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The Guava and Its Propagation

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The discussion given here refers only to the guava **(Psidium guajava),** sometimes in California called the lemon guava. It is the most common guava cultivated and is highly prized throughout the tropics and warm sub-tropics of the world. The Cattley or strawberry guava **(Psidium Cattleianum)** is a valuable fruit, but belongs to a very different species and is not included in this discussion.

The guava is frequently referred to as the apple of the tropics. This is because it is the staple fruit of the tropics and serves many uses. It is relished as a fresh fruit, either eaten out of hand or sliced and served in salads or with cream and sugar. Prom it is made the famous guava jelly known throughout all tropical countries for its delicate and distinctive flavor. It may also be used stewed, canned or preserved, and is an outstanding pie fruit. The dried or dehydrated product may be preserved for long periods, and makes a very acceptable stewed product.

The guava has recently been catapulted into world recognition by the discovery of its extreme richness in the antiscorbutic vitamin C (ascorbic acid). All varieties of the true guava are very rich in vitamin C, but some are much richer than others. Some varieties average only about 90 milligrams to 100 grams of fruit pulp, which for fruits is a high average, but a number of varieties have been discovered which average as high as 400 to 600, or even 1000 milligrams to 100 grams of fruit pulp. Of these, the fresh fruit pulp may be considered as in the vitamin C "pill" class.

Under arrangements made by government agencies concerned with army nutrition, several million pounds of guava puree was manufactured in a Cuban factory during the past year and used to fortify the vitamin C content of canned berries, cherries and like products prepared for army consumption: ten per cent of guava puree is added. This use is in process of rapid extension and I am informed that this year arrangements are being made to establish factories in Mexico and perhaps elsewhere. Guava products are already being extensively advocated and prepared for the soldiers of South Africa and India.

Recently a car lot shipment of guavas (probably in the form of frozen puree) is reported to have arrived in Los Angeles from Mexico. This product is intended principally for use in flavoring ice cream.

Experiments extending over a period of 30 years, conducted under the writer's direction at the California Citrus Experiment Station, indicate that guavas may be produced successfully on warm lands in many sections of southern California (Webber, 4). During these experiments, batches of seedlings have been grown from good types chosen in Florida, Cuba, Mexico, India, South Africa, Hawaii and Egypt. A number of the best

seedling types from these progenies have been selected and named as varieties, and these are now being propagated for distribution.[1] Experimental plantings should be made in the warmest lands of southern California and it has thus become important that horticulturists be informed relative to the methods that may be used in their propagation. The following is an outline of the little that is known about propagation and while based on meager data, will probably be suggestive and helpful.

The guava is difficult to propagate by the methods most commonly employed with other fruits. The question of propagation is further complicated by the fact that in California and in many subtropical countries where the plants are liable to be frozen to the ground occasionally, it is desirable to have the roots of the same variety as the top so that when frozen back the original variety only will sprout from the underground parts. If any type of budding or grafting is used in the propagation, the whole or a part of the root system would be of a different variety, and a mixture would almost certainly be produced in the new top. It seems evident, therefore, that in sections like California, propagation generally should be by cuttings or layers.

Unfortunately the guava is very difficult to propagate by stem cuttings, through the use of ordinary methods or by any manipulation thus far tested. Small batches of such cuttings have frequently been tested at the California Citrus Experiment Station with various treatments, but with almost no results, only an occasional one rooting. Stem cuttings in considerable numbers and of a half dozen different varieties have, at various times, been furnished to propagators of commercial nurseries for trial rootings, but in all cases exceedingly few, or none, rooted. It must be admitted, however, that no thorough investigation of this matter has yet been made.

The use of root-cuttings appears to be the most satisfactory method of propagation thus far tested. In April, 1941, plantings were made directly in the nursery of 249 root-cuttings of some 20 different varieties. The cuttings were taken from lateral roots 1/4 to 1/2 inches in diameter, cut into lengths of 6 to 10 inches. They were set directly into the nursery in rows three feet apart, and the cuttings one foot apart in the rows. In planting, the cuttings were set nearly vertical and the stem ends were brought nearly or quite to the surface, and shaded temporarily by shingles set beside them. These cuttings, carefully irrigated, gave a successful rooting of 102 or 40.96 per cent. In the spring of 1942, employing the same methods, 287 root-cuttings were planted in the nursery, but only 63, or 21.95 per cent, rooted. If such root-cuttings were handled in greenhouse cutting-beds, or in nurseries in humid countries, a much higher percentage of success would doubtless result.

Mowry and Toy (2), in describing guava propagation in Florida, stated "root-cuttings are made of any except very large or very small roots. They are cut into lengths of 5 to 8 inches, laid flat in a seed bed and covered with soil to a depth of 2 to 4 inches. The soil is kept moist but not wet."

S. J. Lynch, Assistant Horticulturist, Subtropical Experiment Station, Homestead, Florida, wrote,[2] "In regard to growing guavas from cuttings we have found that root-cuttings 4 to 6 inches in length and from 1/4 to 1/2 inch in diameter give the greatest percentage of rooted plants. We place them horizontally, about 1/2 inch below the surface, in flats containing a mixture of about half cutting sand and half shredded peat

moss. The roots that are lying closest to the surface of the ground seem to put out foliage buds rather quickly."

