

The Expedition to Mexico of October 1947

Wilson Popenoe and Louis O. Williams

The possibility of discovering rootstocks resistant to those conditions which favor avocado tree decline is perhaps the factor most directly responsible for the appointment, by President Griswold, of the Committee on Foreign Exploration; but it has already become quite obvious that such a committee can serve the interests of the California Avocado Society in more ways than one. Here are a few of the objectives which, in our opinion, the committee may well hope to attain.

1. It can explore those regions in tropical America where avocados and avocado relatives grow wild, and bring together the forms which seem worth testing as rootstocks. This, as stated above, we may assume to be the primary objective. It will take some years to get results. Seedlings will have to be assembled and grown at one or more points in tropical America, until budwood is available for sending to California. There, trees will have to be grown until they come into bearing and their seeds can be planted for trial as root- stocks; unless, of course, some short-cut can be worked out. The probability that it will take a considerable number of years to obtain results makes it all the more important that no time be lost in getting under way.

2. New varieties can be introduced. While it has been the feeling, in many quarters, that California should depend in the future upon varieties of local origin, the fact remains that the industry has been based, for more than a quarter of a century, upon varieties which originated in the American tropics. President Griswold has pointed out that the industry needs varieties which capitalize the prestige of Fuerte and which at the same time will extend the season for Fuerte-like avocados, or prove satisfactory in regions where Fuerte for one reason or another, is not profitable. The fact that many Fuerte-like varieties are now known to exist in the Atlixco region of Mexico makes it seem worth while to explore more fully the possibilities along this line—and perhaps along other lines. This work was commenced in October 1947, as will be described later in this report.

3. The classification of horticultural varieties of the avocado and their development from ancestral forms, has not yet been worked out satisfactorily. While these problems may be of greater academic than practical interest, they are nevertheless worth consideration in connection with the general development of the avocado industry. It seems possible that much information can be obtained, as a side line, in connection with the search for wild forms and species closely allied to the avocado which are desired for trial as root- stocks.

As background for some of the work which has been undertaken by the newly-formed Committee on Foreign Exploration, President Griswold has requested that we attempt to summarize the situation as we see it. This we here attempt to do, in the light of what

has been learned in past years and in the expedition to Mexico of October 1947 conducted by Harlan B. Griswold, Carl S. Crawford, and ourselves.

What Do We Know About Wild Avocados?

The accounts of early travelers, the prevalence or absence of common names in native languages and dialects, and other evidence has led us to believe that the avocado was cultivated, at the time of the Discovery, from Mexico on the north to Peru on the south, extending from the Pacific side of South America only to the eastern slopes of the Andes. The available data has been presented in earlier issues of the Yearbook, and elsewhere. We have assumed that we must look for the ancestral forms of cultivated avocados in this general region. What have we found, to date?

1. There is a tree which grows, in what has every indication of being an indigenous state, on the slopes of the volcano Irazu in Costa Rica, that was described in the 1935 Yearbook ("Origin of the Cultivated Races of Avocados", by Wilson Popenoe). What may be the same thing grows on the Caribbean coast of Honduras, at low elevations. This tree produces round fruits two or three inches in diameter which are strongly anise-flavored; and the foliage and bark have the anise odor to a high degree. The fruit has a thick, woody skin like that of many variations of the Guatemalan race of avocados. Probably it occurs in other regions in addition to those where it has been observed.

Whether or not this plant has any connection with development of the present-day horticultural forms of the avocado we do not know. We are rather inclined to doubt it. As a possible rootstock it should receive consideration because it seems, botanically, to be a true avocado and because it grows in parts of Honduras where the annual rainfall is from 100 to 200 inches. In explanation of this latter point, it should perhaps be mentioned that we are assuming one of the requirements in California is a rootstock which will thrive on lands which are, at times, so saturated with moisture as to be inimical to the development of trees budded on those rootstocks at present in commercial use.

2. About 1930 a wild avocado was discovered in the mountains above Tecpan in Guatemala, which was described in the 1935 Yearbook as "The Wild Avocado of Tecpan". This tree gives one the impression that it might easily have been a progenitor of the cultivated Guatemalan avocados. To produce the latter little but selection for larger fruit with a higher proportion of flesh to seed would seem to have been required.

