Grape varieties can be changed at a high level by a simple procedure for grafting dormant T-buds on fruiting vines.

T-bud grafting of grapevines

Curtis J. Alley

A fast, easy, foolproof method is needed for topworking fruiting grapevines to a better variety high above ground level (that is, just below the bottom trellis wire). High-level grafting with the bark graft or the wedge graft requires time, considerable skill, and two or more applications of a good grafting compound. Usually, less than 90 percent of the grafts take.

T-budding has been the common practice for years to change varieties in young deciduous fruit trees, either in the fall, when the bark is still slipping, or in the spring. Branches budded in the fall are cut off above the bud the following spring to force the bud. Branches or young scaffolds budded in the spring may be cut off 25 to 30 cm (10 to 12 inches) beyond the bud at the time the bud is inserted, and cut back to 2 to 4 cm (1 to 1½ inches) about 10 days later.

T-budding is also the most common form of budding in the nursery row in May and June on seedling fruit tree understocks or rooted cuttings of resistant rootstocks.

On grapevines, T-budding has been used primarily in breeding work. Green buds are inserted into the base of green shoots in early summer so that seedlings will fruit early. T-budding is not satisfactory on grapevines under 1 inch in diameter, because the bark is very thin and tears easily, and most grape buds are too large to be easily inserted under the bark.

Dormant mature buds may be used for T-budding at ground level on rootstocks that are too large for chip-budding (over 1 inch in diameter). There is also a way to T-bud dormant mature vines at a high level.

T-budding experiments

In 1975, it was reported that growers in Mexico were successfully using a dormant T-bud wrapped with plastic tape on fruiting vines at a high level. The technique was developed in Argentina.

On June 11, 1976, we started research at the Kearney Horticultural Field Station, Parlier, California, to see if the T-budding method of topworking was better than the wedge-grafting technique. Six-year-old vines of St. Émilion were T-budded to Carignane. The budwood, collected in December 1975, had been wetted thoroughly, placed in 6-mil, 90-cm by 150-cm plastic bags, and refrigerated at 0° to 1.5° C (32° to 34° F) until used. The tops of the vines were cut off about 90 cm (3 feet) above the ground, or about 30 cm (12 inches) below the bottom wire of a two-wire vertical trellis. Vines were 3.7 to 5 cm (1½ to 2 inches) in diameter.

Two T-buds were inserted into each vine—on opposite sides, in line with the row. Buds were inserted 10 to 15 cm (4 to 6 inches) below the cut-off tops of most vines and 2 to 3 cm (¾ to 1 inch) below the cut-off tops of a few others.

On July 28, 76 of the 100 buds that had been inserted were growing. On most of the vines, both buds were growing. Shoots varied in length from 2 to 3 cm (¾ inch) to a few at about 180 cm (7 feet); most were 75 to 90 cm (30 to 36 inches) long.

Vines with buds inserted 2 to 3 cm (¾ inch) from the top grew the most. Those with buds inserted 10 to 15 cm (4 to 6 inches) below the top usually had one strong shoot; the second bud either remained dormant or produced a weak shoot.

The heavy growth of watersprouts at the top of the vines and on the trunks was removed after the July 28 inspection. Those vines that had been budded 10 to 15 cm (4 to 6 inches) below the top were topped to within 2 to 3 cm (¾ inch) of the buds.

By August 31, 90 percent of the grafts had taken and produced shoots. As workers become more familiar with the technique, the 95 percent rate of takes reported by Mexican growers can probably be achieved.

T-budding procedure

The vine was decapitated, and all loose bark was removed from the area on the vine trunk where the incision was to be made. A vertical cut 2 to 4 cm (¾ to 1½ inches) long was made, 2 to 3 cm (¾ inch) below the top. A knife designed for T-budding (not chip-budding) was used (fig. 1).

