

virulent on *A. lycopsoides* or *A. gloriosa*. The latter hypothesis agrees with the field observations of Pantone, Griesbach and Maggenti (1986) who reported that known hosts of the nematode were unaffected at several sites of nematosis where only one species was galled.

A. spectabilis, which is in the section Microcarpae, is not as close taxonomically to *A. intermedia* as is *A. menziesii*, the later two species both being in the section Muricatae (Ray & Chisaki, 1957a). The hypersensitive reaction within the gall that formed on *A. spectabilis* could have been a defense mechanism that prevented the nematode from reproducing.

Nagamine and Maggenti (1980) are the only other researchers who have reported *Anguina amsinckiae* forming leaf galls. They hypothesized that only under very moist environmental conditions will leaf galls form. Other studies failed to find evidence of nematode galls on any tissues other than floral tissues (Steiner & Scott, 1934; Godfrey, 1940; Pantone & Womersley, 1986). It is probable that the high relative humidity in this experiment provided the conditions necessary for leaf galls to form.

REFERENCES

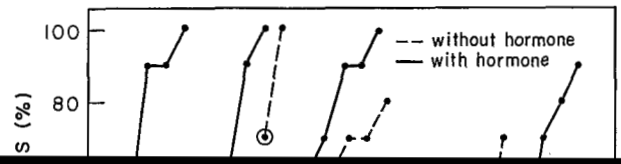
- Anon. (1982). Plants of California declared to be endangered or rare. *State Calif. Fish & Game Commission, Calif. Administr. Code*, 14 : Section 670.2.
- GODFREY, G. H. (1940). Ecological specialization in the stem- and bulb-infesting nematode, *Ditylenchus dipsaci* var. *amsinckiae*. *Phytopathology*, 38 : 41-53.
- MUNZ, P. A. (1959). *A California Flora*. Berkeley, Univ. Calif. Press, 1681 p.
- NAGAMINE, C., & MAGGENTI, A. R. (1980). Blinding of shoots and a leaf gall in *Amsinckia intermedia* induced by *Anguina amsinckiae* (Steiner and Scott, 1934) (Nemata, Tylenchidae), with a note on the absence of a rachis in *A. amsinckiae*. *J. Nematol.*, 12 : 129-132.
- PANTONE, D. J., GRIESBACH, J. A. & MAGGENTI, A. R. (1986). Morphometric analysis of *Anguina amsinckiae* from three host species, *J. Nematol.* (in Press).
- PANTONE, D. J. & WOMERSLEY, C. (1986). The distribution of flower galls caused by *Anguina amsinckiae* on the weed, common fiddleneck, *Amsinckia intermedia*. *Revue Nématol.*, 9 : 185-189.
- RAY, P. M. & CHISAKI, H. F. (1957a). Studies on *Amsinckia*. I. A synopsis of the genus with a study of heterostyly in it. *Am. J. Bot.*, 44 : 529-536.
- RAY, P. M. & CHISAKI, H. F. (1957b). Studies on *Amsinckia*. II. Relationships among the primitive species. *Am. J. Bot.*, 44 : 537-544.
- RAY, P. M. & CHISAKI, H. F. (1957c). Studies on *Amsinckia*. III. Aneuploid diversification in the Muricatae. *Am. J. Bot.*, 44 : 545-554.
- STEINER, G. & SCOTT, C. E. (1934). A nematosis of *Amsinckia* caused by a new variety of *Anguillulina dipsaci*. *J. agric. Res.*, 49 : 1087-1092.

Accepté pour publication le 13 août 1986.

ASSESSING RESISTANCE OF CITRUS ROOTSTOCKS TO *TYLENCHULUS SEMIPENETRANS* WITH ROOTED LEAVES (1)

Yaakov GOTTLIB*, Eli COHN* and Pinchas SPIEGEL-ROY**

Leaves with petioles, collected from 10-year old trees were disinfested with 0.2 % Daconil (chlorophalonil) and embedded in a medium containing peat and polystyrene flakes (1 : 3), previously disinfested with 0.3 % Previcurn. They were kept on a bench enclosed within a polyethylene sheet and intermittently (15 sec. every hour)



Poorman orange and Troyer citrange was found to be superior to that of the other varieties (Fig. 1), particularly since they exhibited high rooting percentages already after 20 days, while all the other rootstocks began rooting only 10 days later. Evidently, also, the hormonal treatment generally improved rate of rooting, which in the case of sour orange and 48/21 was statistically significant ($P = 0.05$).

