

## COLLECTIONS FOR ROOT ROT RESISTANCE IN GUATEMALA, MEXICO AND EL SALVADOR

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Early in 1971 we obtained information, principally from the collections of *Persea* (the avocado is *Persea americana*) in the herbarium at the New York Botanical Garden, and from Dr. Wilson Popenoe on possible new areas for collecting additional avocado relatives as well as native avocados in Mexico and Central America, which might serve as rootstocks resistant to the avocado root rot fungus, *Phytophthora cinnamomi*. Collecting trips were made to these areas in the summer of 1971, with the aid of special funds contributed by the California avocado industry.

The plans, as on previous collecting trips, were to collect either seeds or budwood, or both, from species related to the avocado and not collected before, and to collect additional material from vigorous native avocado trees. Attempts were made particularly to find vigorous old trees growing in very wet areas, or, preferably growing well in the presence of the root rot fungus (*Phytophthora cinnamomi*). The necessary quarantine permits were taken on the trips, as avocado seeds or budwood cannot be imported into California without special permits from the United States Department of Agriculture. Avocado seeds must be sent through either El Paso or Brownsville, Texas, where they are fumigated with methyl bromide to assure that the avocado seed weevil, a common pest in Latin America, will not be brought into California. We may send avocados or *Persea* sp. budwood through the quarantine stations in California, where the material is inspected, then released to us for growing under a post-entry quarantine permit.

A three week avocado collecting expedition was conducted this summer in Guatemala, with the excellent cooperation of Guatemala plant pathologist Dr. E. Schieber. The objective of this trip was to locate certain wild species of avocado closely related to *Persea americana*. This yielded propagative materials of *Persea schiedeana*, *Persea steyermarkii*, and *Persea americana* var. *nubigena*. Other collections were made from avocados known locally as "aguacatillo", "mutul oj", and "perulo oj". The latter two were Mexican seedlings rarely found in this region.

Our first week was spent in the Lake Atitlan area. Near Tecpan, seeds and budwood were obtained from *Persea americana* var. *nubigena*, (Fig. 1) which grows to be a huge tree, 70 or 80 feet in height. The fruit of this variety were small (2 inches in diameter), green and spherical (see photo). Near Solola, material was collected from the "Mutul Oj". This avocado tree produced small, black pyriform fruit and leaves possessing a distinct anise odor when crushed, which suggested Mexican ancestry.



Figure 1. Leaves and fruit of native tree related to the avocado, Tecpan, Guatemala (*Persea americana* v. *nubigena*).

Antigua became our headquarters for the last two weeks. On a long journey to the Jalapa area, budwood from *Persea steyermarkii* was collected; this is a species closely related to the avocado. Another day, a local market supplied *Persea schiedeana* seeds. *P. schiedeana* is one of the large fruited species of *Persea*, quite similar to the avocado, but the flesh of the fruit is usually brownish gray and not of as good quality as the average avocado.

During the last week, one of our more memorable discoveries occurred. At an elevation of 7,000 feet on the slopes of the volcano Acatenango, some unusual trees grow. Locally known as "aguacatillo" (little avocado), these magnificent trees towered up to 100 feet in height and grew nearly 3 feet in diameter (Fig. 2). The fruit, very small, black skinned and oval in shape (Fig. 3), had little meat, and were filled almost entirely with deep purple colored seeds. In the same area, another Mexican type seedling, "Perulo Oj", was found.

Two additional collections were made during a short stay in El Salvador. With excellent assistance from Mr. Armando Alas-Lopez and Mr. Tamacas of the Santa Tecla Experiment Station, we were able to collect seeds from the "Aguacato mico" and budwood from *Persea schiedeana*. The 50 to 60 foot "Aguacate mico" (possibly *P. americana* var. *drymifolia*) avocado tree was located high on the dense jungle slopes of Volcano San Salvador and produced small green oval shaped fruit. *P. schiedeana* budwood was secured near Atecozol.

In summary, the 7 specimens described above were collected. Additionally, 15 separate lots of seeds were extracted from fruit purchased at local markets. Also, numerous unhealthy appearing trees were tested negatively for *Phytophthora cinnamomi*. This fungus has never been isolated on avocado trees in Guatemala. Presently, these seed collections are being screened for root rot resistance at Riverside.



**Figure 2. Trunk of large "Aguacatillo" tree and Sr. Arturo Falla, on slopes of volcano Acatenango, near Antigua, Guatemala.**

Also, three weeks were spent in various parts of Mexico, again with the aim of collecting avocados or related species of *Persea* that might be resistant to root rot.



**Figure 3. Leaves and fruit of "Aguacatillo" tree from Falla property, slopes of volcano Acatenango, near Antigua, Guatemala.**

The first week of our investigations were conducted in and around the state of Michoacan. With the aid of Ing. Sergio Arevalo V., of Agroquimica de Uruapan, we looked at a great number of root rot areas. Two seedling avocado trees of the Mexican type were found growing in root rot areas. Neither of these trees exhibited any root rot symptoms, even though we were able to recover *Phytophthora cinnamomi* from the roots of one of them.

Our next stop was Mexico City, where we mailed our collections and while we were there looked for avocados in the central market. We found several interesting looking avocados along with some "chinini" or *Persea schiedeana*. From here we proceeded to

the state of Vera Cruz. A number of collections of avocado seeds were made in the areas of Cordoba, Orizaba and Nogales. Most of the collections were of the Mexican type, from trees of various sizes and shapes, with a very wide assortment of fruit types.

The third and final week of our collecting trip was conducted in and around the state of Queretaro. We were assisted by Dr. Jesus Castro, Plant Pathologist at Celaya. We discovered two very interesting seedling trees in San Juan del Rio. These trees were growing on a ranch owned by Señor Teófilo Gomez C., and were quite large (50 ft. in height) and appeared very vigorous. They were in a twenty acre field, that the owner stated was destroyed by *Phytophthora cinnamomi*.

To briefly summarize, we have found several vigorous escape trees, which have been introduced and propagated at Riverside. We are hopeful that with cooperators in Mexico, we will be able to obtain seeds from these trees to learn something of their resistance sooner.

### **SUMMARY OF COLLECTIONS, SUMMER 1971**

Guatemala: *Persea americana* – 26 collections from various areas, involving 155 seeds, and 12 budwood collections.  
*P. americana* v. *nubigena* – budwood and 24 seeds.  
*P. schiedeana* – 12 seeds.  
*P. steyermarkii* (?) – budwood.

Mexico: *Persea americana* – 19 collections from various areas, involving 134 seeds and 4 budwood collections.  
*P. schiedeana* (“chinini”) – 3 collections, 16 seeds.

El Salvador: *P. schiedeana* – budwood.  
*P. americana* (?) – 15 seeds.

(Collections in Guatemala and El Salvador made by E. Johnson, in Mexico by F. B. Guillemet.)