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Experiments with Avocados in Lower Rio Grande Valley of Texas

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Over the years a good many avocado trees have been planted in the Rio Grande Valley. Most of them have died out, but a few here and there have lived; and some have grown well and borne fruit. No one seemed to know why such a large proportion of the trees failed. In the summer of 1941, Mr. Karl Hoblitzelle became interested in a dozen or more Mexican seedlings on his ranch near Mercedes. These were growing fairly well and had reached a height of 10 to 12 feet. Efforts to get them grafted to good varieties had not been successful.

Mr. Hoblitzelle determined to carry on a good sized experiment to find out if avocado culture was feasible under the environmental conditions of the locality, and if not, why not. I was asked to plan and supervise the experiment. At first the variety question seemed most important. The only place I knew of where 558 first class trees of eleven different varieties could be obtained was Armstrong Nursery at Ontario, California. All these were on Mexican root-stocks as that is used exclusively in California. The trees were selected, carefully balled and shipped by rail to Mercedes in November 1941. The varieties included Fuerte, Duke, Leucadia, Jalna, Ryan, Nabal, Edranol, Zutano, Hellen, Middleton, and Benedict.

The trees arrived in excellent condition and were promptly planted by Mr. Morris C. Allen, the superintendent of the ranch. In Rio Grande Valley, it is the usual practice to plant orchard trees in late fall rather than spring. The trunks were painted with Bordeaux and mounded with soil as a protection from cold injury, the same as is customary there with citrus. The writer inspected this planting a few weeks after completion, but on account of travel limitations, due to war conditions, was not able to revisit the experiment until December, 1946. During this interval, the trees were looked after by Superintendent Allen, who was in frequent correspondence with the writer with respect to their cultural care.

Background Trees Dead from Heavy Soil.
Foreground Trees are on Lighter Soil.
Mercedes, Texas.

Avocado Trees on Sandy Soil. Volunteer Papaya Tree in Background.
Photo by Coit

Soils

Many of these trees died out rather promptly while some of them grew well. The loss of trees appeared to be related to differences in soil type. Those planted on flat clay land failed, while those planted on low sand hills with good subdrainage grew fairly well. In February, 1945, one thousand additional trees of the same varieties and from the same source were dug bare root and shipped by express. These were planted at different locations on the same ranch with the idea of testing out soil types. Practically all of these planted on flat heavy soil died, while those planted on sandy soil with fair drainage grew in spite of having been shipped bare root. About this time, a few Florida varieties, on West Indian root-stock, were secured from Florida. These were planted on heavy soil and, unfortunately, all died out. By this time, it had been clearly demonstrated that it is useless to plant avocados on heavy valley soils irrespective of root-stock. When the writer inspected the plantings in December 1946, he immediately advised the

removal to sandy soil of what few trees remained alive on heavy soil.

Root-stock

At the start of the experiment it was suggested by Mr. Wm. H. Friend of the local Experiment Station that West Indian root-stock was best for local conditions. The sole reason no such stocks were included in the experiment is that none were available.

In September 1946, Dr. R. H. Cintron, a well qualified tropical horticulturist, was employed on the ranch. He immediately took keen interest in the avocado experiment and his studies and observations during the 1947 season, have been of great value. Dr. Cintron early searched out all the bearing avocado trees he could find in the valley, and noted soil conditions, root-stock, and variety. He confirmed our conclusions with respect to the undesirability of heavy soils. After making an examination of a number of the best trees we agreed that apparently the West Indian root-stock is better than Mexican, because of greater vigor and much less susceptibility to tip-burn of foliage. A nursery of West Indian seedlings, including a few Mexicans and Guatemalans for comparison, was started. The West Indian stocks are to be budded low, so that soil mounds in winter may protect that tender stock from cold injury.

Varieties

The pure Guatemalans, Nabal and Edranol bloom very heavily; so much so that the trees drop all their leaves at peak of bloom. Fruit set is abundant, but by the time the young fruits are the size of marbles, at which time new leaves are putting out, the fruits begin to drop. Within a few weeks all young fruits have fallen. It is our theory, that the excessive bloom of Guatemalan varieties so reduces the store of carbohydrates in the wood, that what little remains is quite insufficient to nourish young fruit and at the same time support the expanding new leaves. Although, both Nabal and Edranol trees on sandy soil are healthy looking and quite large for their age, so far not a single fruit has been held to maturity. This is in striking contrast to the way the Nabal acts in Central Florida and California.

Typical varieties of the Mexican race, such as Duke, bloom over a longer period, do not shed their leaves during bloom, and set and hold a heavy crop. Some trees set too much and shedding is continuous, 'til after the fruits reach full size in July.

There are many fine large trees of Leucadia. They act like the Nabal. All fruit is shed while quite small, and so far not a fruit has reached maturity.

Zutano sets a good crop and sizes it up only to drop completely from anthracnose decay.

Jalna has produced some fine trees which set a very good crop. Fruit developed to large size and was free of anthracnose. In July, 1947, it appeared to be the most promising variety. However, a seven inch rain, extending from August 3rd to August 7th, with high temperatures during the rain, caused so much anthracnose decay that the entire crop was lost, in spite of having had several sprayings with bordeaux.

