In: M. L. Arpaia and R. Hofshi (eds.), Proceedings of Avocado Brainstorming. Session I. Plant Breeding and Genetics. Pages 12-15. October 27-28, 1999. Riverside, CA. Hofshi Foundation. http://www.avocadosource.com.

THE IMPORTANCE OF THE CONSERVATION AND EVALUATION OF AVOCADO GENETIC RESOURCES

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According to some predictions we have already lost 40% of the forest cover in developing countries in the world. Unfortunately, much of the wild avocado germplasm are located in these areas. The loss of these resources is known as genetic erosion. This genetic erosion of avocado germplasm is devastating since possible useful genes that could be used for future plant breeding for cultivars and rootstocks are lost (Ben-Ya'acov and Michelson, 1995; Barrientos-Priego et al., 2000).

Natural forests containing avocado resources can still be found in some countries (Barrientos-Priego et al., 1998), where a vast assortment of representatives of the Mexican, Guatemalan, West Indian and *Costaricensis* avocado races (Fig. 1) can be found. Additionally, many other species such as *Persea steyermarkii* and *Persea nubigena* (Fig. 2), and other exotic germplasm related to avocado are also found.

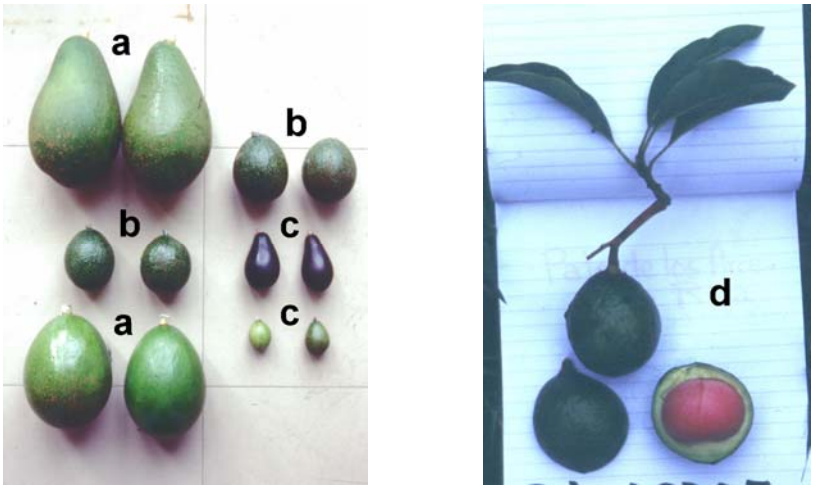


Figure 1. Representatives of *Persea americana* botanical varieties *americana* (a), *guatemalensis* (b), *drymifolia* (c), *costaricensis* (d). The first picture from pure items from México and the second from Costa Rica, taken by the author.

Wild avocado germplasm is an indispensable resource for the search of special attributes that are not among the horticulturally available items. For instance, the ability to form adventitious roots (Fig. 3), found in some genotypes of *Persea steyermarkii,* that grow out from the main trunk when it is damaged. This permits the tree to survive and to be a domi-

nant species in a forest in Chiapas, Mexico (Barrientos-Priego et al., 1992). Other examples are the rootstocks from Mexico, 'Orizaba 3', 'Antigua' and 'Galvan', that show an universal adaptation to multiple soil stress problems. The last two also have tolerance to *Phytophthora cinnamomi* (Ben-Ya'acov, 1992). The search of rootstocks among wild avocado germplasm is an effort which needs to involve international research cooperation. For instance, Spain is trying to solve the problem with the soil borne disease caused by the fungus *Rosellinia necatrix.* Seedlings obtained from the germplasm bank of the Fundación Salvador Sánchez Colín-CICTAMEX, S.C., have shown that there is potential for developing tolerance to this devastating disease (López-Herrera, 1999).

