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ASEXUAL PROPAGATION IN MEXICO

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Sometime in November, 1958, Manuel Vargas, of Azusa, California, received a letter from H. Parra E., APO 36 Tepic, Nayarit, Mexico. Manuel's name had been published along with others, mine included, as a man whose business included the budding and grafting of avocados.

Parra wanted 1,000 avocados budded. Manuel contacted me and we decided to make this Mexican trip.

Through correspondence with Parra we decided on the price of budding and varieties. The varieties were Fuerte, Hass, Rincon, Bacon and Zutano.

Tepic is the capitol of the State of Nayarit. Nayarit is the smallest state in Mexico, about 2,007 kilometers from Tijuana, Baja, California. The temperature is about 50 degrees at night and 80 degrees during the day, sometimes freezing in the low ground in January. One may drive in from San Blas, which is at sea level and very tropical, to Tepic, where pine trees grow, in about $1^{1}/_{2}$ hours.

We flew to Tepic in December. The airfield is now discontinued.

We budded about 300 plants in tarpaper containers at Compostella, where tobacco plants sometime freeze. Most of these were budded to Fuerte.

AMERICAN TRIES FUERTE

About 200 plants, growing in the ground, were budded for an American who had developed about two hectares (about four acres), a little west of Tepic. At that time he was watering the plants with buckets from a well. We budded them to Bacon, Rincon, Zutano and Fuerte, a large portion being Fuerte. He already had Lulu and Hall which he imported from Florida.

The remaining 500 buds were used at Crucedo San Blas (the crossroad to San Blas). The temperature there is very similar to Hawaii or Florida, 70 to 80 degrees. Nayarit is located on the 23rd latitude, as is Florida, and its rainfall is about the same. Its borders are Sinaloa (north), Durango (northeast), Jalisco (east), and the Pacific Ocean (west). There is the same long dry season from November to May, which makes growing avocados commercially very difficult.

In 1959 I budded more avocados for Parra at Crucedo. These were not too successful as they were container-grown in gallon cans and not at all vigorous. They were seeds of the Mexican race.

At this time I tried to get 100 small container-grown plants to Sr. Parra through Nogales,

Arizona. They were budded to Hass. I could not get them across the border and they froze at another nurseryman's place where I left them, intending to pick them up on my return trip.

In 1960, H. Parra's son and Octaloo, his nephew, and I budded 300 trees. These were planted in the ground at Governor Levas' plantation situated about 40 kilometers south of Guliacan, Sinaloa, a distance of 516 kilometers north of Tepic. We budded them to Hass, Bacon, Elsie and Fuerte.

This grove was mostly of a variety of the Mexican race, having leaves with a distinctive anise smell when crushed. I believe they were purchased from a Japanese nurseryman located in Guadalajara, Jalisco. I saw some of these trees purchased by H. Parra. They were quite large trees, cut back about two-thirds. They were budded to a native variety of the Mexican race, with a very broad leaf, and Fuerte. Later, both of these were found to be incompatible with colder night temperatures. They would not set fruit.

BALLED TREES DIE

In 1961, a man who owned one of the largest egg production ranches in Mexico purchased 300 trees. These trees were container grown. He sent his own truck up from Hermosillo. Sonora, and with the truck came his American engineer, employed at his egg producing plant. These trees were budded to Zutano, Bacon, Fuerte and Hass. In 1962 his engineer telephoned me from Hermosillo, wanting to buy 750 more trees. He had tried 1,000 balled trees, purchased by him from a large avocado nursery in San Diego County, and he said most of these balled trees had died. I could not supply all he wanted, so part of them were supplied by another container grower in Pomona, California. Five hundred of these were Hass.

At the request of an official of the Department of Forestry, I grafted a large tree in Hermosillo. I put Bacon, Hass and Fuerte on the same tree. Two years later all these grafts were growing vigorously but had set no fruit.

The plant nursery was engaged principally in growing seedlings (eucalyptus) for wind breaks. The head of the department was very anxious to get some flaming eucalyptus seeds, so I wrote a letter to James A. Beutel, then a Los Angeles County Farm Advisor, and asked him to send this man some of the desired seeds, which he very graciously did.

I saw a portion of the container grown trees. Some were planted right in the heart of the city of Hermosillo and they looked healthy. He had some Mexicola that had a few fruit but they looked very small for the time of the year. They have very dry winds in Hermosillo.

I brought 102 avocado plants, bare root to Tepic, Nayarit, Mexico, We used only 40 seconds in total operating of removing them from dirt and back to dirt in the container. I think this is very important.

We waited for a cold snap in November to send the sap down, and cut the plant back about three-fourths at this time. They were 'healed' in damp sawdust in complete shade for a month prior to shipping and transplanting to containers. The temperature was

about 50 degrees. These trees were budded in September to Hass, Bacon, Zutano and a few Fuerte. Some of the seedlings' tips were cut back at the time of budding and some were not. The ones cut back at the time of budding had a much better callous at the bud union than those that I had not.