Later a wild tree, which seems to be the same thing, has been found in the cloud forests on several mountain-tops in the general region of Tegucigalpa, Honduras, at elevations of 6000 to 7500 feet. Further specimens have been seen near Tecpan, Guatemala, as high up as 9300 feet, which is the greatest elevation at which we have seen avocados, wild or cultivated, in Central America.

And in October 1946, Harlan B. Griswold and Carl S. Crawford discovered a wild avocado at 7500 feet on the heights above Acaltzingo, in the state of Veracruz, Mexico, which was seen again by our party in October 1947. This has every appearance of being the same as those known from near Tecpan and Tegucigalpa. It is not difficult to imagine that this wild avocado, now known to have a fairly wide distribution, might have

given rise through selection and adaptation to different climatic conditions, to the West Indian as well as the Guatemalan races. We have only to assume a long period of cultivation—and there is every reason to suppose that avocados have been cultivated in Mexico and Central America for more than a thousand years.

3. The origin of the Mexican race of avocados phylogenitically and geographically is by no means clear. It is difficult to believe that it could have originated from the same wild form as did the Guatemalan or West Indian races, though it is not difficult to imagine that these two last-named might have been derived from one and the same form, as mentioned above. Because the avocados of the Mexican race which are grown around the eastern slopes of the volcano Orizaba, in Veracruz, are characteristically small with relatively large seeds, and give one the impression of wild avocados, it always had seemed logical to search for wild trees in this region. Such a search was commenced by Harlan B. Griswold and Carl S. Crawford in 1946 and continued by the expedition of October 1947. Our search included the region from Maltrata, down through the city of Orizaba, and northward around the base of the volcano to Coscomatepec. It was assumed that elevations between 4000 and 7000 feet would be the most likely ones at which to find this avocado native; but the results were negative. No trees were seen in what we could believe to be a truly indigenous state and, more important still, the Indians of the region, whose familiarity with native trees *is* intimate and admirable, asserted without exception that avocados of this race do not grow in the forests; that they are only in cultivation, or escapes.

There still remains to be explored a region to the north of the volcano, where climatic conditions are such that one might expect avocados to grow; but there are scant grounds for believing that the Mexican race is to be found there in an indigenous condition. Carl S. Crawford, who has made the discovery of the wild form of this race his pet project, may be able to find them eventually; if they are not found we shall be forced to assume that this race no longer exists in the wild state. It might originally have grown in the valleys and on open slopes, where cultivation has absorbed it as an apparent wild tree. We do not know; perhaps we shall never know, though it must be emphasized that there is need of further investigation.

Perhaps the principal result of the 1947 exploration was this: seeing the wild avocado near Acaltzingo, which gives one the impression of having been a possible progenitor of some of our cultivated forms, and comparing it with trees of the Mexican race near Orizaba, it is difficult to escape the feeling that the two are botanically different—distinct species—in spite of the fact that botanists working with dried specimens of foliage and flowers have had a hard time differentiating them.

Avocado Relatives

The rootstock problem can be approached from several angles. When tree decline first began to attract serious attention in California, growers began to wonder if there was any connection between this trouble and the use of Mexican seedlings as rootstocks. We were asked if we had seen avocados anywhere in tropical America which seemed resistant to wet soils. A review of the situation did not seem to offer much hope. Of course, it is still possible that some cultivated form will be found which will prove more

satisfactory than anything yet used commercially; we do not know.

The next step seems to have been the development of interest in wild avocados as possible rootstocks. This, we take it, was behind the trip to Mexico which was undertaken by Harlan Griswold and Carl Crawford in October 1946; and the second one, on which they were accompanied by Dr. C. A. Schroeder and Harold Wahlberg, in April 1947. These two trips furnished the background for the latest expedition—that of October 1947—to which the present report specifically relates though it is our desire, while covering the results of this expedition, to summarise in a general way what has gone before, and some of the lines along which we may expect interesting developments in the future.

Wild avocados being the main objective of the recent explorations in Mexico, it is obvious that anything which looks like an avocado would come in for attention; hence the program has spread out to include *Perseas* other than *Persea americana*, and as time goes on will doubtless spread out even more. We have little experience on which to base our hopes; but it is possible that relatives of the avocado may be found which can be used as rootstocks for our cultivated varieties. Let us review the situation briefly.

We know that the Guatemalan race can be grafted onto the Mexican. These two forms are not greatly alike. We have noted above the possibility that further study may convince us that they are derived from two distinct sources.