The second cut was made at a right angle (or slightly less) to—and crossing the top of—the first cut. When cutting through the bark, the knife was held at

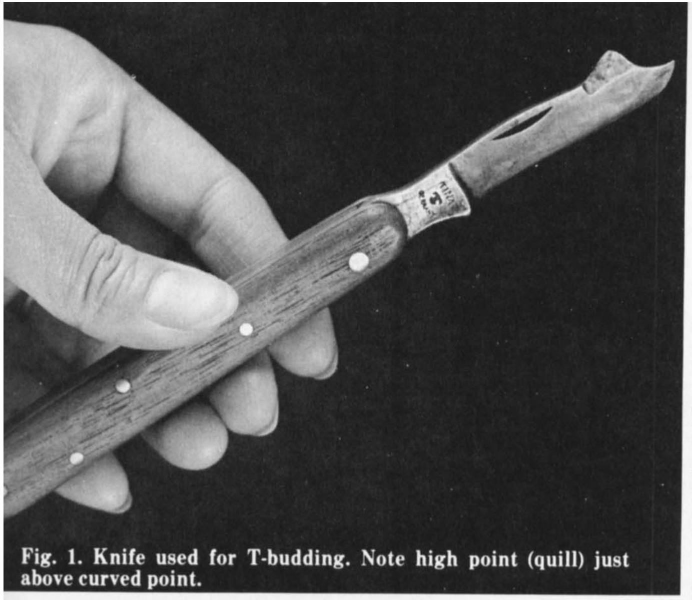

Fig. 1. Knife used for T-budding. Note high point (quill) just above curved point.

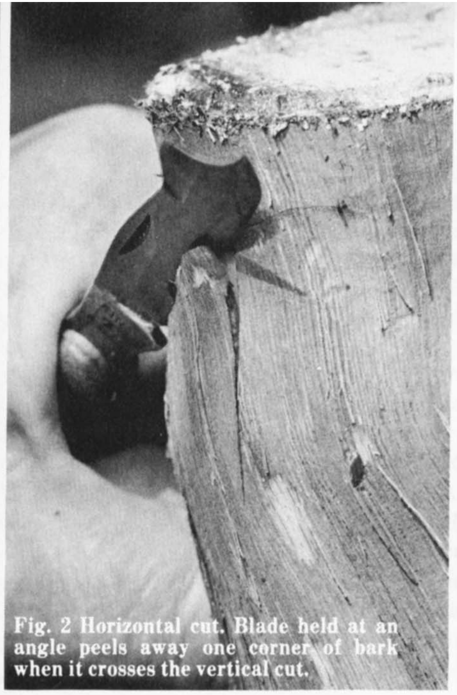

Fig. 2 Horizontal cut. Blade held at an angle peels away one corner of bark when it crosses the vertical cut.

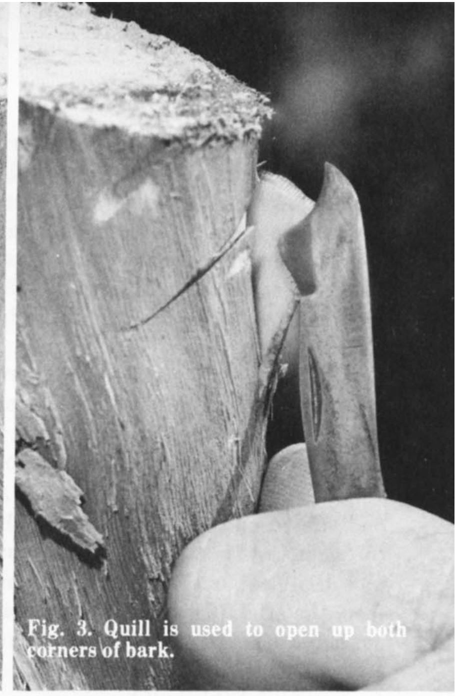

Fig. 3. Quill is used to open up both corners of bark.

