

## AVOCADOS OF THE CHOTA VALLEY, ECUADOR

**WILSON POPENOE**

*Agricultural Explorer United States Department of Agriculture.*

Synchronously with the increased demand for hardy avocados of good commercial quality, which has arisen in California since the cold weather of January 1922, comes the discovery of a hitherto unknown avocado region, in the remote Andes of northern Ecuador, which seems likely to supply such varieties. I refer to the Chota valley, home of an unusual series of large-fruited avocados of the Mexican race, some of which have been introduced into the United States by the Office of Foreign Seed and Plant Introduction, United States Department of Agriculture, and which will soon be sent to California and Florida for testing.

The discovery of the Chota avocados seems to me one of the most fortunate incidents which has occurred since the avocado survey of tropical America was undertaken by the Department, six or seven years ago. Not that I expect these avocados to be the ultimate commercial varieties for California; I cherish no illusions on this point. But having seen them, and having examined them carefully, I feel that we have in the avocados of this remote section of the Andean region, a group which are as a whole considerably superior to the Mexican avocados which have come to California from Mexico itself, and which will most certainly be useful in the development of standard commercial sorts. One or two of them may, and I almost dare believe that they will, find a place on the list of recommended varieties for commercial cultivation in California.

In a letter which I sent to the members of the California Avocado Association from Quito, Ecuador, and which was published in the Report for 1920 and 1921, I described the incident which brought me in touch with the avocados of the Chota valley. At the time I wrote that letter—March 1, 1921—I had secured the first shipment of budwood, comprising rather poor budsticks of five varieties, all from the Hacienda San Vicente. Shortly after the first of May, when the rains had slackened and the trail from Quito to northern Ecuador had again become passable, I returned to Ibarra, where I made my headquarters in the comfortable home of Jose Felix Tamayo, and devoted six weeks' time to a further exploration of the Chota avocados, and to securing and forwarding budwood of ten varieties. If any of these should prove of value in the United States, our horticulturists should remember with grateful esteem the name of Jose Felix Tamayo, a young Ecuadorean, educated in Connecticut, who aided me materially in securing them. I would almost say that Tamayo made possible the work in the Chota valley. I would also like to mention, in connection with this work, the name of our former minister to Ecuador, the Hon. Charles S. Hartman of Montana, and that of our consul general at Guayaquil, Dr. Frederic W. Goding. Both these gentlemen did everything in their power to expedite the forwarding of bud-wood to Washington, and otherwise assisted me in carrying out what I honestly believe to be the most difficult piece of agricultural exploration I have ever undertaken. To cut budwood from dirty trees in a hot and

unhealthy valley over a hundred miles from the railroad, carry it on mule-back across the mountains to Quito, where connections had to be made with a train that would in turn connect with an outgoing steamer for New York at Guayaquil, and to pack the wood in such a manner that it could withstand a long voyage through the tropics, in the hold of a steamer where the temperature was probably never below 85 or 90 degrees above zero—this, I assert, and I do not say it boastfully, is a work which requires a considerable amount of patience, zeal, and effort. And even when all possible precautions were taken, most of the budwood was found to be dead when it reached Washington, and we were only able to save five out of the ten varieties sent from the Chota. Fortunately, however, these five included the two which seemed to me the most promising of the lot.

The Chota valley is not an important avocado region, so far as production is concerned. It cannot stand comparison with any of the great avocado regions such as Queretaro or Atlixco in Mexico, or Antigua in Guatemala. I have made no census of the trees, but I do not believe there are more than two or three thousand in the valley. Perhaps four-fifths of these are of the Mexican race; the remaining fifth comprise West Indians and probably a few hybrids, though I have seen no trees which I feel certain belong to the latter class.

To reach the Chota, one must outfit in Quito; it is necessary to have a saddle animal, which can most easily be secured by watching the mule trains which come in from the North, and bargaining with an arriero (mule driver) who is taking back what is termed in Spanish an "empty" mule. In this way you can go from Quito to Ibarra, a distance of about ninety miles. The journey is usually made in two days, and one has the choice of two routes, of which the shortest is that via Malchingui and the paramo of Mojanda, the other and longer, but the most easily passable in wet weather, via Cayambe.

