Methods of Guava Top-Working

METHOD 1: Cleft Grafting

The routine procedure for cleft grafting was followed (9). The large limbs to be worked by this and subsequent methods were cut back to within twelve to twenty-four inches from the ground. The cleft was sawed with a hand saw rather than split with a grafting iron. The cuts were trimmed to eliminate the tissue that had been injured by the sawing procedure. A hardwood wedge was used to spread the cut in the stock in order to insert the trimmed scions without damage to them. The scions were straight, round, second season wood, averaging 13mm in diameter and 15cm in length. The scions were trimmed down both sides in the ordinary method used in cleft grafting. After the scions were inserted snugly with matching cambiums, the cleft was filled with melted grafting wax (two parts paraffin to one part beeswax) and the cut surface of both the stump and the scions were completely painted over with this wax. (Fig. 1) A paper sleeve was wrapped around the grafted stump and secured with twine. This sleeve, extending about eight inches above the scion, was then filled with damp peat moss over the top of the scions to keep them from drying out. A total of twenty-two grafts were made, using forty-four scions.
METHOD II: Veneer Grafting (stock cut completely off at time of grafting)

Three or more stumps were left on each tree when possible. The cut surfaces of the stumps were painted with grafting wax. The scions were first season wood of which the average diameter was 8mm. and the length 8.6 cm. An incision on the stock was made approximately 9cm. from the top of the stump and extending inward through the bark to the inner woody cylinder at about a 60° angle with the bark. Next, a cut to expose cambial tissue was made from the top of the stump and extending inward through the bark. The scion was trimmed at a 60° angle at the base and a cut made to expose cambial tissue extended the length of the scion on one side. The cambial tissue on one side of the scion was then aligned with the cambial tissue on the stock. The scion was held snugly in place by completely wrapping the grafted area with .0035 inch vinyl film. The film slightly over-lapped the top of the stump, preventing rain from entering the grafting area. (Fig. 2) One stump on each tree was protected with a paper sleeve and peat moss, as in Method I. The second stump was protected with a paper sleeve but without the damp peat moss. The third stump was left unprotected, except for the vinyl film wrap. A total of fifty-six grafts were made on ten trees, one scion being used on each graft.

METHOD III: Bark Grafting

In this method, the stocks were cut back and the cut surfaces painted with grafting wax as in Method II. Two incisions parallel to one another and perpendicular to the cut off surface of the stock were made. These incisions were approximately the width of a scion apart, and cuts extended inward through the bark. The bottom of this piece of bark was left intact and the bark flap was then separated from the stock with a bone blade. Scions of first year growth, similar to those used in Method II, were used. They were trimmed on both front and back surfaces and placed in the slot, one cut surface against the woody cylinder and the bark flap brought up against the outer cut surface of the scion. Two short nails were driven through the bark, scion, and into the woody stock to hold the scion firmly in place. A total of sixty-two bark grafts were made. The above Methods
I, II, and III were worked in the fall of 1953.

**METHOD IV: Veneer Grafting (greenwood scions)**

The trees to be worked by Method IV were cut back in October of 1953 when the above mentioned grafts were put on, and were allowed to sucker freely. In January and February of 1954, the trees had suckered and the shoots were thinned out to leave three or four equally spaced shoots close to the original terminal cut of the stump. The scions used were similar to "center" in figure 3, which were green barked, quadrangular shaped, of the latest growth flush, and with well developed axillary buds. The modified veneer graft was followed as described by Nelson (7). (Fig. 4, Left). Of the total of eighty-three buds inserted, forty-three were wrapped with a porolated vinyl film of approximately .0035 inch thickness and the remainder with regular .0035 inch thickness vinyl film.