In December I took 110 of these bare root Hass to Mexico. This time I entered Mexico at Sonoita, Sonora. Three dropped off at Hermosillo and five at Culiacan and the remaining 102 were planted in containers at Tepic. All 102 lived, although not all of the buds grew. Some of the sleeping buds had grown a little on the three-day trip in their plastic bags.

BUDS SURVIVE

In the early '60s I arranged to take 10,000 buds to H. Parra at Crucedo, San Blas, in two suitcases containing large cardboard boxes full of buds in plastic bags, about 100 to a bag. There was no moisture in the plastic bags except that generated by the buds themselves.

Due to difficulties regarding permits to transport the buds into Mexico and an error in shipping instructions, the buds arrived in Matzatlan, some 130 miles from Tepic, their destination, and approximately a month late.

Yet, almost every bud used "took," which could indicate the value of having no moisture agent in plastic bags.

(While we are talking about Matzatlan, it might be noted that there is a planting of about 500 Hass near there.)

One year we received from Cuba, Garcia No. 1 and Garcia No. 2. They were shipped in moist sphagnum moss. Only a very few of the buds were usable.

Incidentally, the Wilson Popenoe from Florida, a medium fruit of Fuerte shape, looks very good at Crucedo, San Blas. The single tree set a very heavy crop in 1964. It looks like it will mature much later, maybe as late as March or April, which is shortly before the native avocados come in. The native avocados are called "the butter of the poor" and in mid-season are very inexpensive.

A SWITCH TO HASS

In December of 1964, two Americans had two individual groves, one a "Don" Louis Jaeger and the other, the first American I had budded trees for in 1958. I now, in 1964, grafted over to Hass about half of each grove, including even some Halls and Lulus from Florida on "Don Jaeger's" place. The first American left half of his Fuertes. Louis Jaeger left no Fuertes, but kept a few Lulus, however.

We thought at the beginning that Lulus and Halls might be the answer.

A few years after I had started going to Mexico I grafted a large tree over to Hall, a large green fruit, for Parra. In two years it produced. Sr. Parra sold at his large restaurant at Crucedo, San Blas, $180 worth of its fruit. The following year the tree died, ostensibly

from root rot.

It seems that much the same problems confront Mexico that face us in California. When the market is high, as it is in December when they market the Hass, Lulus, Halls, etc., it is inadvisable to have a large avocado. An average Hass will sell for five pesos (about 40 cents) in Mexico City and Guadalajara, or anywhere for that matter. A large avocado will not sell for much more.

There are also many more advantages to Hass. It produces from three to five times more individual fruit than a tree producing a large fruit. The tonnage may be the same but the prices are better.

The fruit fly is very prevalent in this area. The Hass has a thick skin, seemingly much more resistant to the penetration of the black fly's stinger, which deposits the egg inside the fruit—much more than, say, the Fuerte. It is, as we know, of superb quality and ships and keeps well.

The tree seems a little more susceptible to anthracnose although the fruit itself is much more resistant. The first American informed me that he must spray at least five times a year. He has a rig built for this and uses copper. Also, he now uses portable sprinklers to irrigate his grove every two weeks when it does not rain. He told ma that he had invested about $30,000 to date on this small grove. His only returns to date in any volume have been on Hass. He ruefully said, "I would have been much better off financially to have loaned this money out at interest of one per cent a month."

GRAFTING A PROBLEM

In Mexico, grafting presents problems. I wrote to the United States for a case (four gallons) of Tree Seal, a commercial product which we use as a seal in California. One gallon came through. We waited and waited for the others to come and they did not so we decided to use the one gallon only at point of insertion of bud wood, using a saw kerf (or notch) graft.

In the center of the tree we used a white synthetic paint similar to that made from milk, I believe, from Ireland.

On the outer bark (except where scions were placed) we used a roofing tar. The volatile agent in this was something like kerosene. I was afraid of the solvent near the bud wood, but it would not get too hard. I've seen the failure of the cambium to roll at the top of the stump when the substances used got too hard. I saw it on the trees in Mexico where a solution of beeswax, paraffine and carbon was used to treat wounds. It became too hard for the cambium to roll easily. The tar would at least remain semi-soft. The synthetic paint would not.

We used 80-pound fertilizer sacks to cover the graft, sometimes having to use two sacks tied together with nails to a tree. Some of these trees were almost three feet across, since they grow very rapidly there. These sacks had contained ammonia sulphate and were lined with plastic.

We used thin-bladed bucksaws to cut the trees. I had brought these saws with me from the United States. The job worked out very nicely in a country where labor can be hired

for 13 pesos (a little over one dollar) a day. Good labor, too.

The stakes we used to hold up the ammonia sulphate sacks were stalks from Copa De Oro (sunflower) gathered along the highway.