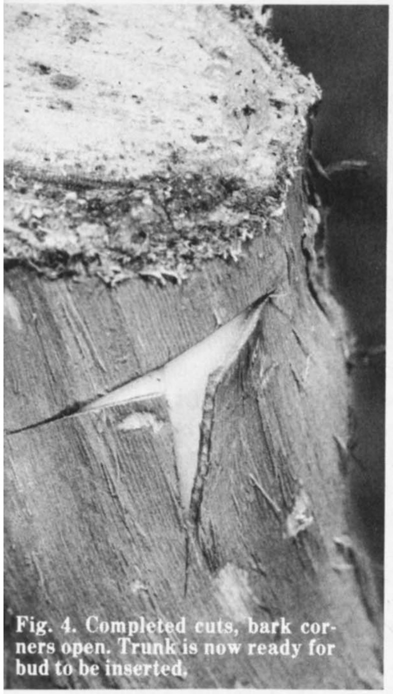

Fig. 4. Completed cuts, bark corners open. Trunk is now ready for bud to be inserted.

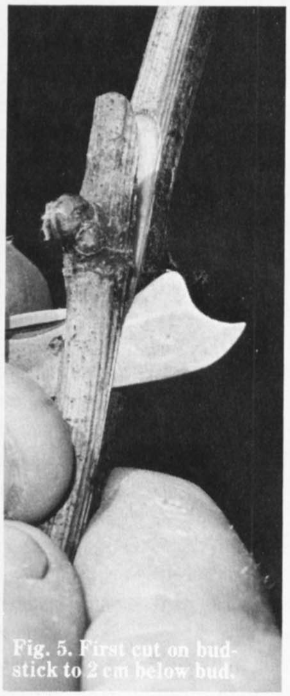

Fig. 5. First cut on budstick to 2 cm below bud.

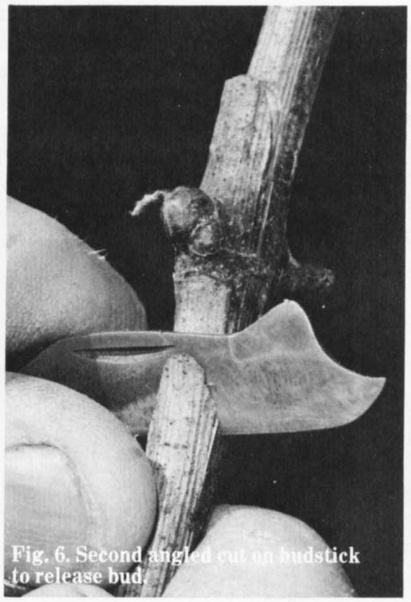

Fig. 6. Second angled cut on budstick to release bud.

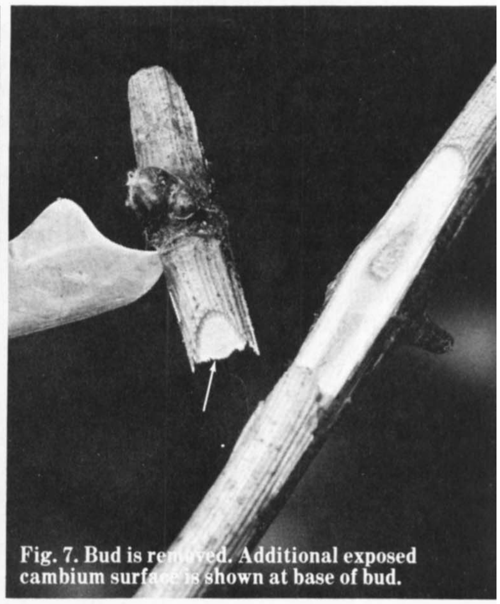

Fig. 7. Bud is removed. Additional exposed cambium surface is shown at base of bud.

