

THE WILD AVOCADO OF MONTEVERDE, COSTA RICA

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SUMMARY

In the framework of a study of avocado germplasm resources, special attention was paid to Costa Rica, as it was found that its avocado tree population differs from those known to be from northern countries of origin. The wild avocado of Monteverde described in this article is a unique type of avocado, not known from any other habitat, but only from the wild forest of Monteverde, and it could not be recognized botanically, as any other known species. Its description shows that it is closer to *Persea nubigena* than to any known avocado, but its fruit is much bigger. The origin of the avocado that was discovered in Monteverde and measures for its future conservation and evaluation are discussed.

Key Words: *Persea americana* var. *Nubigena*, *Persea nubigena*, Wild avocado

Abbreviations: M.V.= Monteverde avocado; P.=*Persea*; S.G.=sub-genus;

S.S.= sub-species; Var.=variety; VN=variety *Nubigena*

BACKGROUND

Tropical America is considered as the origin of the avocado (*Persea americana* Mill.). Different avocado types could be found in each country of origin between Mexico and Peru, all of them belonging to the same species, but divided into four botanical varieties or sub-species, namely var. *Dry-*

mifolia (the Mexican avocado), var. *Guatemalensis* (the Guatemalan avocado), var. *Americana* (the tropical lowland avocado called also West Indian) and var. *Nubigena* (Kopp, 1966). Probably, some other *Persea* species should also be considered as sub-species of the *Persea americana* (Scora and Bergh 1992). Most of the information about the avocado sub-species was collected in Mexico and Guatemala, where their distribution is well known.

Like many other species and probably more than most, the wild avocado is now undergoing a rapid process of extinction. Many of the tropical forests that were cutback during the last two to three decades, included avocado types and relative species. The diversity of the avocado population has diminished and traits essential for future breeding research will not be available. For this reason, a study of the avocado germplasm resources was commenced in 1989; it includes exploration, collection, conservation and evaluation of the various accessions (Ben-Ya'acov et al., 1992). In Costa Rica, the exploration resulted in new avocado types not known in countries further north. (Ben-Ya'acov et al., submitted for publication).

METHODS

In a study of the avocado genetic resources, several different regions of Costa Rica were included. The ecological conditions of each region as well as earlier botanical investigations were studied. Plant material, either seeds or budwood were collected, propagated and conserved. Material was also used for evaluation for horticultural purposes, especially as rootstocks. Leaf material was collected, treated and sent to Germany for a study of its DNA characteristics (Bufler and Ben-Ya'acov, 1992).

RESULTS AND DISCUSSION

Among about 60 items that were described and collected in Costa Rica, one will be described here: the wild avocado of the Monteverde forest. When part of the forest was cut back, a type of avocado tree was discovered and left alone in the pasture. A few trees of the same type were found at an elevation of 1700 m above sea level, and probably there are more in the crowded forest.

The avocado tree of Monteverde (MV) is called "Nubichena" by local people; this is the Spanish pronunciation of "Nubigena". The main question is whether it is identical to var. *Nubigena* (VN) of *Persea americana*.

Twigs: MV has corky twigs; new vegetation flesh has green twigs, but when it attains only a few centimeters in length it becomes completely covered with a corky layer. This phenomenon is known also from VN in which it is less pronounced.

Leaves: Two leaf characteristics are common to MV and VN: the secondary-veins divergence of more than 60° and the existence of a canal along the leaf petiole. However MV leaves are smaller in size, do not hold erect positions like VN leaves and are softer.

Fruit: The VN fruit is limited to 4-5 cm in diameter (Schieber and Zentmyer, 1973; Williams, 1977). Williams even used this size limitation as a main identification trait. The MV fruit diameter is much bigger: 12-14 cm. Both fruits have a round form and corky skin, but the MV skin is much thicker, about 5 mm or more, and is harder and very woody (See Photo 1)

Distribution: According to several sources (Kopp, 1966; Schieber and Zentmyer, 1973, 1976). VN is distributed in Chiapas (Mexico), Guatemala, Honduras, El Salvador and northern Nicaragua. The place where we have found the MV was not included in any of these information sources.

Relationship with the Guatemalan avocado: Several different authors tend to consider the VN as a precursor of the Guatemalan avocado (the same applies to *P. steyermarkii* and *P. tolimanensis*) (Kopp 1966; Schroeder 1951; Williams 1977), and some of them included the Guatemalan avocado in the species *Persea nubigena*. Primitive Guatemalan avocado types as well as more developed ones could be found in the same regions where VN is abundant in Chiapas, Guatemala and elsewhere, but this is not the case with MV. All around Monteverde and throughout other parts of Costa Rica no Guatemalan avocado trees could be found. On the other hand, MV is much closer in size to the typical Guatemalan avocado than to any VN type.

Compatibility with avocado cultivars: VN is known to be graftable and compatible with avocado cultivars. We have some experience with MV: when we collected budwood in Monteverde, we managed to graft it on avocado rootstocks and the reciprocal grafts were also successful. A grower in Monteverde, Sr. Juan Evangelista, used to collect seeds from the wild jungle trees and grow them in his nursery. Then he grafted them with scion of different cultivars. The grafted trees in his orchard showed a bottle phenomenon, i.e., the rootstock trunk was stronger and hence thicker than the tip.

DNA analysis: The as yet uncompleted analysis has led to the conclusion that MV is an "avocado of unknown race" with "some VN traits". The wild avocado of Monteverde described here, and the mountain avocado of Costa Rica (Ben-Ya'acov et al., submitted for publication) are two of the avocado types of Costa Rica not known further north. One explanation for this fact (Jorge Leon, personal communication) is the existence of Lake Nicaragua, in southern Nicaragua near the Costa Rican border. In this place the mountain chain is interrupted, preventing the migration of mountain flora in either direction. The avocado type described here was not mentioned in past explorations of Costa Rica (Skutch, 1971; Zentmyer and Schieber, 1976).

CONCLUSIONS

The wild avocado of Monteverde, Costa Rica is a unique type of avocado, endemic to this area. It has many primitive characteristics, described in the article, but its fruit is much bigger than that of any other primitive avocado. It is more closely related to *Persea americana* var. *Nubigena* than to any other avocado type, but differs from the var. *Nubigena* in important traits. Probably it should be considered as a different variety. It is clear that the wild avocado of Monteverde developed separately from var. *Nubigena*, and neither of these two a precursor nor progenitor of the other.

No relationships to possible Guatemalan progenitors were found. This avocado is compatible with avocado cultivars and when it was used as a rootstock, trees developed successfully and showed precocity. MV avocado is now conserved in gene pools in Mexico, Costa Rica and Israel, and will be further evaluated for its horticultural traits.

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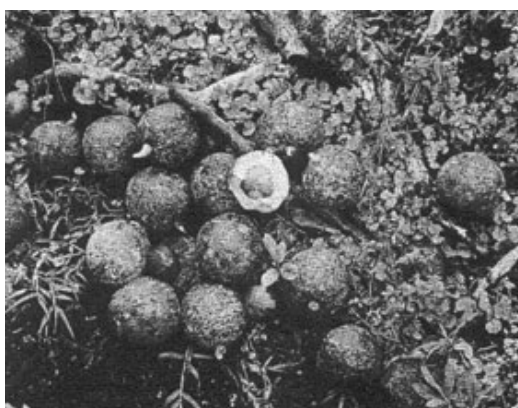


Photo 1. The wild avocado of Monteverde, Costa Rica