

## COLLECTING PERSEAS IN CENTRAL AMERICA AND MEXICO

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"Aguacateando": hunting for wild avocados, occupied much of the time of the senior author during the past year, in the search for avocado rootstocks resistant to *Phytophthora cinnamomi* under the expanded collection program by the University of California. (Another article in this Yearbook summarizes the collections in all of Central America and Mexico; this article reports a number of the interesting collections made by Dr. Schieber).

Making collections begins with the study of previous botanical exploration on *Persea* in the region. Information provided by Dr. Popenoe, Dr. Louis Williams, from Dr. L. Kopp's monograph, and obtained by the second author in visits to many herbaria in the United States and Latin America helped to serve as a guide to locations where species of *Persea* might be found.

There are areas where complete forests have been destroyed during the recent decades, so that it is impossible to locate a particular species described for that area. Sometimes, particularly in the highlands of Guatemala, native guides will inform you that only where the Quetzal bird is found there you may find wild avocados, as this rare bird eats the fruit of some *Perseas*. Therefore we must explore the Quetzal country.

In some cases, several new species were found along with the single one that was described for the area. This was the case in Nicaragua, while searching for *P. rigens*, other species were found.

The problem of not encountering flowers or fruit when the region is visited is a common one, which makes it often necessary to make several trips to the same region.

### SOUTHERN MEXICO

In June 22, a second collecting trip was made to the region of San Cristobal de las Casas in Chiapas, Mexico. Collections were made in five different areas, as detailed below:

**Comitán** — One tree of "Aguacate Yema de Huevo" was found here at nearly 5000 ft. elevation; this was a tall tree (50 ft.) with trunk and branching similar to *P. americana*. Fruit were round and dark purple, about 2 ½ inches in diameter, with yellow flesh, hence the native name. The leaves did not have the anise odor. A collection of *P. americana* v. *drymifolia*, the typical Mexican avocado, was also made here.

*Amatenango* — A large, old tree of the *P. americana drymifolia* type known locally as "Tzizi" or "tzizito" (Figure 1) was found just before reaching the valley of Amatenango, at about 5500 ft. elevation. Budwood was collected.

**San Cristobal de las Casas** — Eight collections were made in this area, both of the Mexican type (*P. americana drymifolia*) and of *P. americana* types. Some of these were fruit from the market in San Cristobal de las Casas, (Figure 2) brought in from various areas in Chiapas, including some from the "tierra caliente" - West Indian types from the lowlands, as from Tapachula, with yellowish-green to reddish-green fruit.



Figure 1. Branch with fruit of Mexican type avocado "Tzi Tzi To", near valley of Amatenango, Chiapas, Mexico.



Figure 2. Avocados in market at San Cristobal de los Casas, Chiapas, Mexico.

**San Andres** — Four collections were made here, including both *P. americana* v. *drymifolia* types and *P. americana*. One tree was very old, with interesting shape, in an old forest near the edge of the town of San Andres; the leaves had a strong anise odor. Another tree of "Aguacate de Anis" was found outside the town of San Andres towards Chamula; fruit were green and leaves with anise odor. Here very primitive fruit of *P. americana* were found; these were round and hard-shelled fruit such as those found in Quiche, Guatemala.

**La Ventana Mountain** — Two trees of "Aguacate de Monte" were located at the edge of the crater of La Ventana mountain, south of San Cristobal de las Casas. "La Ventana" is between Cerro Santa Cruz and Cerro la Pantoja, in the mountainous region on the south side of the valley where San Cristobal de las Casas is located. These trees were at an elevation of 8,000 ft. on limestone, and in a forest with oaks and pines. This appears to be *Persea americana* v. *nubigena*, which has not been reported before from Chiapas, Mexico. Frosts are frequent in this area, so that these trees show tolerance to low temperature. Another tree of *P. americana* v. *drymifolia* "Aguacate de Anís" was found at Estación de la Flor, Km. 145 between San Cristobal de las Casas and Comitán; leaves were a brilliant green in color, and with anise odor. Budwood was collected.

## GUATEMALA

**Lake Atitlan region** — To reach an area where we had information on the occurrence of *Persea standleyi*, it was necessary to take a boat across Lake Atitlan from Panajachel, then hike 8 hours to the mountains between Volcan San Pedro and Volcan Santa Clara. Two trees with the local names of "Aguacate do Monte" or "Canoj" or "Kanoj" were found in the natural mountain forest close to the small village of Panyebar, at an elevation of about 8,000 ft. These may be *P. vesticula* instead of *P. standleyi*; the trees are about 100 feet tall with leaves 7 to 8 inches long which have a medicinal odor, not the anise odor. The natives said that the fruit is very small and bitter; no fruits were available in January, so budwood only could be collected. The trees are commonly cut for their very hard wood which is used for making houses and canoes (cayucos) used on Lake Atitlan.