A combination of Methods I, II, and IV was put on in January and February of 1954. The three methods being placed on separate large limbs of each stock tree. One limb of each tree had been cut back and allowed to sucker the previous October. This limb was worked by Method IV, veneer grafting with greenwood scions. A total of thirty-four scions were inserted, one-half were wrapped with the porolated vinyl film and one-half were wrapped with the regular .0035 inch vinyl film. One limb of each tree was worked by cleft grafting. Ten cleft grafts were made, using twenty scions. The third limb of each tree was worked by veneer grafting with mature scions, grafting a total of twenty scions. Of these, one-half were wrapped with porolated vinyl film and the remainder were wrapped with the regular .0035 inch vinyl film. (Fig. 4).

**Results**

Results of the above experiments were taken at the end of twelve weeks, at which time the scions had either sprouted or died. All of the scions of Methods I, II, and III put on in the fall, failed to survive. Dead scions removed from the clefts showed that there was very little cambium proliferation of the stock. It should be noted that at the time when these three methods were used there was a large amount of rainfall which caused a great upsurge of sap. Water covering the growing tissues probably prevented the proper amount of oxygen from coming in contact with the tissues to insure an active division of cells. The sap exuded in such quantities that the hardened wax covering the cut areas of the stock was pushed up. On the side veneer grafts, the vinyl film trapped the exuding sap and, although drains were made, the scions became waterlogged and failed to unite. (Porolated vinyl film came on the market about this time and was used in the spring grafting.) The large amount of sap exuding...
was not observed on trees with the bark grafts and there seemed to be adequate proliferation of tissue, but a union did not form and the scions died. This may have been partially due to injury from the small nails splitting the scions.

The results obtained on the grafting done in the spring of 1954 were more encouraging. On the modified veneer grafts used in Method IV, after twelve weeks, a total of 62.1% of the scions were alive. The scions wrapped with porolated vinyl film had 73% "take" and those wrapped with the regular vinyl film had a 50% "take". There appeared to be no accumulation of sap under the wrap with either type of vinyl film used. The green bark of the scion turned dark brown after about four weeks, as the bud eye began to spring. There was adequate cambial proliferation at the bud union.

On the trees on which Methods I, II, and IV were combined, after twelve weeks, 85% of the scions that had been inserted by cleft grafting were alive. None of the scions used in veneer grafting (mature wood) survived. Of the veneer grafts with greenwood scions, a total of 91.1% were alive. Those wrapped with the porolated vinyl film survived 100%, and with the regular vinyl film, 82.3% were alive.

**DISCUSSION AND CONCLUSIONS**

It seems fairly obvious that there are two major factors which controlled the success of these experiments. One was the heavy rainfall period in the fall which played a large part in causing unsuccessful grafts, and in conjunction with this, if one might judge from other fast growing subtropica, that in the early fall cambial proliferation is at a low ebb. Of course, this is somewhat disproved by the success of avocado grafting in the winter, but it seems fairly obvious in this case. Another major factor is graftwood selection. The only external grafting methods which succeeded using mature scion wood, were the cleft grafts. Excellent results were obtained when a green quadrangular scion was used.

In elapsed-time studies carried out during this experiment, it was found that three times as much time was consumed in cleft grafting a stump as in the modified veneer grafting on sprouted stumps. Also, the cleft grafting requires a larger output of physical energy.

There seemed to be some difference between the use of porolated, vinyl film wrap and the regular vinyl film in the above experiment, but in subsequent work, the difference was found to be negligible. It could be quite safely recommended that, for the average top-working job with guavas, using the modified veneer graft with succulent scions is reliable.

**LITERATURE CITED**


**GROWING UP WITH THE LYCHEE**

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My experience with the lychee in Florida began at the age of seven when in 1922 my father secured eight layerd Brewster Lychee plants from Mr. Reasoner's Royal Palm Nurseries. These trees were set on high hammock land in a well protected area among large oaks and hickories and along side of a number of mangos. The land sloped to the north to the shore of a large lake some 25 to 100 yards away. They received no special attention because they were lychees, but were cared for in general as were the mangos, avocados and ornamental plants on the property. These eight lychees grew rather rapidly