Studies on Xyloporosis of Citrus in Brazil

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THE PRESENT PAPER is a progress report of experiments on xyloporosis now being conducted at the Limeira Citrus Experiment Station of the Instituto Agrônomico do Estado de São Paulo. Emphasis has been placed on determining the tolerance of various varieties of citrus and in finding a plant to serve as a host for quick test for the virus.

Results

INTOLERANT VARIETIES.—Previous work has shown that 76 of 152 citrus varieties tested by inoculation with xyloporosis virus developed symptoms (1, 2). The number of intolerant varieties has now been increased as a result of a new testing trial in which 53 citrus species, varieties, and relatives were tested for their reaction to xyloporosis virus. Two years after inoculation with a severe strain of the virus, 18 types were found exhibiting typical wood pitting and gummy-peg symptoms of the disease. These were: the Malvasio, Loose Jacket, Tankan, Sylhat, Scarlet, Kaula, Lee, Robinson, Osceola, and Cravo varieties of tangerine; Thornless sweet lime; Yalaha tangelo; Philippine hybrid 86496; *Citrus longispina;* Jaragua do Sul lemon hybrid; Tahiti lime off-type EEL-2; and 2 off-type selections of Rangpur lime. Those showing no symptoms up to the time of the last inspection were: funadokomikan, yatsushiro-mikan, *C. pseudoparadisi,* ujukitsu, natsudaidai, *C. iwaikan,* keraji, yuzu, Eustis and Lakeland limequat, Coachella eremolemon, faustrimedin, Nagami and Meiwa kumquat, *Citropsis* sp., Hesperethusa, calamondin, Tahiti lime off-type EEL-1, Fukuhara orange, and 16 off-type selections of Rangpur lime. Plants of some of these

types may still develop symptoms. Controls consisted of 6 xyloporosis-infected and 6 healthy plants of each type budded on Rangpur lime. One year after the beginning of the experiment, infected plants of certain types were more vigorous than those of the infected controls. These types were: faustrimedin, yuzu, *C. longispina,* Cravo tangerine, calamondin, Thornless sweet lime, and 1 of the off-type selections of Rangpur line. A similar situation has already been observed in another experiment (3). Scarlet tangerine was found to be the most severely affected of the intolerant types.

Citrus longispina developed severe inverse pitting in the stem, in addition to the common wood pitting and bark gummy pegs.

SEARCH FOR A QUICK INDICATOR PLANT.—Xyloporosis is still lacking a quick indicator plant. Most of the experiments on the reaction of citrus types to xyloporosis virus were conducted in the hope of finding such an indicator. None of the nearly 100 citrus types now known to have tissues intolerant to xyloporosis, however, showed any typical leaf symptom that could be related to the presence of the virus. Orlando tangelo continues to be the one developing the fastest and most reliable symptoms of the disease. Search for a fast indicator was initiated within off-type Orlando tangelo selections. In one test, plants of 11 off-type selections were infected with a severe strain of xyloporosis virus. One, EEL-46, developed leaf symptoms characterized by malformation, curling, and cupping plus microelement deficiency signs that were very conspicuous within 3 months after inoculation. The plants of the 9 other off-type selections developed only trunk symptoms in varying intensity. The other one, which has leaves resembling those of grapefruit, showed no symptoms.

More studies are now being conducted with the off-type EEL-46 for its possible use as a quick indicator for xyloporosis virus.

TESTS FOR RESISTANCE.—In one of the first experiments in which a large number of citrus types were tested for their reaction to xyloporosis virus, 49 failed to develop symptoms of the disease. It was questioned then whether the 49 were tolerant or resistant. Buds from these trees were used to inoculate test plants of Orlando tangelo and Palestine sweet lime on Rangpur lime rootstock. All test plants developed xyloporosis symptoms within 3 years following inoculation except those inoculated with buds collected from the *Coachella eremocitrus, Citrus webberii,* and Zamboa shaddock. These types apparently are resistant to xyloporosis virus and may possibly be used to separate viruses. The other types are tolerant to the virus and may be symptomless carriers.

Conclusions

Of 53 citrus types tested, 18 were found to be intolerant. One hundred citrus varieties and types are now known to be intolerant to xyloporosis virus. Calamondin, previously re-

ported intolerant, was found to be tolerant.

One off-type Orlando tangelo, EEL-46, was found to develop leaf symptoms within 3 months after inoculation with xyloporosis virus.

Of 49 types of citrus previously infected with the virus, 3, Coachella eremocitrus, *Citrus webberii,* and Zamboa shaddock, are resistant.

Literature Cited

1. SALIBE, A. A. 1965. Reaction of types of citrus as scion and as rootstock to xyloporosis virus, p. 70–75. *In* W. C. Price (ed.), Proc. 3d Conf. Intern. Organization Citrus Virol. Univ. Florida Press, Gainesville.
2. SALIBE, A. A. 1967. Variedades cítricas intolerantes ao virus da xiloporose. Ciência e Cultura 19(2): 299.
3. SALIBE, A. A., and MOREIRA, S. 1968. Effect of virus diseases on the growth and productivity of citrus trees, p. 299–303. *In* J. F. L. Childs (ed.), Proc. 4th Conf. Intern. Organization Citrus Virol. Univ. Florida Press, Gainesville.