

1953 COLLECTIONS IN CENTRAL AMERICA AND MEXICO FOR RESISTANCE TO AVOCADO ROOT ROT



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In the latter part of June and early July, 1953, another trip was made to Central America and Mexico to search for resistance to avocado root rot in the native avocados and related species of *Persea*. The primary objective was to obtain seed from as many as possible of the promising locations found in 1952, where avocados were growing in wet locations and where the fungus *Phytophthora cinnamomi* was present in the soil. Other objectives were to make arrangements for cooperative tests on root rot resistance with Dr. Wilson Popenoe at the Escuela Agricola Panamericana in Honduras, and at the Institute Agropecuario Nacional in Guatemala, and to search for signs of natural resistance in the area where avocado trees are severely affected with root rot near Tenancingo, Mexico.

In the course of this trip seed were collected from 12 trees of three species of *Persea* (*P. americana*, *P. schiedeana*, and *P. skutchii*), and budwood was collected from 15 trees of five species of *Persea* (*P. americana*, *P. Donnell-Smithii*, *P. gigantea*, *P. schiedeana*, and *P. skutchii*). Root samples were also taken from trees from which budwood or seed were collected, as well as other trees of interest, and cultures made to determine whether or not the fungus *Phytophthora cinnamomi* was present. Cultures were made from the roots of 26 trees; *P. cinnamomi* was recovered from five of these. The fungus was found on roots of a *Persea schiedeana* tree growing near San Pedro Carcha in Alta Verapaz, Guatemala ; this is the first record of *P. cinnamomi* on *Persea* in Guatemala.

GUATEMALA

Collections in this country were made in the Alta Verapaz and Baja Verapaz regions, north of Guatemala City, where species of *Persea* were found growing in exceedingly wet sites in 1952. Budwood was collected from six trees (four *P. schiedeana*, 2 *P.*

Donnell-Smithii) in the vicinity of Coban and Tactic. 1953 was a very poor seed year in this area; no fruit were available on trees in the Tactic swamp where it was hoped that a number of seed could be collected. Seed were collected from two *P. schiedeana* trees in Coban, and one *P. americana* tree near San Cristobal. Very immature fruit were present on *P. Donnell-Smithii* trees near Tactic in the latter part of June.

Budwood was placed in polyethylene bags and sent by air from Guatemala City to San Pedro, California under U.S. Department of Agriculture quarantine permit 37-5966. Seed were removed from the fruit, washed, allowed to dry, and shipped via air express to El Paso, Texas under U.S. Department of Agriculture quarantine permit 53982; seed were fumigated at El Paso and then forwarded to Riverside, California. Some of the seed collected in Guatemala were left for disease resistance testing at the Instituto Agropecuario Nacional in Guatemala City.

Root cultures were made on the usual cornmeal agar medium, from 12 trees in the Departments of Baja Verapaz and Alta Verapaz. *Phytophthora cinnamomi* was recovered from one of these trees, an old specimen of *Persea schiedeana* growing about one mile southwest of the town of San Pedro Carcha, near the road to Coban. This is the first time the fungus has been recovered from avocado or avocado relatives in Guatemala. The tree on which *P. cinnamomi* was found is probably a native tree, though it is often difficult to be sure of this point. It was growing on the edge of a pasture, in an area where *Persea schiedeana* is a common native tree. There is a possibility that the tree may have grown from seed thrown out by the Indians but there is little likelihood that *Phytophthora cinnamomi* was imported into the area. It therefore seems very likely that the fungus is native in that region, which should make it a promising location for root rot resistance.

At the Instituto Agropecuario Nacional, in Guatemala City, discussions were held with the Director, Rolland C. Lorenz, and with Dr. F. J. LeBeau, plant pathologist, relative to establishing cooperative work on avocado root rot in Guatemala. Through the generosity of the California Avocado Society, which donated \$1,000 to the University of California for this purpose, a joint project on root rot resistance was established with the Instituto Agropecuario Nacional in August, 1953. The agreement provides for the collection of seed from promising locations in Guatemala, and the propagation of the seed, maintenance of inoculum of *Phytophthora cinnamomi*, inoculation of soil, and testing of seedlings for root rot resistance at the Instituto Agropecuario Nacional. A large number of seed collections were made in the fall of 1953, and a number of these, as well as seed from Guatemala and Honduras left in Guatemala City in June, have been tested for resistance.

