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PROGRESS OF THE STUDY ON THE AVOCADO GENETIC RESOURCES: THE FINDINGS FROM THE MEXICAN GULF REGION

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Abstract

Explorations have been carried out in search for specimens of the genera *Persea* in the states of Tamaulipas, Veracruz, Puebla, Tabasco, Yucatán, Oaxaca and Chiapas. They have been collected genotypes of the Mexican race *(Persea americana var. drymifolia),* Guatemalan race *(P. americana var. guatemalensis),* West Indian race *(P. americana var. americana), and* hybrids among these races, in addition the species *P. nubigena, P. donnell-smithii, P. borbonia, P. schiedeana, P. steyermarkii, P. vesticula, Beilschmiedia anay* and other 3 kinds of *Persea.* They have been located two places where items of the Mexican race are growing under wild condition; Tula-Ocampo, Tamaulipas and Tantima, Veracruz, and for the case of the West lndian race a possible wild individual in Tantima, Veracruz. Of the Guatemalan race we have not found wild subjects, however, in Motozintla, Chiapas, we have collected a type of *Persea* of the subgenera *Persea* that grows wild in the low parts of the hillsides together with pines, that its fruit seems like a primitive type of the Guatemalan race, but its leaves are different and with so much brown pubescence even in the shoots, that we think that is a new species of *Persea.*

1. Introduction

Wild and semi-wild gene pools of avocado are vital to locate desired genes for resistance to diseases and pests, as other characteristics that are apparently absent in the domesticated gene pool. Some examples are the root rot caused by *Phytophthora cinnamomi* where collections of

the late Dr. Eugenio Schieber in Guatemala showed high resistance to the fungal pathogen (Zentmyer, 1993), and the case of studies carried out in Israel of different rootstocks under contrasting stress conditions, where some items like 'Orizaba 3' showed a more universal adaptation to different stress conditions as rootstocks, or like 'Antigua' and 'Galvan' that were outstanding under *Phytophthora cinnamomi* conditions (Ben-Ya'acov et al., 1992b).

Deforestation has accelerated dramatically in the tropics. At current rates, developing countries will have lost close to 40 percent of their forest cover between 1978 and the turn of the century (Westoby, 1989), During the last two or three decades, the native and semi-wild avocado material has been disappearing rapidly. This avocado genetic erosion is probably even faster that we could imagine previously (Ben-Ya'acov et al., 1992a). It is urgent to Conserve as many native avocado items for future use before it is lost forever. The general aim of the "Study on the avocado genetic resources" is to contribute to the exploration, collection and conservation of the germplasm of the avocado and related species.

2. Materials and methods

Exploration work was carried out in what we call "Mexican Gulf Region", that includes the Mexican States of Tamaulipas, Veracruz, North of Puebla, Tabasco, Yucatán, Oaxaca and Chiapas. The visited sites were planned according to the literature, herbarium specimens information and personal communication with agronomists, botanists and village people. Collection of vegetative material was based on budwood, seed and seedlings and were made in field as well as local markets. The collected materials were taken to the nursery and after established at the high and low elevation germplasm banks located in the State of Mexico of the Fundación Salvador Sánchez Colin-CICTAMEX, S.C. (López et al., 1994).

3. Results and discussion

Until now 39 visits to different places have been made (table 1, 2 and figure 1), with 143 items collected (table 1 and 2). Some of the interesting collections made are the ones growing under wild conditions in Motozintla, that we think is a new species belonging to the subgenera *Persea* and could be one of the direct ancestors of the Guatemalan race. One of the main characteristic of distinction, of this species, is the dense brown pubescense in the abaxial part of the leaf and on the young stems, the fruit is like a primitive Guatemalan but with very few flesh. Near the same place in a backyard collection, we located seedlings of the Mexican race that had flowers and fruit set after some months of sowing (less than a year).

A vast variability has been found in the 3 races of avocado, with special characteristics under their natural conditions, like tolerance to high lime content of the soil (West Indian race in Yucatán), drought conditions (Guatemalan race in Chiapas), good fruit quality (Guatemalan race in Chiapas), tree longevity (Mexican race in Veracruz), fruit peel thickness of 0.5 cm (Guatemalan race in Chiapas), high oil content (Mexican race in Veracruz), two productions a year (West Indian race in Yucatán), resistance to moth borer (West Indian race in Tamaulipas), production of adventitious roots on the trunk *(Persea steyermarkii* in Chiapas), among others. All of the characteristics of each item must be checked to determinate its possible use for horticultural purpose. The collected species related to avocado are *Persea steyermarkii, Persea nubigena, Persea donnell- smithii, P. borbonia, P. schiedeana, P. vesticula, Bedschmiedia anay* and other 3 kinds of *Persea. We* think that *Persea steyermarkii and Persea nubigena* from

Chiapas have been confused by botanists with *Persea floccosa* because these species show some pubescence in very young shoots, which is common in *Persea floccosa*, the identification of the two species has been confirmed by Ing Edgar Martinez from Guatemala and by the botanist Luis Poveda from Costa Rica.

