

## **Avocado Improvement Program in Hawaii**

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Some fifteen years ago a number of articles dealing with avocado production in Hawaii were published in the California Avocado Association Yearbooks. In order to bring the members of the Society up to date the writer was recently requested by Dr. J. E. Coit to furnish a story on the avocado improvement program now being carried on in Hawaii by the Agricultural Extension Service in cooperation with other interested groups.

The former articles dealt largely with avocado growing on the Island of Maui. In recent years the Kona districts on the west side of the Island of Hawaii have been producing many more avocados than all the rest of the islands combined. There seems to be much justification for this when climatic and physical conditions are studied. Sections of the Kona district suitable for avocado production comprise an area about 22½ miles long and 10 miles wide. This area experiences almost perfect weather for growing avocados. It is protected from the northeast tradewinds by two fairly recent volcanos, Mauna Loa with an elevation of 13,675 feet and Mt. Hualalai with an elevation of 8,269 feet. The saddle between the two has an elevation of nearly 7,000 feet. The temperature ranges between 60 and 80 degrees F. Maximum rainfall occurs during the summer months but is generally distributed throughout the year. At an elevation of 2,500 feet on the slope (above the avocado plantings) the average rainfall exceeds 100 inches. At sea level it is only about 20 to 30 inches annually, and above the 2,500 foot level the amount of rainfall decreases to 50 inches or less at the 5,000 foot level.

In spite of the fact that lava rock covers almost the entire surface in many places and in others only a few inches to a few feet of volcanic ash is distributed over the lava, trees and other plants grow in profusion. One resident remarked that avocados grow too well. Numerous seedlings have germinated wherever seeds or fruits fell. One grower was accused of planting his orchard by standing near his house and throwing selected seeds in every direction so seeds germinated and grew where they landed. The layout certainly indicates such a possibility.

Much of the land has been leased in 10 to 15 acre tracts for coffee production, and very high yields are produced in the more fertile sections. It is in these coffee orchards that avocado production is on the increase. It is estimated that an area of about 133 acres is now in production.

Guatemalan varieties fruit mostly during the winter and West Indian during the summer months. An occasional Mexican hybrid may also be found.

Among the Guatemalan varieties there are several strains of Macdonald which come fairly true to seed. Nabal, Linda, and others are also produced in quantity. One of the late seedlings was just coming into harvest in April, and it was estimated that one

individual trees was producing at least a ton of fruit this season. A similar yield was harvested last year. The grower said the variety had not been grafted onto other trees. However, other interested growers began immediately to propagate plants from this remarkable tree.

One reason why the yield on this large tree, was so high was because coffee is heavily fertilized and the tree had been able to utilize this fertilizer. Other large trees in the same lot were producing inferior fruit and had been girdled recently to kill them.

The West Indian varieties are extremely variable. Many trees produce worthless fruit in abundance. Some fruits are round, some are long, and all variations in between occur. Black, purple, green, and yellow fruits may be seen. The weight varies from 14 pound to 2 pounds or more. Most of them have large seeds and are frequently watery and full of fiber. Some seed cavities are tight and some are larger than the seed. In some the outer seed coat adheres firmly to the seed and in others it adheres to the flesh when fruits are cut open.

About a million and a quarter pounds of avocados were shipped out of Kona during 1945. Much of this fruit should never have been marketed but buyers who had learned that the army and navy were buying avocados at a good price purchased the fruit on the tree and frequently marketed it before it was mature. Many members of the armed forces acquired a dislike for avocados when they tasted this fruit. Without doubt much harm was done to the industry because this low quality fruit was allowed to be marketed. As a result several important steps have been taken recently. A federal and territorial inspection and labeling law enacted by the last legislature is now in force.

The Agricultural Extension Service assisted growers in organizing a cooperative and in building a new packing shed to handle vegetables and fruits.

Two projects were set up simultaneously to effect improvement in the avocado industry at Kona. One dealt with marketing the 1946 crop. The other is a long time program. Growers were organized into ten sectional groups, each group electing a leader. These leaders, together with the local Agricultural teacher, Branch Experiment Station superintendent, Farm Security Administration supervisor, and the packing shed manager, constitute a steering committee to carry out the projects with the assistance of Extension specialists in horticulture.

Two subcommittees were set up by the steering committee to carry out details of the program. The sectional leaders constituted the tree selection and numbering committee, and three growers plus two other members of the steering committee made up the variety committee.

Over 1,000 West Indian avocado trees were numbered in the spring and the quality of the fruit of these trees is tested before it is marketed. Only the trees designated as good by the growers have been labeled. As a result many of the so called "cowboy" pears have been kept off the market this season. Growers are encouraged to remove trees producing inferior fruit or to top work them to recommended varieties.

The variety committee is studying the fruits that are being marketed and will choose a few of the better ones to recommend for propagation purposes. The committee will also determine the price of scionwood and will prepare a list of experienced local

propagators who are qualified to graft avocados.

The side tongue graft is being recommended by the local experiment station as the best means of propagating avocados. Bark grafting and cleft grafting are also practiced. Budding has not been found satisfactory because the buds fall out before starting growth even though the shield may remain green and healthy. One propagator with considerable experience successfully grafted some scions which were three weeks old without applying wax to the union. Many growers use paraffin to cover the union at the time the graft is made.

The improvement program thus far has dealt largely with West Indian avocados. The committee also contemplates selecting better types of Guatemalan fruits to recommend for propagation. Several of these hard shell types come fairly true to seed. The Macdonald types especially have been the parents of a number of satisfactory seedlings. The Guatemalan fruits on the whole are often called butter pears because of their richer oil content. They are also most satisfactory because of their greater immunity to fruit fly infestations.

It is believed that some progress has been made toward elimination of undesirable fruits from the Honolulu markets during 1946. Much work still remains to be done. Considerable harm was done by buyers as they went through the district and offered growers ten dollars per tree, knowing that they could reap a handsome profit for this fibery, watery fruit on the local markets. The new territorial grading, marketing, and labeling law makes it difficult to sell such fruit at present. Although some low quality fruit still appears on the Honolulu markets it must be labeled as such and consumers are learning to discriminate.

The writer is greatly indebted to the California Avocado Society for the mine of information which has been found in the yearbooks of the organization. This article has been written in appreciation of benefits received therefrom. It is hoped that it will in a small way compensate the organization and its officers for the kindness shown by them in making their literature available for use in Hawaii.