Once in Ibarra, an attractive place of perhaps 10,000 people, lying on a broad and fertile plain at an altitude of about 7500 feet, you must secure fresh riding animals and make your plans to cross the Cordillera de Angochagua, by the trail which goes to Tulcan and the Colombian frontier, and then, leaving behind the moist, fertile plain of Ibarra and Otavalo, you drop down into as dry, barren, and hot a valley as any to be found on the coast of California. This is the Chota; it is not so extremely hot as our interior valleys such as the Imperial, but its maximum temperatures are probably above 100, and the rainfall is probably not more than a few inches per year, as attested by the scanty vegetation which covers the sandy slopes on either side. Through this narrow valley, which is three to four thousand feet in depth, flows a large, clear stream, the Rio Chota. It is one to two hundred feet in width, and three to six feet in depth. The current is fairly swift, and at times of high water it is difficult to make a ford. At the village of Chota, where the Tulcan trail crosses, there is a substantial stone bridge, but this does not serve all parts of the valley, and some of the haciendas or farms can only be reached by fording the stream.

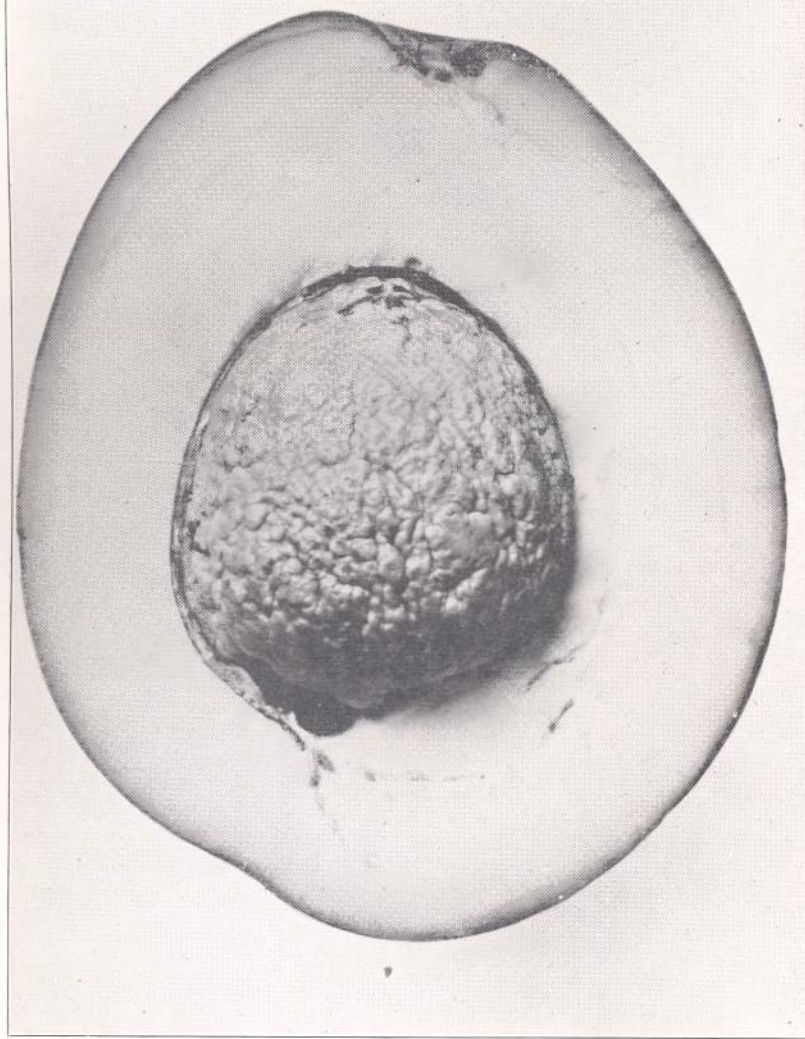
It is about ten miles from the lower end of the region in which avocados are grown to the upper. Throughout this distance, there is little level land along the river; here and there a narrow flood-plain which can be utilized, and in addition, a few bits of mesa land along the sides of the valley. On one of the latter is located the hacienda San Vicente, perhaps the most important in the Chota; it lies at an elevation of about 6100 feet, while

