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THE PROPAGATION OF GUAVA BY FORKERT BUDDING[1]

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The ordinary guava or guayaba, *Psidium guajava,* is one of the most common native fruits of Central America. Although the desirable nutritional qualities and flavor characteristics of this fruit are well established, guavas have never achieved much success as a cultivated crop in this part of the world. Their popularity for home garden and dooryard planting has likewise been limited, in spite of the fact that, as compared with most other fruit trees, they are hardy, productive, and easy to grow.

The failure of guavas to achieve wide popularity as a fruit is related, no doubt, to the high proportion of wild trees that produce fruit which is excessively seedy, thin fleshed, and inferior in quality and flavor. Strangely enough, guavas have achieved their greatest popularity as a fruit crop in countries far removed from their native Central-American environment, such as India, South Africa and the Unites States. This is due, in large part, to the fact that clonal varieties and improved seedling types predominate in countries where guavas are popular. In Central America, on the other hand, guavas have not been improved from the native wild forms. However, individual trees have been found which bear sweet, thick-fleshed fruit with small seed cavities. The best of these selected types are fine dessert fruits, comparable in quality and flavor to mangos, apples, or pears, and readily acceptable as a dessert fruit. Trees bearing fruit of this type should be multiplied vegetatively

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in order to take advantage of their desirable flavor and nutritional qualities.

Vegetative propagation of the guava has usually been considered difficult by authors on the subject, because stem cuttings are usually difficult and slow to root, and grafting by conventional methods has seldom given satisfactory results. Root cuttings of some varieties can be induced to sprout and form new plants if placed in suitable media in a well-drained flat or cutting bed. This method of propagation is, however, relatively slow and, since some varieties cannot be increased through root cuttings it is not widely used.

Various authors have discussed and commented on the difficulties encountered in propagating guavas vegetatively (1), (2), (3), (8), (9), (10). Perhaps the most satisfactory and efficient method of propagating a large number of guava plants vegetatively is by the "Forkert' method of budding described by Ochse (7). Forkert budding is actually a modified form of patch budding. An adaptation of the Forkert method, used successfully in propagating guavas vegetatively, is described in detail by Hamilton and Seagrave- Smith (4). The use of budding bands cut from vinyl plastic has proven to be a marked improvement over the usual method of holding the bud in place by wrapping with string, raffia, o rubber bands. The use of plastic budding bands, suggested by Merle (6), insures a tight seal over the budded section, thus preventing the bud patch from dryng out rapidly. Lynch and Nelson (5) also mention the advantage of using vinyl plastic strips to hold guava grafts in place. They describe an ingenious method of veneer grafting in which young, relatively tender terminal shoots are used for scions.

In Forkert budding, illustrated in Figure 1, a curved or half-moon cut about 15 mm. long is made in the bark of the stock, 5 to 8 cm. above ground level. Two parallel vertical cuts are then made in the stock, extending downward from each end of the curved cut previously made. These cuts should be about 12 mm. apart and approximately 25 mm. long. All budding operations should be made with a razor-sharp budding knife having a blade with a curved point.