Another area on the west side of Lake Atitlan that will be explored further is above the village of San Pedro La Laguna, where "Aguacate de Montana" trees are said to occur. A guide who could help locate these trees was not available at the time of a trip there in March. This tree may be similar to the one found near Panyebar. On this visit to the area in March a very vigorous *P. americana* tree was found near the lakeshore near the town of San Pedro La Laguna; budwood was collected.

**Mazatenango, Quetzaltenango, and San Marcos** — Following instructions given by Dr. Wilson Popenoe, a specimen of the "Anay" tree, a close relative of the avocado in the genus *Beilschmiedia*, was found on the grounds of a farm, Finca El Compromiso, near Mazatenango on the Pacific coast side of Guatemala. This was a large tree (Figure 3), with fruit the size of the average Fuerte (Figure 4) but dark purple and with a large seed. Twenty seeds were collected from this tree in September.

In August, 1972 a trip was made to San Marcos in the western highlands of Guatemala, to find trees of *Persea steyermarkii*, as the type collection by J. A. Steyermark was made in the Depto. of San Marcos, between Finca El Porvenir and San Sebastian. Four trees that appear to be *P. steyermarkii* were found in the Caserio Buena Vista that is close to La Lucha, a satellite of Finca El Porvenir. The trees were in a natural cloud forest at about 7,500 feet elevation. Trees are similar in appearance to *P. americana nubigena*, but with somewhat smaller leaves, very dark green on the upper surface and light green beneath. Fruit is said to be globose, with very little flesh, and to be available in December. Budwood was collected of this new species.



Figure 3. Tree of "Anay" (*Beilschmedia anay*), related to avocado, near Mazatenango, Guatemala.

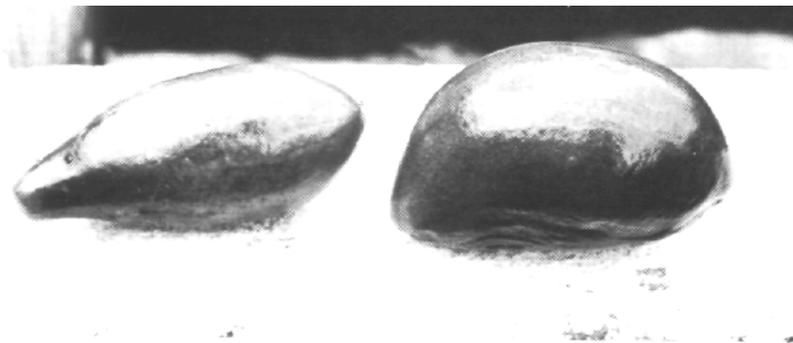


Figure 4. Fruit of "Anay" (*Beilschmedia anay*) near Mazatenango, Guatemala.

In another expedition to this area in September, the *P. steyermarkii* trees were found to be flowering. Typical *P. americana* fruit were collected of six different types, generally the typical Guatemalan type with oval shape.

In the Department of Quetzaltenango, near the town of Nahualá, a very vigorous and unusual type of *P. americana* tree was found. The leaves were relatively small, with reddish new growth, and according to the natives the fruit are quite small. The native name for this tree is "Oj". Budwood was collected. Also, some different types of fruit were collected in the Quetzaltenango market in September.

**Jalapa** — On a second trip to the Depto. of Jalapa in September, the region of Miramundo, La Soledad and Las Minas were covered. Here an unknown *Persea* was found that resembles both *P. americana v. nubigena* and *P. steyermarkii*. The trees of this different type are only about 18 to 25 feet in height, with smooth leaves, with a bluish color underneath. Fruit are smaller than *P. americana v. nubigena*, round to pear shape, with color ranging from yellow-green to yellow and occasionally reddish. The bark of the trunk when cut is red to purple in color. Some seeds were collected.

In this same area many trees of *P. americana v. nubigena* were seen, some with young fruit, in September. In the Finca Las Minas another unidentified *Persea* tree that has been seen previously was found to have some flower buds, so that fruit should be available in December. Leaves are too broad to be *P. steyermarkii*.

