

EXPANSION OF AVOCADO ROOT ROT RESISTANCE PROGRAM

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Increased emphasis on the search for rootstocks resistant to avocado root rot caused by *Phytophthora cinnamomi* was made possible earlier this year by contributions from the avocado industry, collected and handled through the California Avocado Society. The discovery or development of a resistant rootstock still appears to be the best method of control of this serious disease, so we are emphasizing this phase even more now, without neglecting studies of other possible means of control — by soil fungicides, cultural methods, nutrition, systemic fungicides, irrigation management, and studies of the fungus.

This report concerns our expanded program at Riverside in relation to rootstock resistance. Some specific aspects of the program, involving collections in Mexico, Guatemala and Salvador in 1971 are covered in more detail in another article in this yearbook.

When additional funds became available I began to explore additional possibilities for collections of possible resistant rootstock material. A visit to the New York Botanical Garden hardly seems like a fruitful means to accelerate our avocado collecting program, however, the New York Botanical Garden has one of the best herbarium collections in the world of species of *Persea*, the genus in which the avocado is classified. Included with many of the herbarium collections is detailed information on where the collection was made — in what particular area in Mexico or Guatemala or other Latin American countries.

Dr. Caroline Allen at the New York Botanical Garden has for many years studied the classification of the genus *Persea* and also the numerous other genera in the family Lauraceae where the avocado is classified, including the genera *Ocotea*, *Nectandra*, and *Phoebe*.

Dr. Lucille Kopp recently published a monograph of the genus *Persea* "A Taxonomic Revision of the Genus *Persea* in the Western Hemisphere," *Memoirs of the New York Botanical Garden*, V. 14, which lists 81 species of *Persea* which are native trees in various countries in Latin America. The classification of some of the species that we have collected previously in Latin America is changed in that publication; based on this new system we have collected and tested 14 of the 81 species of *Persea*.

Discussions with Drs. Allen and Kopp at the New York Botanical Garden were very valuable; they provided suggestions regarding additional species of *Persea* that would seem most worth collecting, based on close taxonomic relationships with the avocado species, *Persea americana*. These include: *P. rigens*, *P. steyermarkii*, *P. pallida*, and *P.*

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By going through all of the *Persea* collection material at the New York Botanical Garden, with emphasis on the above species but also obtaining locations of a number of other species in Latin America. I obtained many new locations for potential collections — especially in Mexico, Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica. Additional information was obtained by contacting Dr. Louis Williams, botanist at the Chicago Natural History Museum, who also has a good collection of species of *Persea*, and who is very familiar with the flora of Central America from his several years at the Escuela Agrícola Panamericana in Honduras.

Dr. Wilson Popenoe is still very interested in the avocado and in native species of *Persea*, and has provided many valuable suggestions in correspondence this year. I also had a wonderful visit with Dr. Popenoe at his house in Antigua, Guatemala, in the spring of this year, when we discussed possible collecting sites in Mexico and down through Central America, based on his long experience and many travels in that area. This was a memorable and invaluable visit, and provided much information that should accelerate our collecting program.

Dr. Popenoe suggested locations for collections in various parts of Mexico, Guatemala, Honduras and Costa Rica. Many of these are areas where native avocados or related species are growing, such as in Mexico on the slopes of Mt. Orizaba, and in the mountains both north and south of Oaxaca. Others are trees in cultivation which are of interest because of their age and vigor, or which are growing in root rot areas, such as the old La Canada area of Queretaro.

One of Dr. Popenoe's suggestions for collection in Guatemala is the "Anay", a peculiar, large-fruited edible relative of the avocado which is classified in another genus, *Beilschmedia*. This large tree grows in several locations in central Guatemala, and we will make collections of it this year. In Honduras and Costa Rica, Dr. Popenoe has records of a strange type of avocado which has fruit with a thick skin like the Guatemalan race but has the strong anise odor of the Mexican race. This is a very interesting and potentially useful type, and we are making efforts to obtain this collection, with our own collectors or with the help of several good contacts that we have in Honduras and Costa Rica. These are merely a few examples of the many possibilities for root rot resistant collections provided to us by Dr. Popenoe.

Additional locations for species of *Persea* were obtained from the Kew Gardens Herbarium in England where there is also a good collection, particularly of South American species. At Kew also they have one of the best collections in the world of Asian plants in the family Lauraceae. Dr. Kostermans from Indonesia, specialist in this group in the Asian region, thinks that at least one of the other genera, the genus *Machilus*, should be classified with *Persea*. This genus has one species with edible fruit the size of a Mexican avocado: *M. edulis*. We now have information from the Kew collections on locations where this species grows and are trying to obtain material through Asian botanists.

Based on the information obtained from these various herbarium collections and contacts with Dr. Popenoe and other knowledgeable scientists, we now have a number of locations for expanding our collecting program for root rot resistance. These include

not only various native avocados, but also a number of the other species of *Persea*, including *P. rigens*, *P. pallida*, *P. steyermarkii*, *P. vesticula*, *P. standleyi*, *P. hintonii*, *P. podadenia*, *P. cinerascens*, *P. schiedeana*, *P. brenesii*, *P. sessilis*, *P. mutisii*, *P. chamissonis*, *P. liebmanni*, *P. urbaniana*, and *P. benthamiana*.

Since the additional funds were made available in the spring of 1971 for the increased rootstock resistance program, we have obtained the following collections:

P. americana var. *nubigena* — seeds sent from Honduras by Dr. Antonio Molina.

Beilschmiedia anay — seeds sent from Mexico by the Mexican Coffee Research Institute.

Persea americana — two collections of seeds from Costa Rica, by Dr. B. H. Waite of the Organization for Tropical Studies.

Ocotea (?) — avocado relative — two collections of seeds sent from Costa Rica by Dr. Waite.

Persea americana — 24 collections from Guatemala — seeds and bud-wood collected by E. L. V. Johnson and Dr. E. Schieber (described in detail in accompanying article).

Persea schiedeana — collected in Guatemala by Johnson and Schieber.

Persea sp. (?) — collected in Guatemala by Johnson and Schieber.

Persea americana v. *nubigena* — collected in Guatemala by Johnson and Schieber.

Persea steyermarkii (?) — collected in Guatemala by Johnson and Schieber.

Persea americana — collected in El Salvador by Johnson.

Persea schiedeana — collected in El Salvador by Johnson.

Persea americana — 19 collections of seed and budwood from Mexico by F. B. Guillemet (described in detail in accompanying article).

Persea schiedeana — 3 collections from Mexico by Guillemet.

Persea americana — 7 collections from Guatemala by G. A. Zentmyer and E. Schieber.

Persea americana — 4 collections from Costa Rica by Zentmyer and A. C. White.

Persea americana — 4 collections from Mexico by Dr. W. B. Storey.

Persea americana — 2 collections from Mexico by Oscar Clarke.

Persea sp. (?) — 1 collection from Oaxaca, Mexico, by Clarke.

Persea sp. (?) — 1 collection from Chiapas, Mexico, by Clarke.

With the increased funds available we will be making additional collections throughout the year, in an effort to find the ideal, highly resistant and graft-compatible avocado type or other species of *Persea*. The various species fruit at different times of year in various localities, so that additional collections will be made this fall, winter, and spring. We appreciate very much the contributions from many growers in California, which have made this expanded program possible.