Xyloporosis in Brazil

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XYLOPOROSIS was first recognized on sweet lime (*Citrus limettioides* Tanaka) rootstocks in Brazil in the early 1930's and was first reported by Moreira (1) in 1938. Sweet lime is no longer used as a rootstock in Brazil because of its susceptibility to tristeza virus. Almost 80 per cent of the new plantings are on Rangpur lime (*C. limonia* Osb.) which is intolerant of xyloporosis virus. Many of them show evidence of xyloporosis infection especially in the State of Rio de Janeiro. Incidence of xyloporosis in new plantings is much less in the State of São Paulo, and the disease is rare in Rio Grande do Sul. This situation makes xyloporosis of considerable economic importance in Brazil, and a great deal of effort has been devoted to studying the incidence of the virus in the principal commercial varieties of citrus, and the reaction of these varieties to xyloporosis infection. This report concerns the results of this study.

Results

INFECTED VARIETIES.—Clones of several commercially important varieties were found to be infected as follows: Barão, Pera, and Bahia sweet orange [*C. sinensis* (L.) Osb.]; Mexirica do Rio and Dancy tangerine (*C. reticulata* Blanco); and Marsh grapefruit (*C. paradisi* Macf.). Less important varieties also found infected are Coco and Robertson navel oranges, Cristal lime, Clementine mandarin, Wase satsuma (*C. reticulata* Blanco), Sabara tangor [*C. sinensis* (L.) Osb. x *C. reticulata* Blanco], and Redblush grapefruit.

INTOLERANT VARIETIES.—So far as is known all species of citrus can carry xyloporosis virus, but certain species are intolerant of the virus and display recognizable symptoms when infected. Index tests of 152 varieties were made at the Limeira Citrus Experiment Station, and 63 of them were previously reported (3) to exhibit symptoms when infected. Since then recognizable symptoms were found on 13 additional varieties as follows: Campiona, Kara, Mexirica do Para, and Kinnow tangerines; Owari satsuma; Kusaie and Galego lime; citrange [*C. sinensis* (L.)Osb. x *Poncirus trifoliata* L.] hybrid (EEL 322); and 5 lemon (*C. limon* L. Burm. f.) hybrids, Americano, Cidra, Gigante, Marrocos, and Perrine. Cleopatra mandarin and Florida Rough lemon eventually developed weak symptoms as follows: a small number of gummy pegs and wood pits more easily observed during the dry season.

TOLERANT VARIETIES.—The following varieties were found to be infected, but showed no discernible symptoms: all 15 sweet orange varieties examined (Washington navel, Ruby Blood, Lue Gim Gong, Homossassa, Florida sweet seedling, Pera, Hamlin, Pineapple, Jaffa, Mediterranean, Caipira, Valencia, Parson Brown, Shamouti, and Lamb Summer); 2 grapefruit (Marsh seedless and Ruby Blood); 2 shaddock (Zamboa and Cuban); 8 tangelo (Minneola, Sampson, San Jacinto, Suwanee, Thornton, Yalaha, Webber, and Williams); 3 tangerine (Sunki, Suen Kat, and Sun Chu Shu Kat); trifoliate orange and most of its hybrids (Morton, Rusk, Savage, Sacaton, and Troyer citranges); Citrumelo 4475; Satsumelo 10-V-3; and others.

Symptoms were usually strongest near the bud-union and decreased in intensity with increasing distance from it; however, in some instances (Bahia navel orange on Rangpur lime rootstock) symptoms were more severe at the soil level and decreased in intensity upwards, becoming inconspicuous at the bud-union. Longitudinal cracks in the bark and bark scaling occurred in the Rangpur lime rootstock of Barão and Washington navel orange trees.

INCUBATION PERIOD.—Observations in commercial orchards and experimental plantings show that the period between infection and the appearance of symptoms varies widely in different intolerant varieties, and may be as long as 6 to 12 years in Rangpur lime. This suggests the existence of several strains of xyloporosis (2). However, certain selections of Orlando tangelo develop symptoms earlier than do others (10 to 25 months under Brazilian conditions), which suggests that variation in plants also may cause different incubation periods. On the other hand, the presence of tristeza virus appears to increase the severity of xyloporosis symptoms in trees on Rangpur lime rootstock. In one experiment, sets of 5 plants of Orlando tangelo on Cleopatra mandarin rootstock were inoculated with xyloporosis from 8 different sources. Symptoms developed in 15 months on all plants inoculated from 3 sources, but plants inoculated from the other 5 sources required 30 months.

Conclusions

Xyloporosis has become important in Brazil because of the widespread use of Rangpur lime rootstock and the rather high level of infection of that virus in some commercially important varieties of citrus. Of 152 varieties tested, 77 were intolerant to xyloporosis virus. The incubation period of xyloporosis in Rangpur lime, 6 to 12 years, is much longer than in Orlando tangelo or sweet lime, but the symptoms are similar.

Variation in the incubation period of xyloporosis from different sources suggests the existence of several strains of different levels of virulence. The increased severity of symptoms in Orlando test plants carrying both tristeza and xyloporosis suggests that tristeza virus has a synergistic effect on xyloporosis symptoms in Orlando tangelo.

Of the 15 varieties of sweet orange infected with xyloporosis virus, none developed symptoms of the disease up to 17 years after infection.

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