A similar and more simple method of propagation, commonly used in humid countries, is to sever roots two to three feet away from the trunk with a sharp spade, and sprouts will grow from the portion cut off which may later be transplanted. This method may also be used in arid countries if the soil all around the cut roots under the trees is kept in moist condition.

In warm countries where it is feasible to grow guavas into trees, and where there is little danger of their freezing to the ground, propagation by budding or grafting may be used but the percentage of successful unions is commonly low. In December, 1897, at Bradentown, Florida, the writer accidentally found the bark slipping on some guava bushes and merely to test budding put in a number of shield buds. All of the buds took readily (result published in Wester, 5, p. 359). In California during the period between 1916 to 1936, however, the writer has repeatedly tried to bud the guava at different seasons, but without success. Wester (5) in 1907 made tests in budding guavas in Florida but was unsuccessful. Later in the Philippine Islands he was successful in his budding experiments and in 1916 published the following directions: "Use mature barely brown-colored, petioled bud wood; cut the buds 2.5 to 3 centimeters long; age of stock at point of insertion of the bud important. Perform work from November to May" (Wester, 6).

Mowry and Toy (2) found that "both shield and patch budding are possible but it is difficult to get a reasonable percentage to live. The work is done in the winter on small stock plants; bud wood that is far enough advanced to have lost its green color in the bark should be used."

K. L. Smith (3), a Florida guava grower, has described and illustrated what he calls the "bark-slot" grafting method which he has used successfully in his commercial guava garden. This is similar to crown grafting as used in topworking citrus trees.

Cheema and Deshmukh (1), as a result of their experiments in India, found that: "The vegetative methods of propagation of the guava tried with success are (1) grafting by approach, (2) layering, and (3) cuttings. Out of these the first is the most successful and one which can be practiced with the least trouble." They reported that their percentage of successes with cuttings was not very high.

Mr. S. J. Lynch of the University of Florida Subtropical Experiment Station has had considerable experience in grafting the guava and has described the methods employed as follows:[3]

"The method we have found most successful in grafting guavas has been cleft grafting. . . . We have found that the winter or semi-dormant months are the best times to obtain a high percentage of take.

"We select scion wood about 1/2 inch in diameter at its largest end from either matured terminal growth or from the growth lying interior from the last flush or growth. Graftwood selected from January to March is usually in the best shape here in Florida. At that time the eyes of the buds are filled out well and on each scion we attempt to have from 3 to 5 plump eyes. The wood selected previous to the first of the year usually has buds so thin

and small that many will not burst forth in growth after grafting. And that wood which is selected later in the spring has the most desirable eyes either sprung or in a flush of growth. We thoroughly wax over all cut surfaces on the scion, as well as the end of the stump, and fill the cleft full of wax.

"After placing a paper collar about the grafted stump which extends from 6 to 8 inches above the end of the scion, we fill the collar to the height of the scion with a moistened and wrung-out peat moss. This retains moisture about the scions and seems to encourage a better spring of the eyes. In three to five weeks, sprouts should appear above the paper collar. In your dry climate it might be advisable to moisten the peat moss once or twice during the time you are waiting for the eyes to spring. In our humid climate this has proved unnecessary so far. We also cram a handful of leaves into the end of the collar to help retain the moisture and to keep the sun from shining down on the peat moss and drying it out. The sprouting scions push right through the leaves and it causes no trouble. . . .

"We have found that the selection of budwood is probably one of the most important factors in determining the success of guava grafting or budding. There has been a small success with shield budding of guavas but the percentage of take has been very low. Also we have made a few side veneer grafts on guavas take but here again success has been poor."

It will be evident, from what has been stated above, that information with reference to guava propagation is as yet scanty and imperfect. In such subtropical countries as California where the plants are liable to be frozen to the ground occasionally, it seems clearly evident that some method of propagation by cuttings should be generally employed. This will assure that the new tops developed from the basal stems and the roots after the freeze will be of the same good variety as the original tops, and thus avoid the necessity of re-budding or re-grafting. New sprouts that develop from plants thus killed back begin to bear a fair crop the second year after the freeze and about a full crop the third year. Even the most severe freezes are not likely to cause the loss of more than one to one and one-half of a normal crop. The guava plantings at the California Citrus Experiment Station, which are located on a rather elevated sloping hillside where there is good air drainage, have never been artificially heated and have been severely injured but twice during a period of over 30 years. It should be noted also that fruit developed on the succulent young growth formed in the recovery of injured trees tends to be larger in size, is of good quality, and thus is likely to be more valuable than the fruit from old trees.

All of the evidence now available strongly indicates that the propagation of superior varieties is most easily accomplished by the use of root-cuttings and that such propagations produce good satisfactory trees. It is suggested that this is the method of propagation that should be generally used in California.

1.The distribution of varieties will be made by nurserymen.
2.S. J. Lynch in letter of May 17, 1943 to H. J. Webber. Quoted by permission.
3.S. J. Lynch in letter of January 11, 1944, to H. J. Webber. Quoted by permission.

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