HONDURAS

Collections in this country were made in the general vicinity of the Escuela Agrícola Panamericana. Budwood was collected from three trees representing three species of *Persea*: *P. Donnell-Smithii*, *P. gigantea*, and *P. Skutchii*. Seed were collected from *P. Skutchii* (fruit were very abundant on this species in June), and seed from an unidentified species of *Persea* (probably *P. americana*) were brought into the Escuela Agrícola Panamericana by a native woman. Root cultures were made from five trees in

the experimental plantings at the Escuela; *Phytophthora cinnamomi* was recovered from one of these. Previous cultures had shown the fungus to be present in several of the experimental fields.

Preliminary plans were made with Dr. Wilson Popenoe for tests of root rot resistance at the Escuela Agricola Panamericana. The soil conditions, moisture, and *Phytophthora cinnamomi* population are all favorable for disease development, and with Dr. Popenoe's deep interest in and knowledge of the avocado this should be an excellent location for disease resistance tests. Duplicate samples of budwood and seed collected in Honduras were left at the Escuela Agricola Panamericana for propagation and testing in diseased soil; in addition several seed collections were sent there from Mexico.

MEXICO

All of the collections in Mexico were made in the area near Huatusco in the state of Veracruz, visited in 1951 and 1952. This area is considered very promising from the standpoint of possible resistance to Phytophthora root rot, as *Phytophthora cinnamomi* occurs there, yet the trees show no evidence of root rot. None of the 1952 budwood collections survived and seed free from seed weevil were not available then. In 1953, budwood was collected from six trees (three *Persea americana* and three *P. schiedeana*) near Huatusco. Seed was collected from six trees (five *P. schiedeana* and one *P. americana*) in the Huatusco area, from one *P. americana* near Villa Guerrero in the state of Mexico, and two other types of *P. americana* seed were obtained in markets in Villa Guerrero and in Mexico City. Root cultures were made from eight trees near Huatusco and Villa Guerrero; *Phytophthora cinnamomi* was again recovered from three trees near Huatusco. Two of these trees (one *P. americana*, and one *P. schiedeana*) were in the same localities from which the fungus was cultured previously. Isolation of *Phytophthora cinnamomi* from a new location north of Huatusco on *Persea americana*, indicates that the fungus may be quite widespread in this region.

Unfortunately, 1953 was a poor fruit year in the Huatusco area. Very few of the small Mexican avocados (*P. americana*) had any fruit at all, while fruit of *P. schiedeana* was scattered in occurrence.

PRESENT STATUS OF COLLECTIONS

By October, 1953 it was evident that three of the 15 budwood collections were established in California; these were collections M7, M8, and M13, all *Persea americana* types from the state of Veracruz, Mexico. These are of particular interest as they are from the region near Huatusco where *Phytophthora cinnamomi* occurs. Lack of establishment of the other species is believed due principally to poor compatibility or lack of compatibility (in the cases of *P. Donnell-Smithii* and *P. Skutchi*), and to the poor budwood available on the other collections.

Viability was excellent on the seed from Guatemala and Honduras; they arrived in Riverside approximately two weeks after shipment. Considerable difficulty was experienced in shipping seed out of Mexico, and by the time this material finally arrived in California all of the *P. schiedeana* seed were dead. The *P. americana* seed from

Mexico arrived in fair condition and germination was good.

Further propagation of the budwood collections is necessary before resistance tests can be conducted on this material. All of the seed collections made on this trip, which covered the period between June 15 and July 3, have been tested for disease resistance at Riverside. Tests have been conducted in naturally infested soil, in artificially infested soil, and in inoculated nutrient solutions. The tests in soil are not yet completed, but indications from these as well as from the solution cultures are that the *Persea Skutchii* collection from Honduras has considerable resistance to Phytophthora root rot. All of the other collections appear to be susceptible. This confirms results with the 1952 *P. Skutchii* material. Some variation is apparent in the seedlings of *P. Skutchii* with respect to resistance.

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