

availability of low-cost Mexican labor.

Technology does not promise a successful harvester for fresh market strawberries in the near future, because the fruit matures unevenly and the plants are very delicate. A sudden cutoff of Mexican labor might drive the industry back to Mexico. The same firms that market California fruit also handle Mexican strawberries, so the middlemen are poised to move with the industry.

Lettuce, Salinas

The \$1 billion lettuce industry depends on a corps of well-paid cutters and packers. About half of the 7,000 harvest workers cut and pack lettuce under a piece-rate schedule that permits many workers to earn \$15 to \$20 an hour at peak periods. The other lettuce workers are mostly women and older men who thin and hoe or wrap the lettuce at wages of \$4 to \$6 an hour.

The lettuce industry is highly concentrated, dominated by a few grower-shippers. The cutting and packing crews are self-regulating, minimizing the grower's supervisory responsibilities. The work of the entire crew determines the piece rate of each individual, so all crew members maintain a fast pace. Salinas lettuce growers depended on contract labor during the Bracero period, after which the industry legalized its ex-Bracero crews. It shifted from an hourly pay scale used during the labor-abundant Bracero period to the present piece-rate crew system after 1964.

Lettuce cutting machines, though expensive and imperfect, are available, and problems with postharvest activities, such as wrapping and bulk handling, could be overcome. However, growers will be slow to switch, because transportation costs to East Coast markets often equal production costs, and mechanical harvesting cannot ensure that the lettuce shipped east is 100 percent salable. In addition, lettuce harvesting, as the highest paying seasonal farm labor task in California, would attract workers from other crops if needed.

Immigration reforms that include employer sanctions, stepped-up enforcement, and an amnesty for illegal residents appear inevitable. If California's agriculture is to adjust to inevitable workforce changes without disruptions and losses, farmers and farmworkers must develop strategies to determine which tasks can be mechanized or modified and which can justify to policy-makers the need for foreign labor.

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Side-whip grafting of grapevines to change over varieties

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Topworking vines earlier in the spring

T-budding is one of the easiest methods of changing over varieties in a mature vineyard. It requires the least skill and, when a certain degree of precaution is used, gives a high take. After some experience, the technique results in vine takes of 95 percent and higher. The greatest drawback to this method is that it cannot be started until the bark "slips," which, in most areas of California, is around the end of April or the first part of May. In the coastal counties where it is cool, the buds may be delayed in pushing. This delay results in a smaller new head or growth that often does not mature.

A method is needed that permits the vines to be topworked earlier in the spring — March and April — at high level, just as has been done in the past by cleft or split grafting at ground level. One such method is chip budding, but this requires considerably more skill than T-budding and may give more erratic results, especially when vines bleed late in the spring. Another method of topworking grapevines at high level early in the spring (March) is the notch or wedge graft, but this also requires considerable skill. Within the last five to eight years, grafters in the lower San Joaquin Valley have shown interest in the side-whip graft, which is reported to be fairly easy to accomplish and to give satisfactory takes.

Two test plots established in 1982 provided "take" data on this type of grafting. One plot was in Manteca, California, where 117 vines of Ruby Cabernet were grafted to five clones of Zinfandel. We compared two methods of side-whip grafting, the first using only a single tongue at the upper end of the slanting cut of the scion, and the second using two tongues (see photos). We

grafted the vines on April 14 using two scions per vine.

The two-tongue method was superior in both vine take (90 percent take out of 50 vines grafted, as opposed to 72 percent of 67 vines by the one-tongue method) and scion take (79 percent take of 100 scions inserted, as opposed to 46 percent of 134 scions).

In the second test plot, at Napa, California, only the double-tongue method was used. Eighty vines of Merlot were grafted over to four Italian wine cultivars on April 24 with two scions on each trunk. A very good vine take (99 percent) resulted, but the scion take was lower (91 percent of 160 scions).

These results and discussions with other budders and grafters suggest that side-whip grafting is not as successful as T-budding. However, the take is acceptable. This method requires somewhat more skill than T-budding but not as much as notch grafting or chip budding.

One limitation of whip grafting is that it should not be used in areas that have high winds in the spring.

Side-whip grafting results in a good-size new head being established early in the season so that the wood matures properly before the next winter. In areas where it can be used, whip grafting offers a means of getting an early start on topworking a vineyard. T-budding may be used later to catch the grafts that failed to grow. In topworking a large vineyard, it is possible to start early by whip grafting until the bark "slips" and then use T-budding.

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Side-whip grafting

Begin grafting in early to mid-March. Cut off tops of vines 12 to 16 inches below the bottom wire of a two-wire vertical trellis. Leave 2 to 3 inches of straight, uniform trunk below the cut. Remove old, dead bark 3 to 4 inches below the cut. Grafts will be made on the sides of the trunk with the most curvature; on trunks over 1 inch in diameter, two such grafts are usually made opposite each other.



First make gently slanting cut upward, starting 2 inches below top of trunk. Then make upper tongue (left), starting 1/4 inch from top and cutting down at 60° angle 1/2 inch deep. Twist knife blade outward to open tongue. Start lower tongue (right) at cambium line at base of long slanting cut; cut 1/2 inch deep, nearly parallel with trunk, just under bark in cambium and xylem region. Twist blade outward.



On two-bud scion, make long tapering cut from behind lower bud, slanting down to base.



Make small, tapered, 1/4-inch cut at scion base in line with lower bud to expose more cambium surface for interlock with tongue on trunk.



Line up tip of the scion with the lower tongue on the vine trunk to determine where to start the upper tongue on the scion.



Cut upward into scion, making a rather thick, 1/2-inch-deep upper tongue. Twist knife blade outward.



Attach scion to trunk to one side of the long slanting cut, aligning cambiums as closely as possible and interlocking the tongues.



Wrap the graft with white plastic tape. Then coat the cut surfaces of the trunk, scion, and buds with asphalt grafting compound.