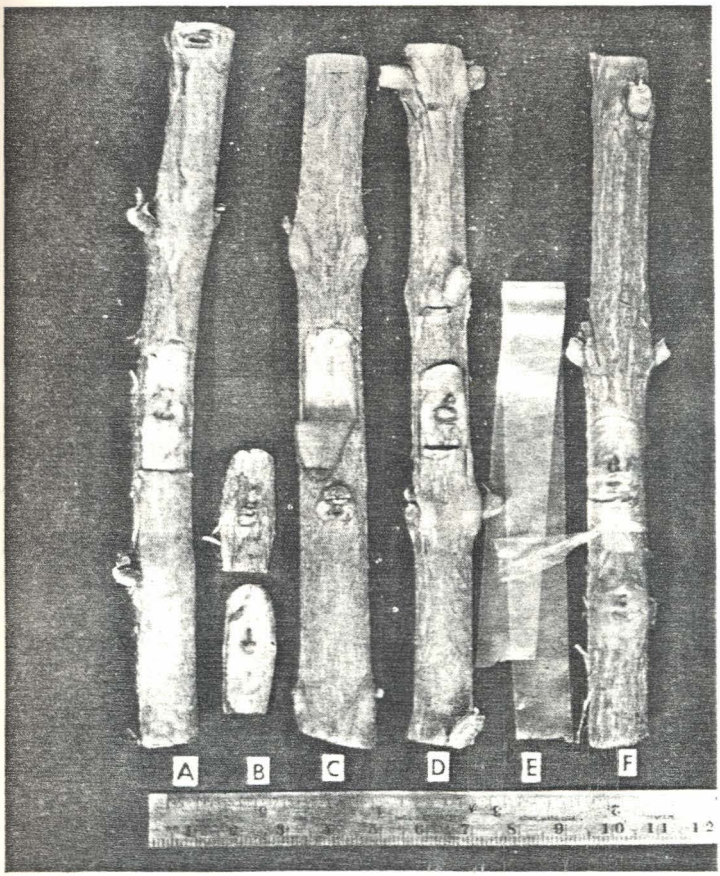

FIGURE 1. Steps in budding guava: **A**, Bud stick with one bud removed. **B**, Buds removed with shield (**top**, upper side of bud shield; **bottom**, underside of bud shield). **C**, Stock with bark peeled back ready to receive bud. **D**, Bud shield inserted in place. **F**, Completed budding operation showing the bud patch held in place with a plastic band; all cut edges are covered and only the bud is left exposed.

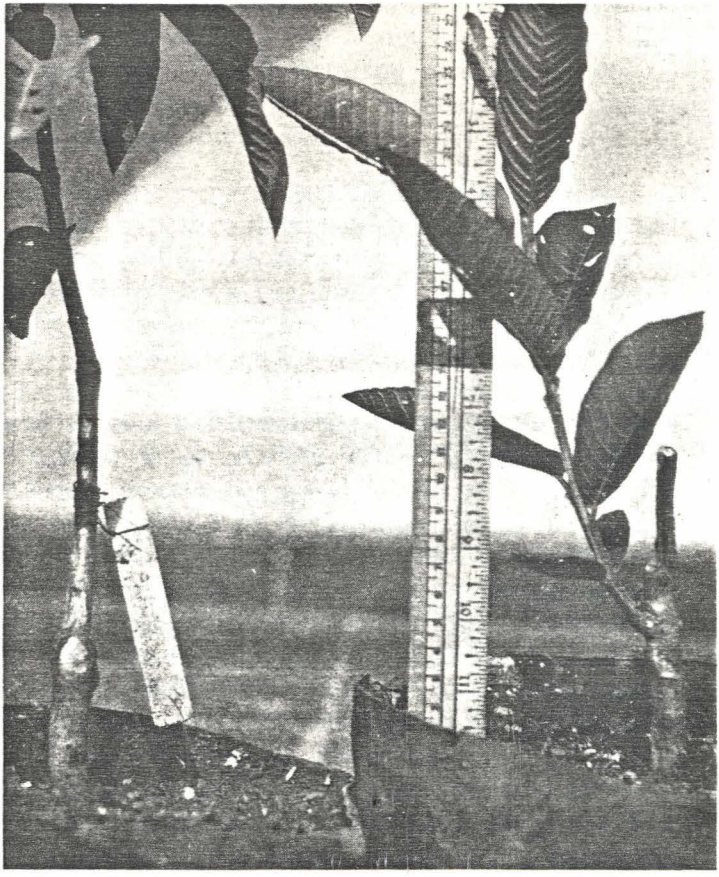

FIGURE 2. **Left:** Budded guava tree ready for transplanting, with original top removed at the bud unicn. **Right:** Young budded tree two months after budding.

The budding operation is completed as follows: Take a fresh bud stick (Fig. 1 *a*), previously prepared by cutting off the leaves 10-15 days prior to removing it from the tree. Then cut around a patch of bark about 15 mm. wide and 25 mm. long, containing a large well-developed bud. The top edge of the patch is cut slightly curved (Fig. 1 *b*), to fit snugly into the cut previously made in the stock (Fig. 1 *c*); peel the patch of bark containing the bud carefully away from the wood. This is done by carefully prying or peeling off the bud patch with the knife blade or fingernails, without breaking or tearing it.

Then peel back the strip of bark on the stock as shown in Figure 1 *c*. This strip should be cut the same width as the patch of bark containing the bud or slightly wider. As soon as the bark is peeled back far enough (Fig. 1*c*), slip the patch of bark containing the bud, under the raised flap of bark. Next, cut off the upper 2/3 of the bark flap. The bud patch is inserted so that the flap of bark remaining on the stock extends up over the lower end of the patch bud, thus helping to hold it in place (Fig. 1 *d*). Finally, bind the patch bud firmly against the wood of the stock plant with the budding band (Fig. 1 *f*). Wrapping is done in a spiral fashion using a piece of plastic 10 to 15 cm. long and about 15 mm. wide. Suitable budding bands may be cut from a strong grade of transparent vinyl plastic about .0035 of an inch thick. Wrap the budding band tightly around the stock above and below the bud as if applying a spiral bandage, taking care to overlap each previous spiral made. Complete the plastic wrapping, passing as near the bud as possible without damaging it, but leaving the bud exposed. The budding band is secured in place by slipping the free end under the last loop and pulling it tight. The faster the operation is performed, the greater the chances of success.

