

Exploring for sources of resistance among *Persea americana* variety *Guatemalensis* and *Persea schiedeana* in Middle America

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SYNOPSIS

Collections of species of Persea in Middle America for resistance to Phytophthora root rot in recent years have emphasised Guatemalan Criollos (Persea americana var guatemalensis) and the Coyou, Chucte, Chinini, or Jas (Persea schiedeana) from Mexico, Guatemala and Costa Rica. Collections since 1971 number approximately 1800. Resistance has been found in some Criollo collections and in Persea schiedeana.

INTRODUCTION

In 1952, when the second author began exploring for different species of *Persea* in Latin America (7), he became very interested in one group of avocados classified as *P. schiedeana* which is found from Chiapas (Mexico) to Central America and Panama. In 1971, when the first author started to collaborate in the explorations, he emphasised a second group of avocados: the Guatemalan Criollos. The authors gave this name to an extensive group belonging to *Persea americana* var *guatemalensis* as identified by Bergh (1). The first author explored regions deep into the Chiapas province in Mexico, after which he went to all the western and central Guatemalan highlands, south to Apaneca (a volcanic region in El Salvador) and to Copan (an important Mayan centre) in western Honduras. It was soon realised that this was the best geographical distribution of Guatemalan Criollos,

RESULTS

The Guatemalan Criollos

This important group of avocados, a very large population which grows mainly in the cool mountain regions of Guatemala, with a few populations in Mexico, Honduras, and El Salvador, constitutes in the authors' opinion the evolutionary foundation of the Guatemalan race. Bergh (1) in 1975 classified this important group under *Persea americana* var *guatemalensis*.

When touching on the history of the avocado, it is important to trace the distribution of these Guatemalan Criollos deep into Mexico; as Schieber & Zentmyer wrote in 1980: "In a recent collecting trip (June 1980) in Mexico, Schieber was interested to see how far into Mexico the Guatemalan Criollos are found, Following 'La Ventosa' trail from Paso Real, down to the Pacific ocean in Tehuantepec, he found trees near the boundary of

the states of Veracruz and Oaxaca, in the region of Jesus Carranza from Paso Real down to Matias Romero and Juchitan. It is of striking interest that this 'La Ventosa' trail was the one followed by the Spanish Conquistadores when Cortez sent Don Pedro de Alvarado (one of his captains) to conquer Guatemala. It is also the path the old Mayas followed in their 'wanderings'." (Schieber, unpublished work.)

During the last decade we have given prime importance to this group within the collecting programme of the University of California (4). The Guatemalan Criollos are characterised mainly by their round to oblate-shaped fruit (Figure 1) and sometimes by their hard-shelled skin. The seed of this avocado group is always oblate in shape. Although mostly a dark-green coloured fruit, some fruits are also purple or purple-green. The authors collected many samples in markets; some are a natural cross between a Guatemalan Criollo x *P. drymifolia*, found mainly in the central highlands of Guatemala where both species exist in the cool mountain ranges.

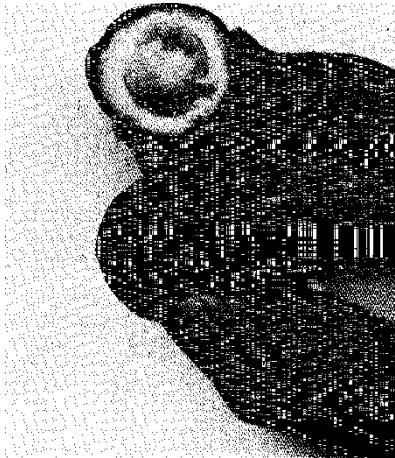


Fig 1 Guatemalan Criollos are characterised mainly by round to oblate-shaped trait.

Where are the ancestors of this very extensive group that, as stated before, the authors have been designating as Guatemalan Criollos (criollo meaning native in the Spanish language)? During 16 years of explorations mainly in Guatemala, the authors encountered four species of *Persea* that are linked in the evolutionary system of the Guatemalan Criollos: *P. steyermarkii*; *P. nubigena*; a type not classified and known by natives as Agucate de Mico; and a recently discovered primitive *Persea*, that Schieber & Bergh are naming *Persea zentmyerii* (unpublished work).

All Guatemalan Criollos grow between 4 500 and 8 000 feet above sea level in the so-called Tierra Fria in the highlands of Guatemala. Of interest are the trees that have been found at 8 500 feet above sea level, where frost occurs at the beginning of the year in the Guatemalan highlands. Schieber & Zentmyer noted in 1980 (4) that: 'It is here where collections could be made in search of "cold resistance"'. As for the

distribution of the Guatemalan Criollos, see previous paper by the authors published in the *California Avocado Society Yearbook*, 1980, pages 85-90(4).