the haciendas which are located upon the flood-plains along the stream are at altitudes between 5000 and 5500 feet. The principal ones which I have visited are San Vicente, Pusir, Carpuela, and Irumina. All of these have many avocado trees. They were established many years ago—probably in the seventeenth century, mainly by Spanish monks. The Jesuits controlled the upper part of the valley, about Pimampiro, while another order—the Mercedarios, I believe—owned San Vicente and other large haciendas of the lower portion. Sugar has long been the principal crop; it is made in the crudest possible manner, and the product, raspadura or coarse brown sugar, is sold in Ibarra and elsewhere. In addition to the cane fields, there are a few cotton plantations, and irregular groves of fruit trees, from which the Ibarra market is supplied with oranges, limes, sweet limes, bananas and plantains, avocados, and a few other tropical fruits. Most of the inhabitants of the valley are Negros whose ancestors were brought by the Spaniards as slaves; very few white people have found it possible to live on the haciendas because of the prevalence of malaria in this region. Indeed, the Chota possesses an evil reputation throughout Ecuador, and travelers are usually afraid to spend even a single night in one of its fever-stricken hamlets. The type of malaria which prevails here is said to be a peculiarly malignant one, and the place is not, therefore, one in which the agricultural explorer yearns to tarry; but with proper precautions there is no grave danger, and if one is equipped with mosquito net and quinine bisulphate he need feel no alarm.



Looking Across the Chota Valley from the Slopes near San Vicente.

In the foreground is the Hacienda of Chota Chiquito, with many avocados and other fruit trees scattered about. The arid nature of this region is evidenced by the barren slopes on the farther side of the valley.



The Tamayo Avocado.

This variety, from the Hacienda San Vicente, is either a Mexican or a hybrid between the Mexican and West Indian races. It weighs about 18 ounces, and is of excellent quality. The relatively small size of the seed is noteworthy. Budwood of this variety was obtained and the variety successfully established in the greenhouses at Washington, whence it will soon be sent to California and Florida for trial.



San Vicente, the Home of Several Choice Avocados.

The Hacienda of San Vicente lies on a small mesa about a thousand feet above the Chota River. It was established several centuries ago by Spanish monks, but now belongs to the government of Ecuador. Besides large fields of sugar cane, the hacienda possesses several small orchards of fruit trees. In these are many oranges, sweet limes, and avocados of superior quality.

At the Hacienda San Vicente I was received with great hospitality by Sr. Egas, who leases the property from the government (many of the large Ecuadorean ranches which formerly belonged to the Church are now held by the national government), and I spent several days in making a careful canvass of the numerous avocado trees which exist in the irregular fruit orchards about the place. There are, in all, two or three hundred trees on this hacienda, of which nearly all seem to be Mexican; at least, the leaves have the characteristic anise-like odor, though not always to a pronounced degree, and the fruits are thin-skinned and otherwise resemble those of the Mexican race. The size of some, however, is so large as to make one a bit doubtful; a variety which I have named Tamayo produces fruits which weigh up to 18 ounces. When it is remembered that practically all of the avocados introduced into the United States from tropical America have produced larger fruits in this country than they did in their native homes, it is reasonable to expect that Tamayo will become, in California or Florida, a 20 to 24 ounce fruit. This is indeed large for a Mexican, and one is inclined to ask if the variety may not be a hybrid? Perhaps it is; it will be easier to determine this by watching the behavior of the young budded trees in the United States than by examining the parent in the Chota valley.

Tamayo (S. P. I., 54270) is an avocado of convenient oval form, and attractive appearance. The surface is smooth, light green overspread on one side with maroon-purple. The skin is not woody in texture; it resembles that of such Mexican varieties as Puebla and Gottfried in this respect. The flesh is cream-colored with a very few inconspicuous fiber markings; the flavor rich, very pleasant. The seed is proportionately very small, and tight in the cavity. The parent tree bears fair, but not heavy crops.

