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THE GROWING OF THE AVOCADO IN HAWAII

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Ladies and Gentlemen of the California Avocado Association:

Your president has requested me to prepare a paper relating to the avocado as it is known in Hawaii. It gives me much pleasure to respond to this request because of my deep interest in your rapidly developing infant industry which I have watched attentively from its earliest beginning, having made several visits to Southern California to observe the progress being made.

First permit me to congratulate the members of the Association on the change in the name of the organization adopting the name "Avocado." The name "Avocado" is now so firmly established in all English-speaking parts of the tropics and it had taken so long to eliminate the many undesirable terms applied to the fruit, that it seems unquestionably best to retain Avocado as the most appropriate.

Perhaps it will be of most interest to consider the subject in its relation to the avocado growing industry in California and in its contrasts as seen from the standpoint of California. In California you have the beginning of an industry and one that appears to be destined to be of very great import. In Hawaii, there is no industry of avocado growing in the strict sense of the term and yet there, are probably many more bearing avocado trees in Hawaii than there are in California. The trees are to be found in almost every dooryard and the fruit is common in the markets, yet few if any people are making a business of producing it. The markets of the city of Honolulu and those of the smaller towns of the Territory are supplied with the surplus from dooryards and from a few irregular plantings of very small extent. Orchards are almost unknown.

Why is it that with so grand a fruit as the avocado in a country so admirably adapted to its growth and fruit-bearing, there has been no development of an industry in its production? It will be remembered that it is only a few years since the avocado began to be thought of as a commercial fruit. It was also said to be extremely difficult of propagation by budding or grafting. These problems were attacked by horticulturists in different parts of the tropical and sub-tropical world and the difficulties of propagation soon passed away. The avocado was by this time attracting considerable attention and a number of progressive men in Hawaii were ready to plant orchards. Then the Mediterranean Fruit Fly made its appearance in Hawaii and established itself. Although its attacks upon the fruit are so few that it does not materially interfere with production, it has cut off the possibilities of marketing the fruit on the mainland of the United States for the present. As this was the chief outlet that was looked to by those who considered the business seriously there have not been any considerable developments. Methods of refrigerating the insects, immune varieties of the fruit and other outlets for the fruit may

in time make a change in this matter. The production of avocado oil is also to be considered in this connection and perhaps other manufactured products.

Another contrast is in the familiarity with the fruit. In Hawaii every child as well as adult is familiar with it while in many parts of California it is still spoken of as the "new fruit". But with the present rate of planting it will not be long before the same familiarity will be established.

There is no frost resistance problem in Hawaii since all the avocados are produced on the low lands where frost and even cold weather is unknown. Hawaiian experience in this matter is therefore of no value to California.

In propagation, budding with the ordinary shield bud inserted in comparatively tender wood has become the established method for multiplying the best varieties. Comparatively young wood is also used for buds and the incision is made in the form of a "T" or an inverted "T" with no apparent advantage in either form. Budding is done chiefly on seedlings in one gallon tins or in the young trees where they are to remain permanently. There is very little growing of trees in nursery form and "balling" them for transplanting, first because it has been found that with many inexperienced planters the tree in the pot is safer. Potted plants are also less likely to distribute a very noxious weed known as "nut grass". Under California conditions, the regular nursery practice of balling the trees has much to recommend it.

Hawaii abounds in varieties yet many of them have not been tried out under varying conditions. Perhaps it would be more correct to state that Hawaii abounds in seedlings from among which not a few appear to be worthy of propagation and naming as varieties. The classification of these does not conform to the terms' which have become more or less common in California, "Hard shell" and "Thin skinned" or "Mexican". Many of the varieties with thin skin are not of Mexican origin and certainly not of the type grown in highland Mexico. They are in many cases, large, vary greatly in shape and have no odor resembling anise. It has been suggested to avoid confusion, that these be called "West Indian", that the term "Mexican" be reserved for those varieties from the highlands of Mexico with thin rind. For the type with the hard and woody rind, perhaps the term "Guatemalan" is as appropriate as any and is in little danger of producing any confusion.