During the past 15 years, the authors selected and recorded trees of Guatemalan Criollos in the central and western highlands of Guatemala. Many of the recorded trees show impressive vigour (Figure 2). Since 1971 many of the collections of Guatemalan Criollos have been from local native markets, mainly in the Guatemalan highlands (Figure 3). As written by the author in 1980(4): 'Avocados are found on almost every market day, and among these mainly the "Guatemalan Criollos". Western Guatemala, where heavy populations of trees exist, belonged to the Cakchiquel Kingdom, where today the same Mayas live. Here in the markets, the word you hear constantly is "Oj" for avocado, the "Guatemalan Criollo" avocado'.



Fig 2 Trees of the Guatemalan Criollos show an impressive vigour.



Fig 3 Fruits of the Guatemalan Criollos were obtained from native markets,

The *Persea schiedeana* group

The interest in this very important group of avocados classified under *Persea schiedeana* C G Nees, stems from the beginning of avocado explorations made by the second author in 1952 (2). This species of *Persea* is found in four areas in Guatemala and is known by natives as Chucte and Coyou (3). In the early years, Zentmyer also collected it in Costa Rica, where it is known by natives as yas. In Mexico it is known by the native name of Chinini, as found by the authors while in the state of Chiapas. The first description of *P. schiedeana* is found in Standley & Steyermark's *Flora of Guatemala* from a specimen collected in Guatemala (6).

The *P. schiedeana* group is distinguished by the pubescence of branches, leaves and its inflorescences. The fruit is edible (by the natives) and found in markets in the mountain ranges where it grows. They are mainly pear-shaped (Figure 4), long-necked and sometimes round to oblong in shape. Usually the fruit is light-green when unripe and chocolate-brown when ripe (Figure 5). Trees are found scattered in hills or swampy valleys and sometimes near cleared rain-forests, as in northern Guatemala (Figure 6). In contrast to other species of *Persea*, the *P. schiedeana* trees grow in warmer regions of Mexico and Central America.



Fig 4 The fruit of *Persea schiedeana* is mainly pear-shaped

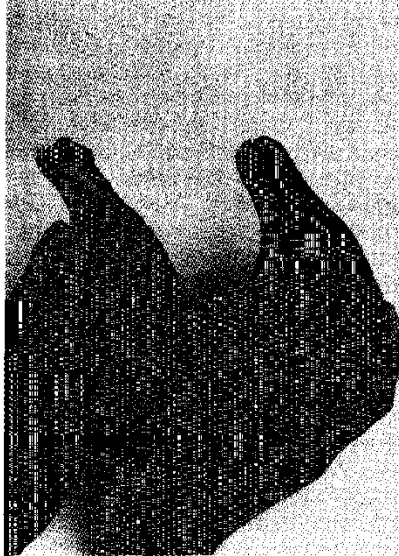


Fig 5 The fruit of *Persea schiedeana* is usually light-green when unripe and chocolate-brown when ripe.

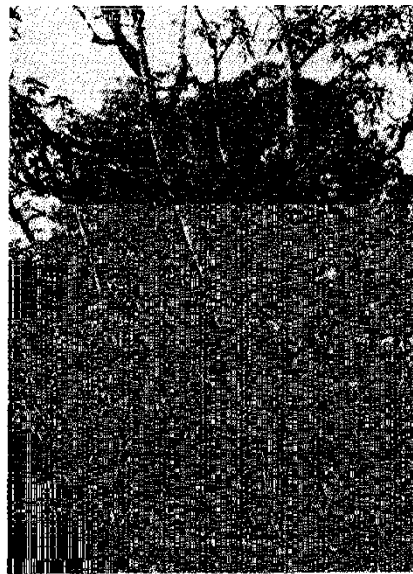


Fig 6 Trees of *Persea schiedeana* are sometimes found near cleared rain-forests.

In recent years, the authors collected from markets mainly in northern Guatemala (5). Trees of interest in the same region were also selected and recorded. One significant market collection was made in the region of Coban with Martin Grande, a Mayan who assisted the authors. G755 was collected - a collection that is currently of interest to researchers at UCR (mainly Prof MD Coffey and Mr FD Guillemet) because of its resistance to root rot in tests carried out in the greenhouse, as well as in the field, under Californian conditions.

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