Another variety obtained at San Vicente I have named Egas (S. P. I., 54271). This is a Mexican avocado, of much the same general character as Puebla, but with a relatively

smaller seed than the latter. The fruit is broadly obovoid, 8 to 12 ounces in weight and glossy maroon-purple when fully ripe. The skin is of average thickness for a large-fruited Mexican avocado; the flesh is devoid of fiber and of good quality. The seed is tight in the cavity; in some specimens examined it was very small, in others, medium-sized. The parent tree is a very old and large one, and is said to bear tremendous crops. Two or three other promising varieties have been introduced from San Vicente. As to the season at which these fruits will mature in the United States, it is impossible to judge with any degree of accuracy. In general, avocados of the Mexican race ripen in California from October to January, and it is likely that these Ecuadorean varieties will remain true to their racial

characteristics in this respect as in others; yet there is a strong possibility that some of them may be unusually early or extraordinarily late, because of having been grown in a climate altogether different from that of their native home, Mexico. If the ancestors of these trees have been cultivated in the Chota valley for two centuries or more, the peculiar climatic conditions of this region may have left their imprint upon them in some such way.

At the hacienda Carpuela, on the banks of the Rio Chota some five or six miles from San Vicente, and at an elevation of 5300 feet, several promising Mexican varieties were found. In haciendas at this elevation there are a few West Indians of good quality, also, but these are, of course, altogether lacking in interest so far as the needs of California are concerned. The Negros in the valley call the West Indian fruits "hacenderos" to distinguish them from fruits of the Mexican race, which are termed simply "aguacates." I may mention that the Quichua name "palta," which is applied to all avocados in Peru, Bolivia and Chile, is rarely used in Ecuador. Educated people are familiar with the word, and recognize it as the Peruvian name for the aguacate.

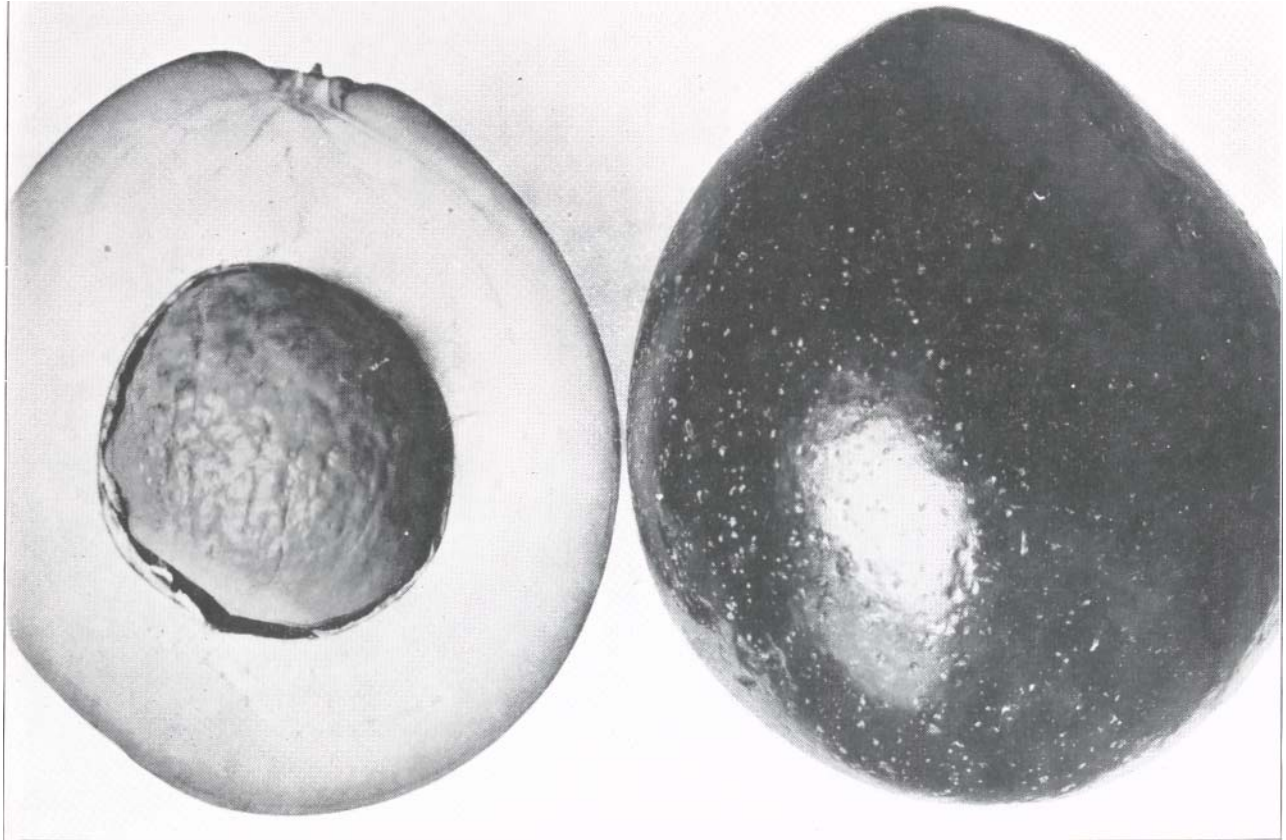
Still other promising varieties were found in the hacienda Irumina, close to the village of Ambuqui, in one of the small valleys leading down to the Chota from the slopes of Yura Cruz mountain. At this pretty little hacienda, where I received a cordial welcome from the Almeida family and from Luis Blanco, ne Louis Leblanc, a Swiss viticulturist who came to Ecuador years ago in the hope of producing wine grapes commercially in this part of the Andes, there are numerous trees of the Mexican race, but no West Indians. It will be more interesting, I think, to look for promising varieties in those places where both races are grown, for under such conditions valuable hybrids may be found.

