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GRAFTING COLD-INJURED AVOCADOS

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The information given in this report was obtained in an avocado rootstock trial plot established in Santa Barbara County in 1948.

The planting consisted of 137 MacArthur trees on Guatemalan, Mexican, and West Indian rootstocks. It included the three types of trees shown in figure 1: standard trees with trunk diameters near the bud union of from 1/4 to 3/4 inch; "tied-up buds" (immature budlings); and "tip grafts" which were propagated by splice grafting a one-bud scion onto a potted seedling.

Fig. 1. *Types of trees planted: Left to right—standard, tied-up bud, tip graft. Arrows point to bud unions.*

None of the trees were protected and all were killed to the ground by the freeze of January 1949. Moreover, later observations showed that the roots of 8 percent of the standard and tied-up buds and 51 percent of the tip grafts were also killed. This

difference in mortality was undoubtedly due to the fact that the tip grafts were much smaller than the other two types of trees. Incidentally, there was no relationship between survival and rootstock variety.

Faced with the problem of rebuilding the trees by the conventional procedure of budding rootstock sprouts, it was decided instead to graft the trunk portion below the soil level. This was done shortly after the freeze. It was thought that, if successful, the reestablishment of the trees would be hastened, and if unsuccessful, only the expense and effort would have been wasted, since rootstock sprouts would still be available for later budding.

The method of grafting is illustrated in fig. 2. One of the difficulties encountered was the uncertainty of the condition of the trunk so soon after the freeze. But to have waited until sprouts became visible would have defeated the purpose for which the work was initiated, namely, to hasten recovery. Also the shortness of the trunk below ground made grafting difficult in many cases.

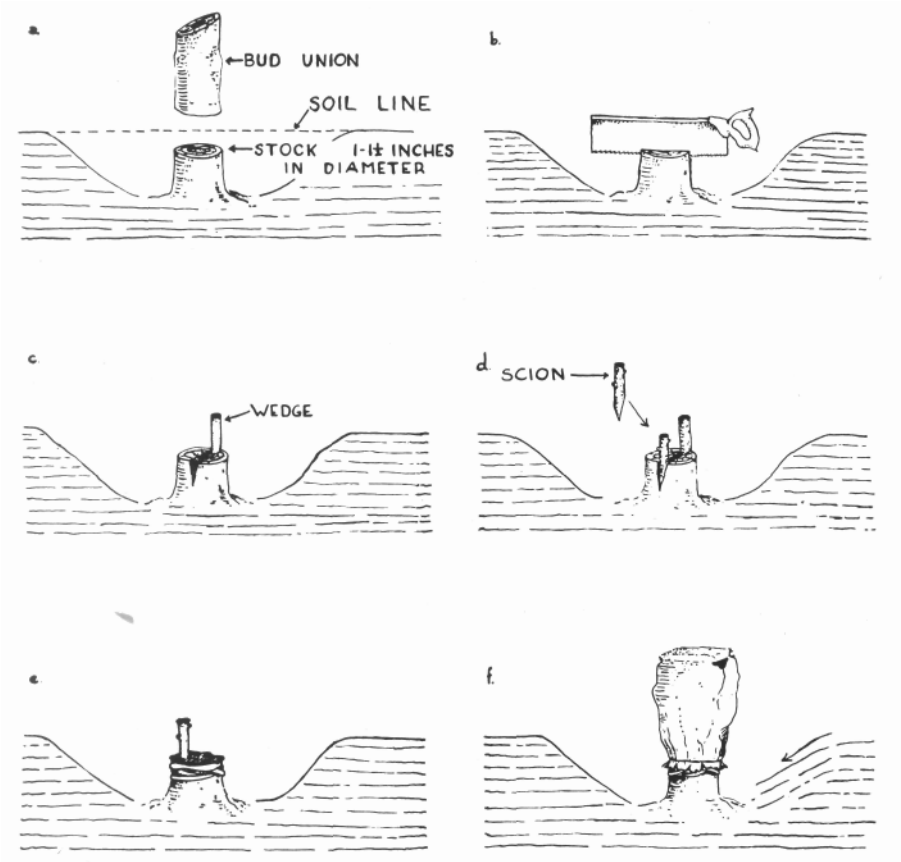

Fig. 2. *Method of grafting. (a) Rootstock trunk 1 to 1½ inches in diameter cut off below ground; (b) vertical cut about 2 inches deep through the center made with miter saw; (c) small wedge widens the cut to facilitate trimming and smoothing of cambium on opposite side; (d) wedge-shaped scion inserted; (e) wedge removed, graft is tied in with friction tape and protective covering applied to exposed surfaces; (f) ventilated paper placed over graft.*

The results were better than was expected. Of the 75 standard and tied-up buds that were grafted (tip grafts were not used), 63 percent developed good tops before the ungrafted stumps, or those on which the graft failed, produced sprouts suitable for budding (Fig. 3). This indicates that grafting hastened the resumption of the plant's normal functions.

Fig. 3. *About 3 months after the freeze the grafted tree (left) was well established before the rootstock sprout (right) reached budding size.*

Fig. 4. *Difference in size between a grafted tree (left) and a protected tree which rebuilt itself. Photo taken from same distance 8 months after the freeze.*

Most of the failures were undoubtedly due to slight cold injury to the trunk cambium which could not be detected at time of grafting. In fact, four of the trees on which the graft failed produced no root sprouts, indicating that the entire root system died as a result of the freeze. In other cases where the graft failed, sprouts appeared only below

the grafted portion of the trunk. It is hardly necessary to point out that the work reported would not have been necessary had the trunks been protected. This was clearly demonstrated in another rootstock trial plot also established in 1948 and near the one under discussion. The tree trunks were protected with cardboard cylinders about 4 inches in diameter or with newspaper wrappings. Here the freeze injured only the unprotected part, which included a good portion of the scion trunk. A few trees which were unprotected were killed to the ground. The relative size of a protected and a grafted tree 8 months after the freeze is shown in figure 4, thus proving the highly beneficial effect of protection.