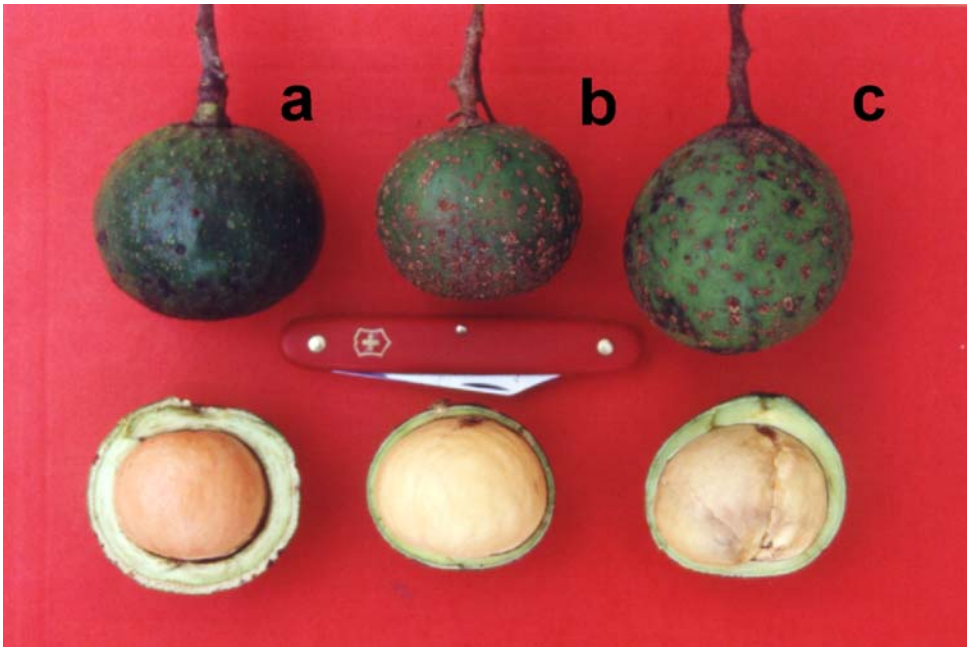


Figure 2. Fruit of a possible new species of *Persea* (a) that have leaves and shoots with brown abundant pubescence and fruits of *Persea steyermarkii* (b) and *Persea nubigena* (c), all collected by the author in the State of Chiapas, México.

In the opinion of the author, there is an urgent need for further exploration and collection of items from the vast avocado genepool that still exists. The collections done in the past only began the process of securing the genes that may be used in the future for avocado crop improvement. One goal for the future is to collect material that will help in improving the avocado root system. The root system is often called the hidden half, because of the lack of attention that is given to it because we do not see it. There is a tremendous amount of research that still needs to be conducted on avocado root systems. For example, there is a need to contrast root systems in avocado (Fig. 4) and their effects on the tree canopy.

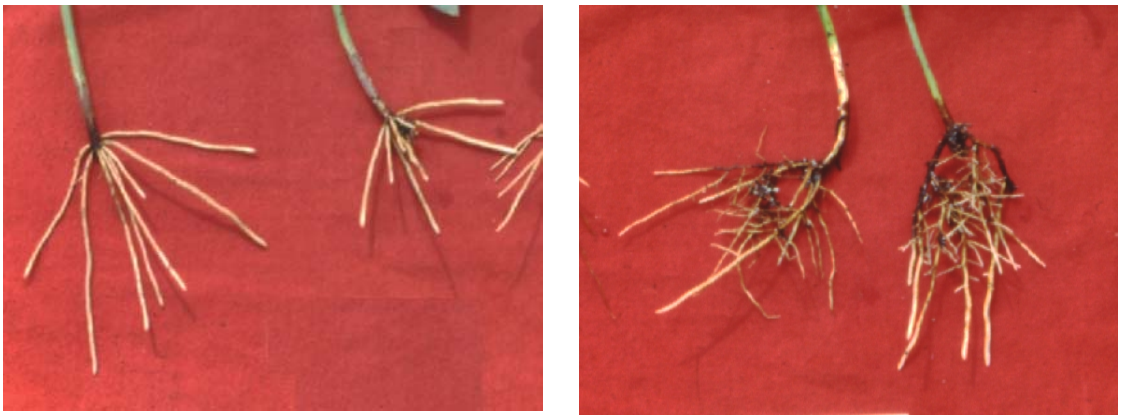
Avocado rootstocks are very sensitive to many soil stress factors (Ben-Ya'acov and Michelson, 1995) such as diseases (like *Phytophthora cinnamomi)*, high lime content, saline soil and irrigation water, recycled water, poor aeration, drought. Many of these factors have a direct impact on productivity (Ben-Ya'acov, 1996) and that is why we must put efforts to

know more about avocado root systems and their interaction with the environment. We must study their special characteristics that can be related to resistance for purposes of selecting among genotypes that may come from germplasm collections.

The conservation of the avocado genetic resources can be *in situ* or *ex situ.* The first option is in the natural environment, this could be the ideal for preservation but it has the inconvenience that it is exposed to fire, drought, and other factors that can destroy them, even if they are situated in protected areas. The *ex situ* orchard conservation is the most used method in fruit species, but the challenge for many genebanks of avocado is to get sufficient funding to continue in the preservation of the invaluable gene pools. During the World Avocado Congress IV in Uruapan, Mexico in October 1999, a Workshop dealing with avocado genetic resources was held, in which it was decided to gather an international avocado genebank with the direct participation of the International Avocado Society. If this efforts succeed it will generate many possibilities for the world avocado industry of the future. Only international cooperation can make this dream a reality. We must search for funding to create this international genebank of avocado, if we do not take action soon the resources will be lost forever.

Figure 3. Adventitious roots emerging from a damaged main trunk of *Persea steyermarki* and the author beside a tree showing restored new adventitious root system after growth for many years. This wild species is dominant in a forest near San Cristóbal de las Casas, Chiapas, México.

Figure 4. Adventitious root system of cloned avocado items differing in morphological root characteristics.



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