**The Cuchumatanes** — In March a visit was made to the region of Nebaj and Chajul in northern Quiche. The first collection made here, in the locality of Los Compadres, was of "Xun-oj" (little avocado in Quiche language), a tree with leaves having a bluish color underneath and very dark green above, with a strong anise odor. Fruit are small, purple, about 4 cm. in length, apparently of the Mexican type. The fruit is edible and seed is used for preparation of tea to cure coughing.

The second collection was in the region of Xongaj, which can only be reached with a jeep during the dry season, followed by walking two miles. The tree found in this area was also named "Xun-oj", but was different from that near Los Compadres. Leaves are more like "Anay" in Mazatenango, but natives say that they cut the trees because the small fruit is poisonous; it is said to be green, round and approximately 4 to 6 cm. in size, and not edible. In this area the natives do not speak Spanish.

In April a second visit was made to the region of Nuca-Barillas in the Depto. of Huehuetanango, where more trees of "Onte" were located. The fruit seems like an avocado, smooth and green, but with very little flesh, similar to *P. americana v. nubigena*. The trees have very erect and rough leaves, giving the appearance of an oak tree. The trees were found at an elevation of over 8,000 feet, where frost is common, yet these *Persea* trees seem to resist some frost damage. Some of this natural forest is being burned, so that there is danger of extinction of the "Onte" trees, along with extinction of the Quetzal bird.

**Quiché** — In February a trip was made to Pamesebal, north of the well known town of Chichicastenango. A tree of "Aquacate de Barranco" or "Aquacate Amarillo" was located at Pamesebal, which is north of the city of Quiché, and two miles by trail from the road, located in a very deep canyon of native vegetation. This tree does not have

the typical avocado shape, but leaves and fruit are typical of avocado. The fruit is pearshaped, of medium size, with a green-yellow color.

Ten additional collections were made in the Depto. of Quiche in July, including "Aguacate de Anís" — one of the oldest trees seen in Mexico or Guatemala; this was near the town of Cunen. The leaves have the anise odor. In Sacapulas, La Estanzuela and Chichicastenango additional collections were made, largely of "Criollo" types of avocado. These "Criollo" types have very primitive round, hardshelled, rough skinned fruit, similar to those in San Andrés, Chiapas. One huge tree of the "Criollo" type was collected in La Estanzuela, between Sacapulas and San Pablo Jocopilas. This tree is probably over 100 years old, with oval, yellow-green fruit.

## **EL SALVADOR**

A number of different types of avocado, and avocado relatives were collected in the course of a visit to El Salvador in June. Upon arrival in the country, plans were made with Ing. Armando Alas, Director of CENTA (Centro Nacional de Tecnología Agropecuaria) and Ing. Rene Portillo V. of the Horticulture Department of CENTA, in Santa Tecla. Trips were made to the region of Volcan Santa Ana, in the Depto. of Santa Ana; and to the border with Honduras in the north, to the mountain range of the Esesmiles in the Depto. of Chalatenango.

Seeds of *Persea schiedeana*, a tree with fruit similar to the avocado, were collected in markets en route to Santa Ana; the local names for these trees are "Chucte negro" and "Chucte blanco".

A tree of "Aguacate de Mico" (Figure 5) was found at Los Andes, on the slopes of Volcan Santa Ana; this was a tree more than 100 years old, very vigorous. Fruit were still small in June; budwood was collected.

Two trees of *Persea* were found in the high mountain range (6500 ft.) of the Esesmiles. One was definitely of *P. americana* v. *nubigena*, similar to those found in Tecpan and Miramundo areas of Guatemala. Fruit were not ripe in June. The other tree was called "Cola de Pavo" by the natives, and is different from the first. The small, elongated fruit look somewhat like fruit of the "Aquacatillo" from the slope of volcan Acatenango they are about 1½ inches in length.

The area of Los Esesmiles was visited because we found a record of *P. steyermarkii* in this region. No such trees could be found, however, after intensive search, and the natives in the area know only of the two *Perseas* described above. Most of the natural forest has been cut in recent years. Pine trees were seen at the high elevation, and quetzal birds were there also.

