

Stump Grafting Ol

familiar bark grafting practice common
proves adaptable to old orange trees in



Scraping with sharpened back of folding saw, preparing bark for splitting and insertion of scion.



Tying-in the scion with baling wire drawn tight, twisted, and drawn down by wire staples.



All cut surfaces are covered with asphalt emulsion grafting compound to exclude air.

Stump grafting old seedling type orange trees was successful in San Bernardino County in 1949—with expectation of reasonable production of fruit within five years.

An experiment started on April 14, 1949, involved more than 144 orange trees, estimated to be about 80 years old, in an orchard in the Bryn Mawr district.

The trees were very tall and the lowest skirt branches were high enough to permit a man to walk under. In most cases, the first scaffold limbs were six feet or more above the ground. Trunks varied from 12 to 22 inches in diameter. The varieties were mostly sweet seedling types with a few blood oranges included.

When grafting operations started, buds long dormant were beginning to break through and the bark was slipping satisfactorily for the insertion of the scions.

A navel orchard—free of scaly bark and other such diseases—was available for scion wood which varied greatly. It was found that hard, round green wood was the best. Sucker wood that had developed streaks of brown in the bark surface, resulted in a difference in percentage of take. As a result of this experiment, soft angular green wood can be considered satisfactory.

Chain saws were used to cut off the trees where the circumference of the trunks was smoothest at about four feet above ground. The trunks were whitewashed on the south side to prevent sunburn.

The initial operation of the actual grafting consisted of scraping the bark with the sharpened back of a saw blade. Flat places around the perimeter of the trunk were selected for placement of scions. A thinly scraped area about two inches wide and two or three inches long for each scion location was prepared. Cut surfaces of the bark and stumps were smoothed similarly with a budding knife.

Scions having four to six buds, and with a long sloping cut were used. Sometimes as many as two buds would be below the cut surface of the trunk. The bark was split on the trunk and only one side loosened, under which the scion was placed. Scions were inserted from the top under the loosened side only, following down the split in the main trunk bark.

As many scions as could be placed around the perimeter of the trunk were

inserted—varying from six to 12. A piece of baling wire, was drawn tight around the stump, about an inch below the top to hold the scions in place. Where the bark was not held tight against all the scions small wire staples were driven in to pull the wire down tightly.

The cut portion of the trunk was immediately coated with an asphalt emulsion grafting material, a type that can be thinned down with water so long as it has not dried out. Generous quantities were used, but it is believed that it would have been satisfactory—and more economical—to have diluted it especially for treating the cut surface of the trunk. There would not be so much thick black asphalt in the center of the trunks to absorb heat from the direct rays of the sun. It is necessary, however, to follow-up several times to eventually build up a satisfactory layer to protect all cut surfaces. There is also another advantage in that thinner material penetrates the cut surfaces more readily and should prevent the loosening observed in a few cases caused by the up-surge of sap from the trunk.

It is highly important that scions be inspected every day or so for the first couple of weeks, and then every two or three weeks until they are well along, resealing to prevent drying.

Trees such as these, cut off and exposed to direct sunlight, are very susceptible to sunburn so, as soon as the trunks were grafted, newspapers were wrapped around the exposed surfaces as protection.

Various types of shelters were erected. As it worked out, the best shelter was one using four stakes, made from car strips driven in the soil around the trunk. Burlap bag canopies could be raised on these stakes as the scions grew. In many cases a center support resting on the top of the stump was used to hold up the center of the canopy. It is essential that shade protection be given scions very soon after they are placed in the stumps.

Follow-up consisted of checking the cut surfaces for cracks in the seal and giving room for free growth by tearing away the paper wrap or raising the canopy above the stump as needed. As scions began to grow, it was necessary to cut the wire to prevent injury.

Some of the stumps pushed up with excessive vigor. Both suckers and scions

d Citrus

used on walnuts San Bernardino County

Ralph G. LaRue

made growth of several feet within a few months. Buds forming on the callous tissue that pushed up over the cut edge of the trunk developed fine suckers for later budding. Many of these buds developed to a point where they could hardly be distinguished from scion growth.

In some cases only a few sucker buds developed on a stump. They would make only 10 to 18 inches of weak growth with immature leaves and then stop. It was noted that where scions failed, the stumps produced but few dormant buds, and those developing into suckers were not vigorous. No differences at the time of doing the grafting were observed in the bark condition. In general, all trunks appeared to be suitable for grafting and yet poor setting of scions resulted, and in fact complete failure occurred in several cases.

Control of vigorous sucker growth was a problem especially where it was interfering with the development of scions. Every effort was made to provide shade for the trunk and to develop abundant foliage on the stumps to aid in maintaining the large established root systems, one of the main reasons for topworking such an old citrus orchard.

As scions made fast growth and were very tender, it became necessary to protect them against blowing out by wind. Car strips were nailed to the trunk and binder twine was used to tie in the growth as it developed. Little or no loss of scions has resulted even though four or five feet of growth was made in a few months.

A breakdown of the cost figures indicates that dehorning, brush cutting, disposal and sawing would cost \$8.08 per stump, with a credit of \$3.00 per stump for fire wood salvage. Budding, grafting, materials and follow-up for six months cost \$4.22 for each unit. These are outside figures due to the size of the trees, long haul and problems of brush disposal.

There were 191 stumps in the area, 36 of which were not reworked because of disease or other considerations, 155 trees were budded or grafted. Disposal costs of tops and stumps of all these 191 trees dehorned is included in the above figures and necessarily was charged against the 144 trees grafted.

A field crew of four men was employed a total of 29 days in doing the work of

dehorning trees, disposing of brush, cutting wood, wrapping and painting stumps.

Propagation material was secured from several sources, selected trees in orchards having a record of high production and freedom from virus diseases. Also certain individual trees in several orchards known to be outstanding were used as a source of scions.

One stump was budded with wood from a Frost nucellar navel and another received scions from the parent navel tree in Riverside. The scion growth from this latter tree is outstanding in its vigor.

More scions were placed in the stumps than were actually needed, to allow for a reasonable percentage of failures. The total number of scions placed was 1,166. As of June 20, 1949, three months after the work was done, 86% of the stumps had a satisfactory take; the percentage of buds placed and growing was 56 and 14% of the stumps had to be completely reworked.

Green barked scions, mature, but not showing brown bark streaks, were most satisfactory, a 72% take resulted from such scions. Young angular, sucker type scions were second best with a take of 57% and round scions, more mature and harder, had a score of 43%. Least satisfactory were fully matured brown bark scions with a take of only 28%.

The scions used had an average length of about six inches, and the buds per stick ranged between four and five—788 buds on 155 scions counted. On the average three buds per scion grew.

A survey made August 26, 1949, revealed that 34 stumps had a complete take; 49 had lost 2 scions each; 26 needed four scions although enough were growing to make a complete top; 16 needed six scions; and 24 stumps had been reworked, all or in part. On reworked stumps 201 scions were replaced, of which only 27 took satisfactorily. Eleven trees were budded with 245 buds, of which 165 grew.

Although scions grew well in all locations around the circumference of the trunk, careful observations indicates that a somewhat better take was obtained on the north side of the stumps.

Ralph G. LaRue is Farm Advisor, University of California College of Agriculture, Extension Service, San Bernardino County.



Type of shelter finally adopted. Paper bag wrap prevents sunburn of stump, tent provides shade protection.



Two vigorous scions on the right. Two scions on the left are second grafting.



Excellent growth after five months. Paper wraps remain on stump, but shade covering has been removed.