

RESEARCH ON ROOTSTOCKS RESISTANT TO AVOCADO ROOT ROT

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The discovery or development by breeding of a resistant rootstock is one of the most successful methods of controlling root diseases, and is one approach that offers hope of adequately controlling avocado root rot. Research on this phase of a disease problem particularly when it involves tree crops, is very likely to be a long-term project. Investigations along this line were begun only recently on the Riverside and Los Angeles campuses of the University of California; this paper constitutes a progress report of the results to date.

In 1949 tests were begun at Riverside to determine the resistance of a number of different varieties of avocados to the root rot disease. Seed, and in some cases, seedlings of some of the varieties used were provided by Dr. F. F. Halma. Varieties used included nine Mexican, ten Guatemalan, two West Indian types, and one hybrid and were: Anaheim, Blake, Caliente, Challenge, Chappelow, Duke, Dickinson, Edranol, Ganter, Hass, Itzamna, Lula, Mayapan, Mexicola, MacArthur, Nabal, Northrup, Puebla, Ryan, Taft, Topa Topa, and Waldin.

Seedlings were transplanted from the seed bed when from six to eight inches in height into a lathhouse bed of soil that had been taken from around diseased trees in San Diego County, and had also been given an additional inoculation with the fungus *Phytophthora cinnamomi*. This fungus is the causal agent in the root rot disease. Soil moisture conditions were maintained at as uniform a level as possible, with the aid of tensiometers installed by Dr. S. J. Richards of the Division of Irrigation and Soils.

During the two years that this experiment was in progress significant differences were noted in the growth and appearance of the different seedlings, and there was a great variation even within a given variety of seedling. Many of the Guatemalan types made much better growth than the Mexican or West Indians. However, when the seedlings were dug in August 1951, the roots of all twenty-two varieties were found to be severely attacked by *Phytophthora cinnamomi*. This phase of the work is being continued in the hope that some individual seedlings will be found which may have at least partial resistance.

During the past four years importation of some botanical relatives of the avocado from Mexico and Central America by the junior author and others has provided opportunity for small-scale testing of some of this material. Cuttings or seedlings of these plants usually have been started at the Los Angeles Campus, then tested for disease resistance at Riverside. To date, the following species have been tested: *Persea floccosa* and *P. longipes* from Mexico, *P. nubigena* from Guatemala, and *Persea* sp.

(Uyuca, Honduras). *Persea longipes* is evidently very susceptible to root rot; cuttings of this species showed severe disease symptoms even before some of the standard Mexican rootstock seedlings used for comparison. The other three species mentioned above did not develop symptoms as rapidly, but infection has occurred with all three of them. Additional tests in inoculated and in naturally diseased soil will determine whether any of these species possess sufficient resistance to make further work with them worthwhile.

Early indications from a field planting and from pot culture were that *Persea floccosa* might have considerable resistance, but further tests show that it can be severely attacked by *Phytophthora cinnamomi*. The fungus has been recovered from rotting roots of several cuttings of this species planted in diseased soil in the greenhouse, and in field plots on the Los Angeles Campus and in Santa Barbara County. In an inoculation experiment involving eight *P. floccosa* cuttings, five of these showed definite top symptoms of the root rot disease within three months after inoculation, and the fungus was causing root damage on the other three. These plants developed the disease somewhat more slowly than Topa Topa seedlings used for comparison.

An additional observation on the Los Angeles Campus indicates that *Persea lingue* (from Chile) is quite susceptible to root rot. A seedling of this species planted in a spot where avocado trees had died, showed severe symptoms within two months after planting. Examination and culturing of the root system revealed that the root rot fungus was attacking many of the feeder roots.

Other species of *Persea*, including *P. indica*, *P. borbonia* (*P. palustris*), and *P. schiedeana* are in the process of being tested.