We know that avocados can be grafted upon ***Persea Schiedeana***, the **chineni** or **chinini** of Mexico, **coyo** of Guatemala, **chucte** of Honduras and **vas** of Costa Rica. This species has received little attention in the United States: many years ago it was introduced into Florida, where it was grown on avocado rootstock, but did not thrive, for reasons with which we are not familiar. The expedition of October 1947 was particularly interested in the chineni, which is cultivated in gardens of the Orizaba-Cordoba region in Mexico, perhaps to a greater extent than in any other part of tropical America. We know that this species is not frost-resistant; we do not know much more about it as a possible stock plant.

There are other *Perseas*, plenty of them, growing wild in Mexico and Central America. A few of them may be fairly close to ***Persea americana*** in character—close enough to prove congenial to the latter when grafted. Practically nothing has been done, as yet, to investigate the possibilities. But if we are to judge by past experience with other crops—such things as Citrus fruits, peaches, grapes, persimmons—we have every reason to feel that we are justified in conducting an extensive long-time investigation into the possibilities of closely related species as stock-plants for the avocado.

And if we are going this far, we might as well experiment with a few other genera. In Mexico and Central America there are species of *Phoebe* and *Ocotea* which produce avocado-like fruits, though usually of small size. "Aguacatillo" (little aguacate) is the name commonly given to a number of these. In our search for wild avocados of the Mexican race near Orizaba in October 1947 we ran across one of these aguacatillos (a *Persea*, allied to ***P. longipes*** (Schl.) Meissner); it was brought down from the mountains by an Indian we met in the village of Chocoman, and had all the characteristics of a small green thick-skinned avocado, though the foliage and inflorescence are different.

Many of the Phoebe and Ocoteas give the impression that they will be more difficult to bud or graft than the avocado; they are thin-barked and slow-growing, with rather dry wood compared to that of young avocados. But they will have to come in for attention, as will also the Anay, **Beilschmiedia Anay** (formerly **Mufelandia Anay**), a tree which grows wild in Guatemala, producing a fruit so similar to a good-sized Mexican avocado in appearance that it might be mistaken for one. Buds of this species put on avocado stocks at the Escuela Agricola Panamericana in Honduras failed to "take" which suggests lack of congeniality; but the experiment was done on too small a scale to be conclusive.

New Horticultural Avocados

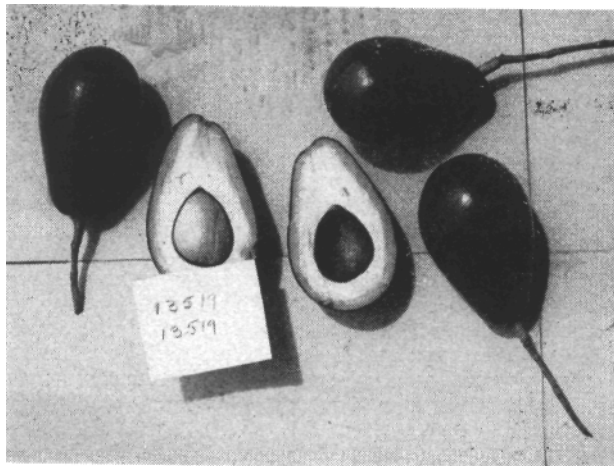
Let us leave the problem of tree decline and its possible solution through the development of new rootstocks. As President Griswold has stated, unless this problem can be solved, the avocado industry in California may suffer serious geographic limitations. It seems highly important, therefore, that attention be focused upon rootstocks as one of the more likely solutions.

When we come to discuss avocado varieties, what we already have and what we want, we are on more familiar ground. For thirty-five years no subject connected with the industry has received so much attention as this. Season after season new varieties have come upon the scene; season after season the Variety Committee has brought together records of growth and production, seeking to get the facts and protect growers against costly mistakes. All in all, the job has been remarkably well done.

Throughout the history of the industry the need has been not for more varieties, but for a few which would measure up to commercial requirements and at the same time produce enough fruit to make their culture profitable to the grower. The introduction of Fuerte, in 1911, seems to have established certain standards which have become even more definitely fixed as the years have gone by. But obviously a single variety cannot meet all the needs of the industry, particularly when it is a variety which does well in some sections and badly in others.