Old Lula Trees on Medium Soil and West Indian Rootstock at Kennedy Ranch, La Feria, Rio Grande Valley—Healthy and Heavy Bearing.

Middleton set a heavy crop which all dropped just before maturity.

The Ryan gave interesting results. The trees bloom heavily, but do not defoliate during bloom. The set is sparse and the few fruits hold to maturity in November and some fruits remain on the trees until January. The fruit is of large size, free from anthracnose or other blemish, whether or not it is sprayed. It happens that all the Ryan trees were planted close to an Athel windbreak and are thereby reduced in size. If in future a better crop can be set, the Ryan looks promising.

Fuerte blooms over a long period, does not entirely defoliate during bloom, and sets an excessively large number of fruits. Almost every flower seems to be pollinated and sets fruit. The necessary shedding begins at once and continues until the fruit is full size, larger on the average than in California. It matures in September-October. It is subject to anthracnose, but five bordeaux sprayings during the summer gave sufficient protection so that a fair crop (150 fruits to a six year old tree) remained in good condition f,or market.

In midsummer 1947, Dr. Cintron was able to obtain a refractometer for his use in studying the oil development in the fruit. He is reporting on his results in a separate paper. Suffice it to say here that it is now apparent that the California varieties under test, with the possible exception of Ryan and Fuerte, are not suited to the climatic conditions of Rio Grande Valley. Both humidity and summer temperatures are so high that the fruits tend to mature long before an oil content, considered normal in California, is reached. In the case of several varieties, notably Jalna, the full sized and apparently mature, but low oil content fruit, does not soften properly. Flesh next the skin softens, but that near the seed remains tough and rubbery. It is worth while to continue experiments for a few more years with Fuerte and Ryan. Meanwhile, the trees of other nonbearing varieties, such as Nabal, Leucadia, and Edranol are to be used as stocks on which to graft more promising kinds.

After completing his search for bearing avocado trees in the valley, Dr. Cintron selected the most successful for examination by the writer. The great majority of these good trees are West Indian Seedlings. The West Indian appears to be much better suited to

valley conditions. Some of these trees were quite large, healthy, and bore well. One lady stated that she had sold as much as $60.00 worth of fruit in one year from a seedling tree in her yard. The fruit was very large, with a large loose seed, and the flavor was good, though sweetish as is usual with West Indians. The tree had never been sprayed, but there was no sign of anthracnose.

The most significant find was at the Kennedy place near La Feria. Here were several very old Fuertes which had been brought from Florida. They had never borne more than an occasional fruit. In the same place were a number of budded trees of the Lula variety, also secured from Florida. Exact age of these trees is not known, but they are about 40 feet high, of upright growth, healthy and vigorous. They have borne regularly and well. They have never been sprayed, but the fruit is not subject to anthracnose. They are growing on flat land, but fairly sandy and well drained. The fruit matures in October and will hold until January.

Florida publications state that the Lula originated at Miami from a seed of the original Taft tree at Orange, California. The Taft tree is pure Guatemalan with Mexican race trees growing near by. I am of the opinion that there must have been an error in the records. The Lula has all the characteristics of a West Indian x Guatemalan hybrid. There are no West Indian trees in Orange County, California. It is proposed to top-graft a number of the non-bearing Hoblitzelle Ranch trees to Lula and also several of the numbered Booth West Indian x Guatemalan hybrids from Florida. Itzamna is being tried out by grafting this year. Also one or two very promising West Indian seedlings originating in the valley.

During the first five years the avocado trees were irrigated in combination furrows and basins. These were disked down and remade several times each season in order to control weeds. In the spring of 1946 this system was changed. The land was made level and weed growth restrained by mowing. Irrigation was by portable sprinklers. This system avoided the root disturbance caused by frequent disking, and also resulted in a marked reduction in the amount of water used.

Seedling Avocado Tree at Hermosillo, Sonora, Mexico
Photo by Coit

Previously, a very large head of water was required to get to the ends of the rows, and near the head, leaching of nitrates out of this sandy soil was excessive.

Until the writer's visit in January 1947, the same heavy application of nitrate fertilizer was given to the avocados as was customary on full-bearing citrus on this ranch. During the 1947 season, nitrates have been reduced to about one half the amount given citrus. Possibly, this high nitrate program may have forced vegetative growth and been a contributing cause of the excessive shedding of young fruit.

One season is insufficient to fully indicate the results of these two radical changes in orchard management. Perhaps after another year or two these California varieties may make a better showing.

It is planned to remove the windbreak of large athels from alongside the row of Ryan trees. This is to be replaced with an artificial windbreak made of camouflage netting. When relieved of this handicap, the Ryans may bear better.

In conclusion, it is evident that climatic conditions in Rio Grande Valley are not very favorable to avocado culture. Avocados can be grown commercially to some extent there, provided they are planted on light, well-drained soils, and varieties used which are not subject to anthracnose. The season of maturity for Lula or other West Indian x Guatemalan hybrids would be September to December, which is a favorable time for marketing.