1958; Cohn, 1965) (range 42-98 days). Moreover, the migratory phase (soil phase) of *R. reniformis* is shorter

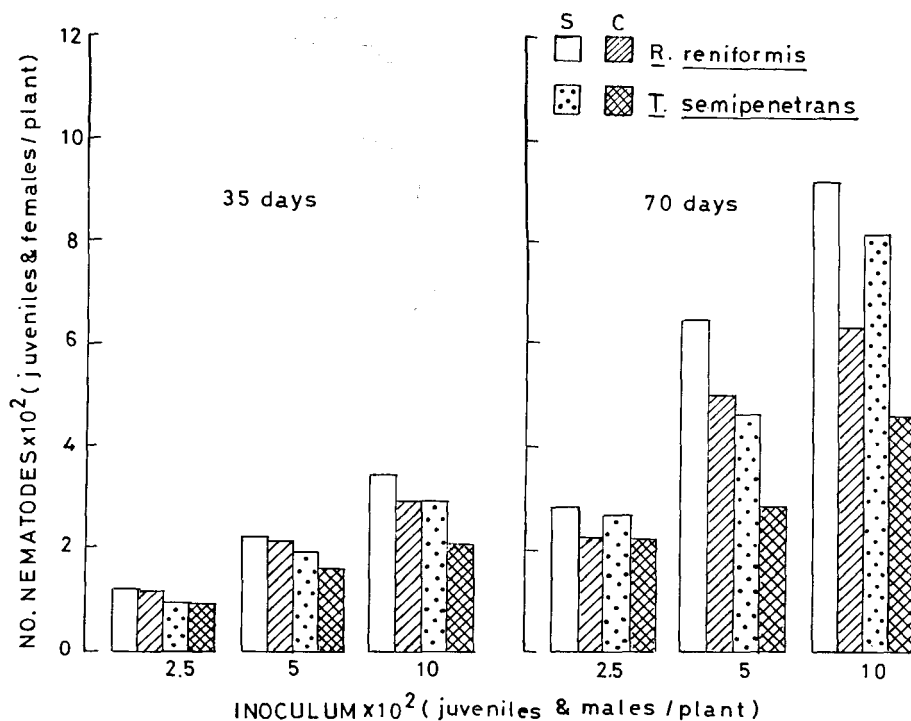


Fig. 1 - Single (s) and concomitant (c) populations of *Rotylenchulus reniformis* and *Tylenchulus semipenetrans* on grape roots 35 and 70 days after inoculation with three inoculum levels.

(about 8 days) (Linford and Oliveira, 1940; Oteifa and Salem, 1972) than that of *T. semipenetrans* on citrus (range 14 days) (Van Gundy, 1958), 2-3 weeks (Cohn, 1965), 6-7 days (Schneider and Baines, 1964), 7-21 days (O'Bannon *et al.*, 1966), 3-39 days (Macaron, 1972). Consequently, the young females of the former preceded the 2nd stage larvae of the latter for occupying areas of the root surface and starting their sedentary life when they were brought together. Furthermore the young females of *R. reniformis* fixed on grape feeder roots reached the maturity and started to lay eggs (in about 8 days according Linford and Oliveira, 1940) before the 2nd stage larvae of *T. semipenetrans* became mature females (in about 4 weeks according Macaron, 1972). Hence, the populations of *R. reniformis* surpassed those of its concomitant species, especially so under the highest inoculum level. When the inoculum potential was low (250 larvae each), there

was enough space for each nematode on root surface. It is noteworthy that males of *R. reniformis* usually outnumbered young females in soil (Linford and Oliveira, 1940), while those of *T. semipenetrans* represent 26% only (Van Gundy, 1958). Nevertheless, the former has advantages over the latter because of its shorter life cycle and ability to infest large areas of root surface.

S U M M A R Y

Inoculation of «Al-Zeiny» grape (*Vitis vinifera* L.) seedlings with 250, 500 or 1,000 second-stage larvae of *Rotylenchulus reniformis* Linford et Oliveira or *Tylenchulus semipenetrans* Cobb separately or concomitantly was conducted outdoors. Their populations were determined and their influences upon each other's populations were assayed 35 and 70 days later. In single infestation, population of *R. reniformis* was not statistically different from that of *T. semipenetrans* at each inoculum level. In mixed infestation, *per contra*, populations of the former were significantly higher than those of its concomitant species under the highest inoculum level at both periods and, under the medium level at 70-day period. Populations of either nematode in single infestation were significantly higher than their own in double infestation under medium and highest inoculum levels only.

R I A S S U N T O

Reciproca interferenza di *Rotylenchulus reniformis* e *Tylenchulus semipenetrans* su semenzali di Vite.

Cariche di 250, 500 o 1000 larve di secondo stadio di *Rotylenchulus reniformis* Linford et Oliveira o *Tylenchulus semipenetrans* Cobb da soli, in vasi separati, o contemporaneamente nello stesso vaso, sono state inoculate in vasi contenenti semenzali di Vite (*Vitis vinifera* L.) var. Al-Zeiny. Le densità di popolazione dell'uno e dell'altro nematode, quando inoculati da soli, 35 e 70 giorni dopo l'inoculazione, non differivano statisticamente tra loro. Per contro, in inoculazioni miste la riproduzione di *R. reniformis* ha avuto un ritmo più intenso di quella di *T. semipenetrans*. Al termine della prova le densità di popolazioni dei due nematodi erano più elevate quando questi erano stati inoculati singolarmente invece che in combinazione, negli stessi vasi.

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