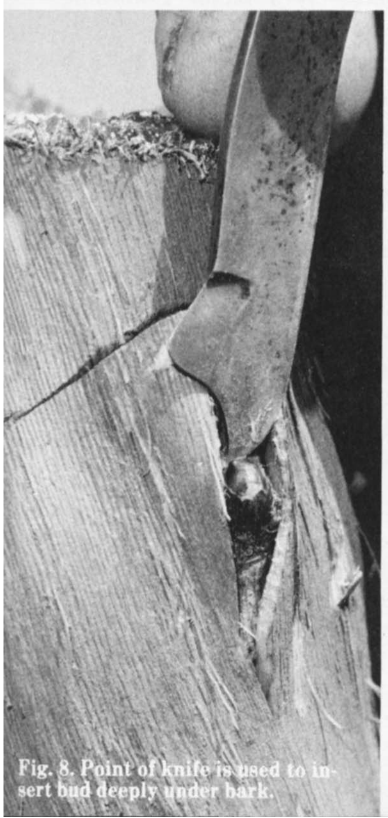

Fig. 8. Point of knife is used to insert bud deeply under bark.

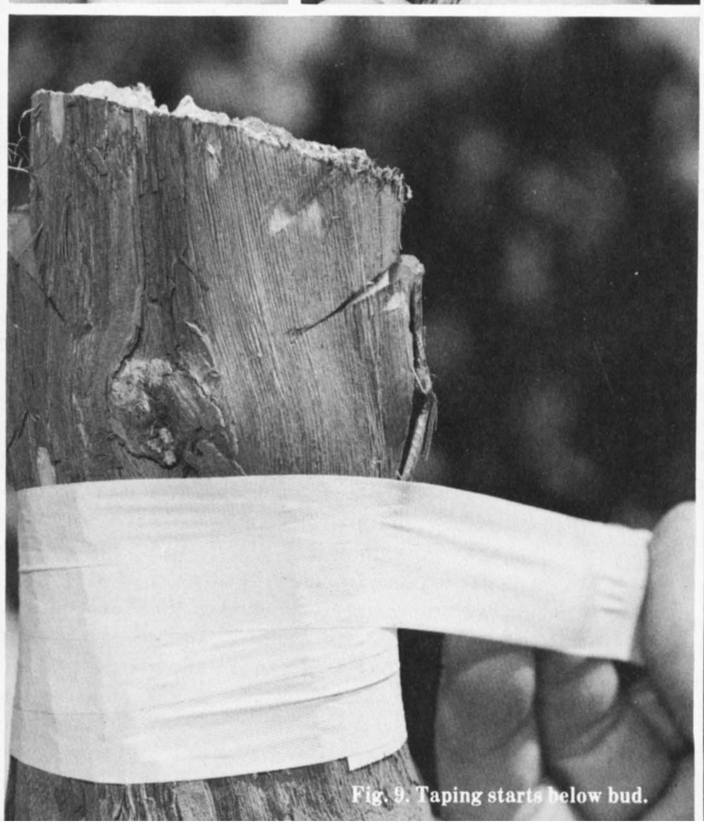

Fig. 9. Taping starts below bud.

Fig. 10. Final taping to above horizontal cut and last wrap just above bud.

an angle so that, as the blade crossed the vertical cut, it tended to peel open one of the corners of the bark where the two incisions crossed (fig. 2). The high point of the knife blade (quill) was then used to peel open both corners (fig. 3). The trunk was now ready for the bud to be inserted (fig. 4).

With a bud stick about 1 cm (1/2 inch)in diameter, the budder made a cut angled downward into the stick, from about 2 cm (3/4 inch) above the bud to about 2 cm below the bud (fig. 5). A second angled cut made downward about 1 to 2 cm (1/2 to 3/4 inch) below the bud met the first cut and severed the bud from the stick (fig. 6). The second angled cut below the bud exposes more cambium surface (fig. 7) for better callusing, which *first occurs at this point.*

The bud was inserted under the open corners of bark, and the base of the bud shield was pushed well below the bottom of the vertical cut with the point of the knife blade (fig. 8). The bud was then covered with tightly pulled, overlapping wraps of white, 4-mil, plastic flagging tape. Since the understocks were about 5 cm (2 inches) in diameter, a 2.5-cm (1-inch) tape was used, starting below the bud (fig. 9) and wrapping up to about 2 to 3 cm (1 inch) above the horizontal cut (fig. 10).

