Lack of Spread of Citrus Tristeza Virus by Aphids in Sicily

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Tristeza disease was found as early as 1956 in many countries of the Mediterranean area (Mendel, 1956; Russo, 1956; Wallace *et al.*, 1956; Nour-Eldin and Bishay, 1958), mainly in introduction plots, and its presence was later frequently reported (Reichert and Bental, 1960; Cassin, 1963; Servazzi *et al.*, 1967; Catara, 1968; Taleb, 1974).

Though *Toxoptera citricida* Kirk. was absent in these countries, spread of the disease by other potential vectors of citrus tristeza virus (CTV) was anticipated. Nevertheless, natural spread of CTV has been recorded only in Spain (Beltran Alonso Cuevillas and Planes Samper, 1960) and in Israel (Bar-Joseph *et al.*, 1972).

The threat of a CTV epidemic in Italy's citrus orchards strengthened the need for preventive measures. Since 1969, a program has been developed to survey for CTV in local citrus varieties and in imported material, to study the aphid populations in citrus orchards, and to evaluate the efficiency of known vectors. The citrus aphid fauna in Italy is represented by nine species (Barbagallo and Inserra, 1974): *Aphis citricola* v.d.G. (= *A. spiraecola* Patch), *A. gossypii* Glover and *Toxoptera aurantii* (B.d.F.) are the most economically important. Other species which occur on citrus occasionally include *A. craccivora* Koch and *Myzus persicae* (Sulz.). This paper summarizes results of transmission attempts with a CTV isolate accidentally introduced into Sicily.

MATERIALS AND METHODS

Declining trees and healthy-looking plants in commercial groves and propagation material introduced from different countries for research purposes were indexed by graft inoculation of greenhouse-grown Mexican lime seedlings.

Aphid transmission trials were carried out in the spring in a screenhouse where temperatures ranged from 10 to 25 C. A CTV isolate introduced by chance from Japan was used for this study. Madam Vinous sweet orange, sour orange, and Mexican lime seedlings, 18 months old, were graft inoculated and used as donor plants after 3 to 5 months.

Transmission tests were conducted with *A. gossypii, A. citricola, A. craccivora,* and *T. aurantii* collected from citrus trees in the field. Young sprouts of citrus trees infested with one species of aphid were placed on young leaves of donor seedlings. These were covered with a cage, the side of which was covered with a dense gauze. After 24 hours, groups of 80-100 apterous aphids at different stages were transferred by a camel's hair brush to actively growing Mexican lime seedlings 6 to 18 months old. Generally, four 6-month-old seedlings were grown in one 14-cm pot. Each pot was covered with a cage. After an inoculation feeding of 24 hours, plants were sprayed with a pirimicarb aphicide, and observed for symptoms for 1 year. Results are summarized in table 1.

RESULTS AND DISCUSSION

Over 3,000 sweet orange, mandarin, lemon, grapefruit, bergamot, kumquat, and bigarade trees were indexed, and no tristeza was found. Also, 20 trees located near declining satsuma mandarin and Meyer lemon trees previously found to be infected by tristeza tested negative for CTV.

About 100 accessions propagated from budwood from California, Florida, Arizona, Spain, Ivory Coast, and Japan were also indexed. Only six clones of early satsuma mandarin from Japan were found to be infected and all but

one, which was used for transmission trials with aphids, were destroyed. This isolate induced vein clearing, yellowing, cupping, and vein corking on Mexican lime but no symptoms on sour orange and Madam Vinous sweet orange.

In spite of many attempts with each species of aphid (table 1), no transmission was obtained. Since species of aphids, temperature and source plant used for the experiments were theoretically favorable to transmit CTV (Bar-Joseph *et al.*, 1977), our results indicate the vectors tested were unable to transmit this isolate. The negative results of indexing of trees located close to the tristeza infected ones confirm the hypothesis. This is probably the case for other isolates introduced into the Mediterranean area and North America from the Far East and South Africa, where a more efficient vector, *T. citricida*, is present (Bar-Joseph, 1978). The experience of other countries, however, suggests that transmissible mutants may arise (Bar-Joseph, 1978; Roistacher *et al.*, 1980). In view of this possibility, introduced propagation material should be carefully indexed and a continuous survey made of declining citrus trees for CTV.

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TABLE 1
NUMBER OF MEXICAN LIME SEEDLINGS INOCULATED BY APHIDS FED ON DIFFERENT DONOR PLANTS*

Donor Plant	*A. citricola*	*A. gossypii*	*A. craccivora*	*T. aurantii*
Mexican lime	37	41	35	38
Sour orange	231	86	29	31
Sweet orange	48	45	36	40

* 80-100 apterous aphids used per transmission attempt.

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