Due to the forests and jungles destruction in Mexico, in several cases upon returning to visit the original trees where a collection was made, we have found that they have been cut-back, therefore it is urgent to try to keep the germplasm that still can be located and that could serve for breeding programs in the future, before they disappear for ever.

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Table 1 - Plant material collected in the States of Tamaulipas, Oaxaca, North of Puebla and Tabasco, México until 1995.

State	Locality of collection	Number	Race or species	Remarks
Tamaulipas	Valle Hermoso	1	1 *Persea borbonia*	
	Tula-Ocampo	4	3 Mexican	Wild condition.
			1 *Persea* spp.	Species of the sugenera *Eriodaphne*
	Ocampo	13	10 West Indian	One resistant to moth borer
			3 W.I. x Mex.	
	Guadalupe	2	1 Mexican	
			1 West Indian	
	Llera	1	1 Mexican	Cultivar 'Papo'
	Santa Engracia	1	1Mexican	Cultivar 'Carmen' from a 80 year old orchard.
	Allende	1	1 West Indian	
			Total 23	
Oaxaca	Tlacolula	2	1 Guatemalan	Market collection, primitive Guatemalan
			1 Mexican	
	Nochixtlán	5	5 Mexican	
			Total 7	
Puebla	Cuetzalan	4	4 *Beischmiedia anay*	Called "anayo"
			Total 4	
Tabasco	Teapa	1	1 *Persea schiedeana*	Low land "chinini"
			Total 1	

Figure 1 - Exploration and collection sites of avocado and relatives germplasm in the "Mexican Gulf Region" of México.

Table 2 - Plant material collected in the States of Chiapas, Veracruz, and Yucatán, México until 1995.

State	Locality of collection	Number	Race or species	Remarks
Chiapas	San Cristobal de las Casas (market)	14	12 Guatemalan 2 Mexican	High variability in fruit forms
	Olanca-Tuxtla Gutiérrez	6	6 Guatemalan	One drougth resistant
	Teopisca	1	1 *Persea schiedeana*	Low land "chinini"
	San Andrés Larrainzar	4	4 Guatemalan	Good fruit quality
	Tenejapa	5	4 *Persea vesticula* 1 *Persea* spp.	Wild species
	Amatenango del Valle	4	1 *Persea* spp. 2 Guatemalan 1 Mexican (Mex.-Guat.)	Probable new species of the subgenera *Persea*
	Chalam	1	1 *Persea schiedeana*	High land "Hib" (chinini)
	Tzontehuitz	3	3 *Persea steyermarkii*	Main forest species, adventitious roots on the trunks.
	La Cascada near Siltepec	9	4 *Persea donnell-smithii* 2 *Persea nubigena* 3 *Persea steyermarkii*	Found wild in virgin forest of Lauracea
	Huixtla	1	1 West Indian	
	El Rodeo near Siltepec	3	3 *Persea nubigena*	Very old trees
	Motozintla	6	4 *Persea* spp. 2 Mexican	A new species of the subgenera *Persea*. Mexican types with very short juvenile phase
	Huitepec	2	2 *Persea nubigena* ?	Tolerant to cold conditions; 4°C with fruit set.
	Berriozábal	1	1 *Persea schiedeana*	Low land "chinini"
	Buenos Aires	1	1 *Persea* spp. ?	Rare type
			Total 61	
Veracruz	Aquila	2	2 Mexican	Very old trees
	Tantima	4	1 *Persea schiedeana* 2 West Indian 1 Mexican	Wild Mexican race and one probable wild West Indian race
	Tlapacoya	1	1 *Persea schiedeana*	Low land "chinini"
	Cazones	2	1 West Indian 1 Mexican	Mexican adapted to tropical conditions
	Antigua	12	12 West Indian	
	Huatusco	1	1 Guatemalan	
	Juan Rodríguez Clara	5	5 West Indian	
	Chiconquiaco	4	3 *Beilschmiedia anay* 2 West Indian	Called "escalán"
	Amatlán	5	2 Mexican 3 West Indian	
			Total 36	
Yucatán	Hunucmá	3	3 West Indian	Tolerant to lime induced chlorosis
	Tetiz	2	2 West Indian	Tolerant to lime induced chlorosis
	Yaaxhom	3	3 West Indian	One with 2 productions a year
	Yotholín	3	3 West Indian	
			Total 11	