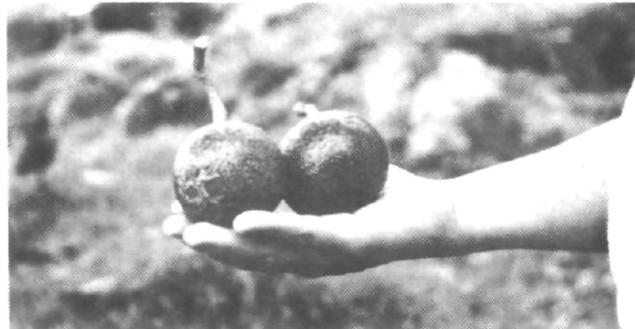
## **NICARAGUA**

In June 1972 a visit was made to the Matagalpa region in the "Cordillera Dariense" of Nicaragua, based on information obtained on an earlier trip and collections made in this area by G. A. Zentmyer. *Perseas* were observed on the property of the owner don Leo Salazar of the Hotel de la Montana, Santa Maria de Ostuma (elevation 4700 ft.), and in

the mountain area "El Arenal" some distance above the hotel area.



Figure 5. "Aquacamico" tree and fruit from Los Andes, on the slopes of the volcano Santa Ana, El Salvador.



At this time the following trees were located and collections were made: 1) *Persea rigens* (local name: "Guaslipe" or "Guasquil"); a very large tree with open branching and clusters of green, date-like fruit which are long and deep black purple when ripe. 2) "Aguacate de Mico", another large tree that appears to be *Persea americana*; fruits are round as one located at Los Andes in volcan Santa Ana in El Salvador. 3) and very hard shelled with coarse skin and small seed. This is the same "Aguacate de Monte", another tree that appears to be *P. americana*, but is different from Aguacate de Mico; seeds are much larger and the round fruit has almost to meat. The bark of the trunk is used for making tea to use against kidney diseases by local inhabitants.

In the "El Arenal" area on the road above Hotel de la Montana (elevation about 4900 feet), is a very old and original rain forest, with diverse and fantastic flora; the region is almost untouched. Here five additional collections were made: 1) "Aguacate Canelo" — a tree about 65 feet tall, with leaves similar to *P. steyermarkii*, but with fruit oblong and about 3.5 cm. in length, which is said to be purple black when ripe; this is probably in the genus *Phoebe* or *Nectandra*. The fine wood of this tree is used for furniture. 2) "Aguacate" — this tree is strikingly similar to *P. americana* var. *nubigena* found at Tecpan and Miramundo in Guatemala; fruit were not available, but were said by the natives to be round and green in color. This is probably *P. americana* var. *nubigena*. Wood is used for construction and canoes. 3) "Aguacate Posan" — dark green tree, not as tall as the other collections; it could be related to *P. vesticula*. No fruit were seen on this tree; "Aguacate Posan" has a fine wood used for construction and furniture. 4) "Posan" — this is similar to collections made of Kan-oj in Panyebar, Santa Clara region of Lake Atitlan in Guatemala, and to the collection at El Manzano, San Jose la Sierra in eastern Guatemala. The leaf type suggests that it is *Persea vesticula*; no fruit were present in June. 5) "Aguacatillo Peludo" — this is an "aguacatillo", with fruit like another genus, *Phoebe* or *Nectandra*, in the Lauraceae; there were typical empty cups at the fruit peduncles left on the branches. Fruit were said by the local guide to be oblong and about 5 cms. in length.

### ***Persea nubigena (americana v. nubigena)***

Many collections have been made of *Persea americana* var. *nubigena* (*P. nubigena*) during 1971 and 1972, in cloud forests from Chiapas, Mexico down through Guatemala, El Salvador, Honduras and Nicaragua. This species was consistently found at altitudes between 6000 and 8000 feet, in the high mountains where frost occasionally occurs. It is a sizeable tree, to 120 feet in height, with oval roughened green fruit (2-2½ inches in diameter), and coarse, rough-textured leaves; the seed is very large, comprising most of the fruit. The type collection of this species was in the Xixoy mountain near Tecpan in the Depto. of Chimaltenango in Guatemala, collected by Williams and Molina near the saw-mill of Aserradero de Santa Elena. The second author of this paper collected this species from that same area several years ago. The local name is "Aguacate de Montana".

Collections made by the senior author were from southern Mexico (La Ventana mountain); Nuca-Barillas in the Cuchumatanes, Depto. of Hehuuetanango in Guatemala; Xixoy (Chichoy), Tecpan in the Depto. de Chimaltenango (with E. Johnson); Miramundo, in Jalapa in eastern Guatemala (with E. Johnson); in the high mountain range of Los Esesmiles, Depto. of Chalatenango in El Salvador; and in Nicaragua, in the "El Arenal" area above Santa Maria de Ostuma. The wood of this species is used in Nicaragua for construction of canoes. In Guatemala the seed is used for medicine.