Nematode infection of roots produced by leaves was studied on "Eureka" lemon (*C. limon* L.); sour orange; citrumelo (*P. trifoliata* × *C. paradisi* Macf.); and *Severinia buxifolia* Poir. Of these, the former two are known to be susceptible and the latter two resistant, to varying degrees, to the Israeli populations of the citrus nematode (Gottlieb, Cohn & Spiegel-Roy, 1986). Leaves of these plant varieties were rooted as described above, then transferred into plastic containers on a medium of peat and sand (2 : 1), and kept in a growth chamber at $25 \pm 1^\circ$. The plants were inoculated by introducing 17 500 free-living stage *T. semipenetrans* into the rhizosphere, and were removed for examination of nematode build-up four months later (Fig. 2). Nematode infection and multiplication were determined by counting the

Table 1
Citrus nematode infection rate of roots produced by leaves from different rootstocks

Rootstocks	No. of replicates	Mean no. of nematodes/g root*
"Eureka" lemon	4	2173 ± 609
Citrumelo	7	(6 ± 1)
<i>S. buxifolia</i>	9	(3 ± 1)
Sour orange	4	1130 ± 192

* Parentheses indicate no adult females present on roots.

Accepté pour publication le 18 août 1986.

ON MACROPOSTHONIA AND CRICONEMOIDES, AGAIN (NEMATA : CRICONEMATIDAE)

Michel LUC* and Dewey J. RASKI**

In his recently published book on Tylenchida Siddiqi (1986) revalidated the genera *Macroposthonia* de Man, 1880 and *Criconemoides* Taylor, 1936. Both these genera have been declared *genera dubia*, and so rejected, by Luc

number of free-living stages emerging from roots incubated overnight in modified Baermann funnels. Results (Tab. 1) indicate that whereas leaf roots of the susceptible varieties showed a high degree of nematode infection, the two resistant varieties did not support nematode reproduction.

Free-hand cross-sectioning of infected susceptible leaf roots revealed a similar pattern of nematode parasitism as that known from normal citrus roots, viz. embedding of the female head within the cortical tissue of the root, surrounded by a small feeding zone comprising a number of discolored parenchyma cells (Cohn, 1965).

We conclude, therefore, that roots produced by leaves in citrus species and hybrids are functionally similar to natural roots in their reaction to parasitism by *T. semipenetrans*, and can serve as a useful tool for rapid evaluation of resistance to the citrus nematode.

REFERENCES

- COHN, E. (1965). On the feeding and histopathology of the citrus nematode. *Nematologica*, 11 : 47-54.
- GOTTLIEB, Y., COHN, E. & SPIEGEL-ROY, P. (1986). Biotypes of the citrus nematode (*Tylenchulus semipenetrans* Cobb.) in Israel. *Phytoparasitica*, 14 (in press).
- FORD, H. W. (1957). A method of propagating citrus rootstock clones by leaf bud cuttings. *Proc. Am. Soc. hort. Sci.* 69 : 204-207.
- HALMA, F. F. (1931). Propagation of citrus by cuttings. *Hilgardia*, 6 : 131-151.
- HARTMANN, H. T. & KESTER, D. E. (1983). *Plant Propagation*. Englewood Cliffs, N. J. Prentice-Hall Inc., 727 p.
- INSERRA, R. N. & O'BANNON, J. H. (1974). Rearing migratory endoparasitic nematodes in citrus callus and roots produced from citrus leaves. *J. Nematol.*, 7 : 261-263.
- SALOMON, E. & MENDEL, K. (1965). Rooting of citrus leaf cuttings. *Proc. am. Soc. hort. Sci.*, 86 : 213-219.

and Raski (1981), who presented a detailed and factually based argumentation for such a nomenclatorial action. Consequently most of the species in these two genera were placed in the genus *Criconemella* De Grisse &

* Nematologist of ORSTOM; Muséum national d'Histoire naturelle, Laboratoire des Vers, 61, rue de Buffon, 75005 Paris, France and ** Nematology division, University of California, Davis, Ca 95616, USA.