Most of the varieties in Hawaii are of the type just designated as "West Indian"; the "Guatemalan" is not uncommon, but the "Mexican" is comparatively rarer. A number of varieties from Hawaii have been tested out or are being tested by two of your foremost growers, Mr. W. A. Spinks and Mr. Joseph Sexton, as well as by others in a smaller way. Either of these gentlemen can give accurate information as to the behavior of Hawaiian avocados in California. It is probable that many of them will not prove as resistant to frost as those that have come to California direct from Mexico. It has been stated that some of the Guatemalan types from Hawaii have shown considerable frost resistance.

The breeding of new varieties of avocados is a field of much promise. Merely by seed selection much has been done through the many years of cultivation in Hawaii to secure excellent varieties; but by the careful selection of characters and the crossing of varieties it is probable that new forms may be originated better adapted to the

requirements of a commercial fruit than any now in existence. Most of the selection of seeds in Hawaii during past years has been from the standpoint of flavor and texture only, little regard being paid to the requirements of a commercial fruit in other particulars. The form of the fruit, the tightness of the seed, the keeping quality, productivity, and such characters have been too often overlooked. Much can be done to secure excellent sorts of this fruit by the judicious selection of chance-fertilized seeds, but more is to be expected from careful crossing. The Hawaii Experiment Station has begun some preliminary work along these lines and probably workers in other parts of the tropics and sub-tropics have also made a beginning.

In the matter of marketing, some of the experience of Hawaii, prior to the advent of the Mediterranean Fruit Fly may be of interest to growers in California. Experiments were conducted in shipping the fruit to San Francisco and also to Chicago. A shipment in a refrigerated car to Chicago arrived at its destination in excellent condition. These were packed in single layer crates, were promptly placed in refrigeration after being picked and were out of refrigeration only long enough to be transferred to a pre-iced car. The varieties used in the several experiments tried showed great variation in the carrying qualities. It is a mistake to suppose that the hard-shelled varieties are necessarily the best shippers. Without a doubt the hard shell is a protection to them from outside bruising, but fruits may be poor carriers because of the internal breaking down of the tissues, entirely apart from injury of a mechanical nature. One of the best shipping varieties tested in the experiments of the Hawaii Station was the Farnsworth, a large and comparatively thin rind fruit. This was at one time shipped to Washington, D. C., by way of San Francisco, Lodi, and New York, having been out of refrigeration from San Francisco to Lodi and from New York to Washington, but it arrived in excellent condition at the capital.

Another consideration in the matter of marketing is the relation of supply and demand. When the shipping experiments referred to above were carried on the avocado was very little known even in San Francisco and in most cities of the United States they were almost wholly unknown. A very few fruits would then supply the demand. Today they are becoming very popular in California, but in the interior cities there are surprisingly few people who have ever heard of an avocado. I entertain no doubt as to the ultimate triumph in the markets of this highly nutritious fruit so universally relished in the tropics where it is grown, but unless there be at the present time a carefully carried out program of preparedness in advertising, there may be a period when for a time the supply will exceed the demand. This always means disaster for some and discourages the progress of the industry. It can be avoided by judicious advertising.

There are a few insect pests and diseases of the avocado which are quite generally distributed, but which may not yet have entered California. The most common insect pest of the species in Hawaii is the avocado Mealy Bug (*Pseudococcus nipae*). Fortunately it is not difficult to control either by spraying with some of the oil sprays or by the use of natural enemies. Several species of ladybugs help to keep down the numbers of the insect, which fortunately seldom attacks the fruit. This insect is widely distributed, having, been seen by the writer in the West Indies, Florida, and Hawaii.

Another insect of less importance is a small wood borer, a species of *Xyleborus*, which penetrates the old wood particularly of trees that are weakened by other causes. These

insects may be controlled by keeping up the general vigor of the trees and by the use of a wash on the infested tree trunks and main branches. This wash consists of one gallon of soft soap, three gallons of water and a half pint of carbolic acid. It can be easily applied with a whitewash brush.

There is a disease caused by a species of the fungus *Gloeosporium* which is known to exist in Porto Rico, Cuba, Florida, Hawaii and in other parts of the tropics. Varying results have been reported in the treatment of the disease with fungicides, probably due to the varying weather conditions where it has been tried. It is a difficult matter to make a fungicide adhere to the foliage in many parts of the tropics where showers are frequent.

Any who may be interested in the further details of the experimental work with the avocado carried on at the Hawaii Experiment Station may secure a copy of Bulletin No. 25, on application to the U. S. Experiment Station, Honolulu, Hawaii.