Forkert budding of guava is most successful when vigorous, well-grown seedling plants 1 to 3 cms. in diameter are used as stocks. An additional requirement is that the bark "slips" or peels away from the wood readily, permitting the bark to be lifted up or peeled back without difficulty. Because of this, in areas where there is a prolonged dry season as in certain parts of Central America it may be necessary to do budding during the rainy season

or with the aid of irrigation. During the dry season, the bark usually adheres tightly to the wood, and budding is not likely to be successful at that time.

The best method of growing suitable budding stock is in rows in the nursery, rather than in containers. If necessary, stock plants can be grown in large containers, such as five-quart cans, eight-inch pots, or open-end asphalt paper containers about 14 inches high and 6 inches in diameter, provided the plants are kept in vigorous growing condition. However, it is difficult and usually unsatisfactory to grow suitable root-stock plants in containers as small as gallon cans.

Vigorous, well-grown rootstocks and selected budwood are essential to insure success in budding guavas. For best results, budwood is prepared by clipping or cutting the leaves from vigorous young branches 1 to 2 cms. in diameter, 10 days to 2 weeks before using them for budding. This is done with a sharp knife or pruning shears while the branch is still on the tree. This causes the buds to swell and become enlarged. Buds in this condition will flush readily soon after budding and are better able to unite successfully with the stock. The bark of small branches less than 8 mm. in diameter is thin and fragile, and the buds usually dry out and die if used for budding. For this reason, larger branches, about the same diameter as the rootstocks, are preferred for budwood.

When the budding operation is completed, the top of the rootstock is cut back leaving 6 to 8 leaves above the budded section. All new shoots arising from the stock after the budding operation should be removed at least once a week. Three or 4 weeks after budding, cut halfway through the stock with a knife or pruning shears 5 to 8 cm. above the budded section and bend the top of the stock over to the ground. This aids in forcing the inserted bud to flush and grow. After the new bud has flushed and grown about 10 cm., the rest of the top should be cut back to about 5 cm. above the bud union (Fig. 2. *right*). After the new shoot has reached the diameter of a lead pencil, the rest of the stock remaining above the union can be removed with a slanting cut made just above the bud union (Fig. 2, *left*). When this is done on young budded plants, the cut surface will usually callus within a few months.

Both patch budding and Forkert budding are satisfactory methods of propagating guavas, and good success can usually be achieved by a skillful propagator after a little practice.

These techniques are not difficult to learn and a propagator of moderate skill and experience can become fairly proficient after two or three lessons or demonstrations. Patch-budding is quite similar to Forkert budding, the main difference being that in patch-budding the upper cut is made straight instead of curved and the patch-bud is fitted into the stock. In Forkert budding, a flap of bark from the stock is allowed to extend up over the bottom of the bud patch, as shown in Fig. 1 *d*. This is not done in ordinary patch budding.

Excellent success is not difficult to obtain with these methods, provided healthy, vigorous stocks are available and reasonable care is taken in preparing the budwood and carrying out the budding operation. With a little skill and practice, together with vigorous rootstocks of suitable size, a good propagator can usually get 90% "take" or better, without difficulty. This method of budding is considered to be the easiest practical means by which guava plants can be propagated true to type in large numbers.

Well-grown budded trees will attain sufficient size for transplanting within 4 or 5 months after budding. From observations made in Hawaii, budded guava plants grow and develop to transplanting size considerably faster than grafted plants or those grown from root cuttings. An additional advantage of this method of budding is that very little suckering will occur below the graft union in plants budded just above ground level. The main branches of large guava trees can also be grafted by means of side-veneer or wedge-grafting techniques. These methods have sometimes been employed in top-working old orchards. Although these types of grafting may give satisfactory takes, it is doubtful whether the top-worked trees produced would be entirely satisfactory for fruit production. A major disadvantage following this system of top-working is that large numbers of suckers frequently arise below the graft union and these require additional effort and expense to remove.