Regarding the quality of the Chota avocados, in general, I may say they are excellent. Some of the fruits show an objectionable amount of fiber, and this is the only point on which I have any apprehension, when they are grown in the United States. The fibrous character of many Mexican fruits, as opposed to the freedom from fiber which prevails in the Guatemalan race, is one of the weakest features of the Mexican race, judged from a commercial standpoint. It has been learned, of course, that the amount of fiber can be influenced very markedly by cultural conditions; and it is therefore possible that certain Mexican varieties which have shown a tendency to have slightly objectionable fiber, may be free from it if grown under proper cultural conditions. But one cannot get away from the fact that many otherwise desirable Mexican varieties have too much fiber, and a further search should be made for good sorts which do not. Many of those which I examined in the Chota valley have no fiber at all; others have an objectionable

amount. Those which have been introduced for trial do not have enough to be objectionable in any case, but I do not feel quite certain that they may not develop more fiber when grown in California under more favorable cultural conditions.

Concerning the hardiness of the Chota varieties, the only basis of judgment is the known hardiness of the Mexican race in general. There is never any frost in the Chota valley; temperatures lower than 45 degrees above zero are probably never experienced. But avocados of the Mexican race retain their characteristic hardiness even when grown in a tropical climate, and I believe there is reason to expect that these Ecuadorean forms will be more or less similar, in this respect, to the Mexican varieties already cultivated in California. Even should their sojourn under the equator have lessened their frost-resistance a trifle, they ought to be hardier than most varieties of the Guatemalan race, and hence of real value to Californians, from this standpoint. It will, however, require a test to bring to light the facts, and I can only recommend that the Ecuadorean varieties be subjected to typical California conditions as promptly as possible, so that their hardiness may be determined.

The five varieties which have been introduced, and which are being propagated in Washington for distribution to avocado growers in California and Florida as soon as budwood is available, represent only a few of the promising sorts which exist in the Chota valley. I did not visit this region until the month of January, 1921, at which time the crop had been harvested from many trees. There remain many, therefore, whose fruits I have not seen, and in case the five varieties already introduced show promise in this country, I think it would be worth while to make another trip to Ecuador, in order to examine all of the trees and obtain as many of them as seem promising for trial in the United States. The principal ripening season for avocados in the Chota valley is from October to January. Many of the trees bear a second crop, not so heavy as the main one, which ripens in March or April. The best time to visit the region would doubtless be in the months of October to February, inclusive.



The Chota Avocado, a Large Fruited Variety of the Mexican Race.

This excellent avocado is representative of the large fruited Mexican varieties which are cultivated in the Chota Valley of Ecuador, whence five of the best were sent to the United States for trial in 1921. Chota is a purple fruit, ten to twelve ounces in weight, with a small seed and rich yellow flesh of excellent quality.