Rodiles Seedling Avocado Orchard near Atlixco, Mexico
Photo by Schroeder



One of Twelve Selected Hybrid Race Avocados
from Rodiles Orchard
Photo by Williams

When Fuerte was introduced, we thought it to be a first generation hybrid between the Mexican and Guatemalan races, both of which were cultivated abundantly in the home of this variety, Atlixco. This belief persisted for many years until men like Professor Hodgson began to notice that Fuerte seedlings did not show the segregation of characters which would be expected of first generation hybrids. Then visitors to Atlixco began to notice that there existed, in the small orchards of that town, other trees which produced fruit resembling Fuerte in several characteristics formerly considered peculiar to that variety.

An attempt was made to summarize the situation in the 1943 Yearbook ("Aguacates de China", page 27 et seq.) which concluded with the suggestion that Fuerte might be representative of a distinct horticultural race and that it definitely would be worth while to give the subject further attention.

There may be varieties in the Atlixco area which are sufficiently like Fuerte in fruit characters to fit the North American market, automatically as it were, and which at the same time are sufficiently different in season of ripening or in cultural requirements to be of great value to the grower.

The expedition of October 1947 was planned to include an investigation of the Atlixco area at a time of the year when avocados of Fuerte character would be coming into season. From two standpoints the situation was perfect: previous visits to the region by A. D. Shamel, by Griswold and Crawford, and others, had focused attention on the remarkable Rodiles grove; and second, the courtesy of Henri Gilly, owner of the beautiful hacienda Xahuentla, adjoining the Rodiles grove, provided a base from which to work conveniently and expeditiously.

The history of the Rodiles grove had best be told by others, more familiar with it, but the story in brief seems to be about this: Thirty years ago, Adolfo Rodiles, owner of the Hacienda San Diego in the suburbs of Atlixco, became interested in avocados (perhaps because of the fame which had been acquired by avocados of that region) and resolved to develop an extensive grove. To this end he bought every good avocado he saw in the market, whether Guatemalan, Mexican, or of the Fuerte type, and planted the seed. Several thousand selected seeds were thus grown; and the result is the most remarkable and, in one sense, probably the most valuable avocado orchard in the Americas. Had this orchard been available during the years when tropical America was being combed for varieties worthy of trial in California, the history of the industry might have been very different.

For in this orchard there are several hundred seedlings which, if we can judge by foliage and fruit characteristics, are perhaps the result of crossing, and recrossing, of the Mexican and Guatemalan races—just as we believe to be the case with Fuerte. That there are so many of them, and that they show certain characteristics in common suggests that many years or generations have passed since the original crosses occurred. Segregates have fallen by the wayside, and the group is now stabilized to a considerable degree at least; so much so that it must be recognized as a group, perhaps a race—a hybrid race.

Three days were spent by our party, examining carefully the trees and fruits in this grove. Carl Crawford had previously made arrangements with the owner, a son of the original founder of the grove, to the end that we could do this and take budwood. With avocados selling in the markets of Mexico City at a peso each (twenty cents in United States currency) the generosity of this man in allowing us to pick samples freely is worth more than passing mention, as also is the permission granted us to take budwood from any trees we thought interesting. The time may come when the California Avocado Society will feel called upon to recognize officially the unlimited cooperation given by Senor Rodiles.



Sen. Adolpho Rodiles,
Owner of the Rodiles Orchard near Atlixco

Passing by, with only a nod, dozens of trees which were producing avocados of Guatemalan character, which would have been the delight of an explorer's heart twenty-five years ago, and passing by dozens of trees of Mexican character which were in flower or carrying tiny fruits which would mature late next spring, we devoted our attention to trees of the hybrid group; those whose fruits were in the majority of cases approaching maturity. Because considerable areas of the orchard are characterized by rocky soil, and because cultural attention has been rather sketchy, many of the trees are in poor condition. Some are dying out, others not producing as they would under more favorable conditions. The fact that here are brought together, in regular orchard form, several thousand trees—a thing itself almost unique in tropical America—plus the fact that these trees were grown from selected seeds, makes the Rodiles grove outstanding in importance. When we think of California, and remember that Fuerte has proved, during 35 years, to be the best commercial avocado; and then remember that here are a large number of trees obviously with the same background as Fuerte, it is hard to restrain enthusiasm. We can only urge that continued attention be given to this grove until we are sure that it has furnished its best to California.

Budwood of twelve varieties was taken home by President Griswold, to be propagated

at the College of Agriculture in Los Angeles. If these varieties are saved they should prove to be a highly interesting group, since most of them were chosen because the fruits were strikingly like Fuerte in size, shape and color.