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Viruses in Sweet Lime Rootstock in Bella Vista, Corrientes

At present, it is estimated that of the three million trees in Bella Vista, Corrientes, Argentina, two million are grafted on sweet lime (*Citrus limettioides* Tanaka) rootstock. Sweet lime is susceptible to xyloporosis. Fearing the damage that this disease could cause in the area, it was decided in 1943 to test different rootstocks for tolerance to the virus. Observations on the behavior of eleven varieties of sweet orange [*C. sinensis* (L.) Osbeck] on one of these rootstocks are summarized below.

Materials and Methods

The test plot to be reported upon consists of 255 trees of 11 varieties of sweet orange grafted on sweet lime rootstock. There were 13 test trees of each scion variety. Buds of the Common Sweet and Valencia varieties were taken from seedling plants and the rest from plants grafted on bitter orange (*C. aurantium* L.) free from symptoms of quick decline (tristeza).

Since 1960, observations have been made of each tree in the plot; a strip of bark was removed, starting at the graft union and reaching to the branches of the tree top, and the symptoms in the stock and scion were recorded. In 1960 also, seedlings of Rangpur lime (*C. limonia* Osbeck) and sweet lime were grafted with buds from these plants.

Results

Parson Brown and Azores.—These varieties had few leaves, grew poorly, and produced small fruit and many dead terminal buds. The

diameter of the tree top was about 2 m and the production averaged 190 fruit per tree. No depressions were visible in the trunk but stem pitting was present in the wood. Exocortis symptoms developed in the Rangpur lime rootstock.

COMMON SWEET.—This variety had greater vegetative development than Parson Brown. The diameter of the crown averaged 3.2 m. Stem pitting was observed under the bark of the rootstock but neither the Rangpur lime rootstock nor the sweet lime rootstock had symptoms of exocortis or of xyloporosis.

PERA AND MEDITERRANEAN SWEET.—Stem pitting was observed in stems and branches of the plants of these varieties. In general, the vegetative condition was poor and the fruit small. The crown of the plants averaged 2 m in diameter. The grafts made on Rangpur lime and sweet lime seedlings had variegated terminal buds and the plants made little growth, but symptoms of known virus diseases were not observed in the rootstock.

LUE GIM GONG AND RUBY BLOOD.—All the plants of these varieties had symptoms of xyloporosis. Development of the top was very poor, 1.4 m in diameter; production was less than 250 fruit per tree. Deep furrows with undulating flutings and gum stains deep in the furrows were observed in the rootstock. Many plants were nearly dry and 15 per cent were dead.

VALENCIA.—This variety had the best development and the greatest production of any. The average diameter of the trees was more than 3.5 m and production exceeded 400 fruit per tree. The Rangpur lime and sweet lime seedlings grafted with buds from this variety made a normal growth and had no virus disease symptoms.

WASHINGTON NAVEL, BAHIA NAVEL, AND NAVELENCIA.—The Bahia and Washington Navel varieties made a vegetative development similar to that of Valencia but produced less fruit. Stem pitting was well defined under the bark and in the rootstock. The external depressions of the stem were deep from the crown roots to the graft union.

In Navelencia, vegetative development was poor; the diameter of the top was only 1.5 m and stem pitting was present in the part of the stem corresponding to the foot. The Rangpur lime seedlings grafted with Navelencia had symptoms of exocortis, but those grafted with buds of the Washington Navel and Bahia Navel varieties did not.

Conclusions

Plants grafted with healthy buds, obtained especially from the varieties Common Sweet, Valencia, and Bahia, grew more or less normally the first year. Plants of all varieties except Valencia and Common Sweet had virus disease symptoms. This is considered to be significant because there were other rootstocks with buds from the same origin in the same plot that did not have these symptoms; presumably these other rootstocks were tolerant.

Plants with symptoms of both exocortis and stem pitting made less growth than plants with stem pitting symptoms alone. From this it is concluded that two viruses in a plant induce more symptoms than one alone.

Since 1955, sweet lime has been the principal rootstock used for the citrus varieties that grow in the area. This is unfortunate because, from the observations reported here, it is anticipated that there will be a gradual decline of the plantations on sweet lime rootstock as has been the case in other parts of the world.