The final few wraps were brought down to just above the bud and tied by tucking the end of the tape under the last wrap and pulling tightly to stretch the tape.

Tape wrapped in this way can be partially removed later if there is evidence of constriction or girdling of the shoot. Cutting across the tape up to the bud on the side of the vine relieves pressure below the bud. The tape will unravel below but not above the bud because of the overlapping last tie just above the bud. The tape should not be cut or removed above the bud until fall, unless there is evidence of girdling above the bud.

The tape held the buds tightly in place and prevented the shoots from breaking away. When the shoots were about 45 cm (18 inches) long, they were fastened to the bottom wire for support. To provide the more flexible established *cordon needed for mechanical harvesting,* each shoot was crossed over the top of the stock so that it was established on the side opposite the bud insertion.

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Lower ethephon rates effective in walnut harvest

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Previous research results have clearly demonstrated that early walnut harvest provides for the maximum quantity of light-colored kernels as well as the minimum amount of navel orangeworm damage.

Walnut kernels are mature, lightest in color, and of most value when the packing tissue surrounding the kernel halves has just turned brown (PTB). This usually occurs 2 to 3 weeks before sufficient hull splitting for harvest occurs. By applying the growth regulator ethephon at PTB, hull dehiscence is accelerated, and walnut harvest can be advanced by 5 to 10 days. Not only is harvest advanced, but in many cases, a complete harvest is obtained in one operation. Proper use of ethephon has made it possible to maintain kernel quality of harvested walnuts at a much higher level.

In spite of benefits provided through earlier harvest with ethephon, growers have been somewhat reluctant to use the growth regulator. Of particular concern has been the expense of applying ethephon at the registered rate of 5 pints per acre and uncertainty about the material's effectiveness in providing an early, single harvest.

Harvest trials

The purpose of these trials was to compare ethephon's effectiveness at 5 pints per acre with that at 3 and 4 pints per acre at dilute and semi-concentrate gallonage.

Replicated trials were established during 1975 in three areas of California with different climates: the San Joaquin Valley, the Sacramento Valley, and the coastal region. In each location a different walnut variety was used in the trial: Marchetti in the San Joaquin Valley, Ashley in the Sacramento Valley, and Payne in the coastal region.

Each trial was replicated three times with an average of 20 trees per replicate. Ethephon was applied at PTB (harvest commencing approximately 10 days later) at the following rates per acre:

- 3 pints in 100 gallons of water.
- 3 pints in 300 gallons.
- 4 pints in 100 gallons.
- 4 pints in 300 gallons.
- 5 pints in 100 gallons.
- 5 pints in 300 gallons.
- 0 pints (untreated check).

In each trial care was taken that ethephon-treated trees received thorough spray coverage. The walnut crop removed from each treatment during each harvest operation was accurately weighed to determine the percent of the crop removed with each harvest.

Harvest began for all treatments, including the untreated check, on the same date. In this way, date of harvest was eliminated as a factor governing completeness of harvest.

Results

Ethephon applications increased the percentage of removal in the first harvest in all locations (fig. 1). In the San Joaquin Valley, nut removal was increased by 15.8 to 21.8 percentage points, in the Sacramento Valley by 11.9 to 15.7 percentage points, and in the coastal region by 24.0 to 41.3 percentage points over the untreated check.

Although the Payne variety used in the coastal region resulted in the lowest percentage of nut removal in the first harvest, it also resulted in the greatest response in terms of percentage of removal over the untreated check. In no case was 100 percent nut removal obtained in the first harvest. However, in the Sacramento Valley trial, well over 90 percent of the nuts were removed with one harvest, leaving so few nuts that the