ORNAMENTALS NORTHWEST ARCHIVES

Nov.- Dec.1981
Vol.5, Issue 6
Pages 15-17

J.L. Green, Extension Ornamentals Specialist, OSU
H.B. Lagerstedt, USDA, ARS
Corvallis, Or 97331

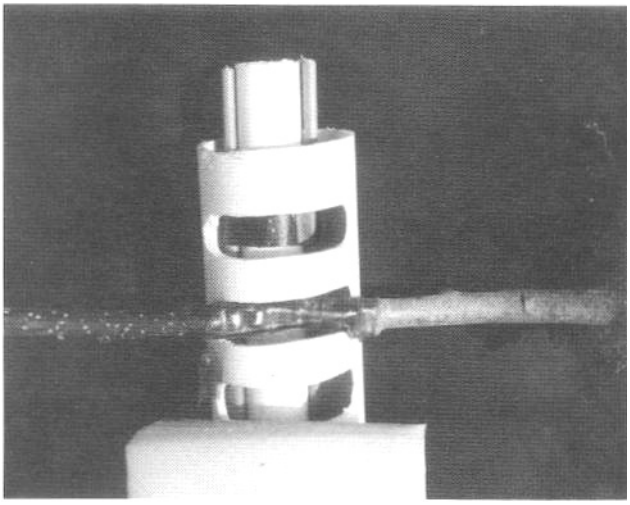
GRAFTED TREE SURVIVAL INCREASED, GRAFTING SEASON EXTENDED BY INEXPENSIVE HOT-CALLUSING DEVICE

Compiled by J.L. Green, based on previously published reports of H.B. Lagerstedt, USDA, ARS, Corvallis, OR 97331: A new device for hot-callusing graft unions, HortScience 16(4): 529-530, 1981; The hot-callusing pipe – a grafting aid, 72nd Annual Report of the Northern Nut Growers Association).

Readily available, inexpensive materials can be utilized to replace greenhouse facilities and improve tree grafting success in the nursery. The hot-callusing system requires no protective structures: it can be placed on bare ground or a gravel area and needs only a source of electricity to operate the heating cable.
With filberts, the hot-callusing pipe increased grafting success from 7% to 100% .

Grafting can begin as soon as rootstocks are dug (about mid-December in western Oregon). Trees are bench-grafted and the graft unions then placed across the hot-callusing pipe in slots (Figure 1). The hot-callusing pipe directs/localizes applied heat to the area of the graft union; root systems and scions are exposed to ambient air temperatures thereby avoiding breaking dormancy of the scion buds.

FIGURE 1. Graft union is placed in the slotted, PVC hot-callusing pipe. The smaller diameter, inner PVC pipe with the heating cable strands taped one on either side is filled with water and capped to provide greater thermal stability. A strip of foam rubber loosely covers the hot-callusing pipe and graft unions to facilitate uniform heat distribution around the graft union and to retard heat loss.



With the hot-callusing device, heat is applied only to the graft union. Formation of the callus bridge is promoted. Temperature-promoted growth and/or drying of the scion buds and roots does not occur.

In the mild winter climate of Oregon's Willamette Valley, trees grafted in mid-December were lined out directly into the nursery the 1st or 2nd week of January. As one group of hot-callused trees was planted in the nursery a newly grafted group was placed on the hot-callusing pipe: 3-4 groups of grafted trees were cycled through the same hot-callusing pipe between December and April. Graft callusing time per cycle ranged from 21 to 28 days.

Grafting success of filberts with the hot-callusing technique is high: 91% survival when grafted in January; 82% and 100% survival in two grafting trials in February (only 7% survival achieved in a control group that was not hot-callused); 96% survival of March grafts; and, in April, even though scions were leafing out, 77% grafting success was obtained.

Planting time had a strong effect on subsequent scion growth. Grafted filbert trees planted in January exhibited better survival and vigor than those planted in February and much better growth than those planted in March or April.

Quality of the root system has a pronounced effect on both survival and vigor of scion growth. The best scion wood, grafting techniques, and hot-callusing cannot substitute for a lack of roots on the rootstock. Approximately half of the observed grafting losses following hot-callusing were caused by poor quality root systems, not by a poor union. The quality of the root system has a pronounced effect on both the survival and vigor of the scion.

Hot-callusing technique is most beneficial when grafting plants that require high temperatures at the graft union for optimum callusing. The hot-callusing device is of greatest benefit in grafting dormant plants that have a high optimum callusing temperature. Hot-callusing greatly increases the success rate when grafting nut trees. Nut trees appear to produce optimum callusing at about 27°C (80°F). Apple trees, on the other hand, produce callus at temperatures below 15°C, and hot-callusing does not significantly increase the graft success rate. The hot-callusing device confines heating to the graft union of the nut tree and thereby avoids premature bud sprouting. The problem of premature bud break does not occur with apples and pears that are grafted and callused at lower temperatures.

The hot-callusing technique has been evaluated on other plants. During 1981, the hot-callusing technique was evaluated on grafts of apple, peach, pear, prune and Douglas-fir.

APPLE - Apple tree grafts callused and grew regardless of treatment: apple trees planted in the nursery the same day as grafted survived as well as those that were hot-callused prior to planting.

PEACH - 'Veteran' peach was grafted to rootstocks of 'Halford' and *Prunus besseyi*. Approximately 40% of the grafts were successful: the poor results were partly due to gumming and partly due to the poor condition of the 'Halford' rootstocks.

FIGURE 2. A peach graft after being placed in the hot-callusing pipe is well-callused.

PEAR - 'Bartlett' was grafted, hot-callused onto *Calleryana* rootstock with up to 92% success.

PRUNE - 'Brooks' on Myrobalan resulted in 74% success; 'Brooks' on *Prunus besseyi* had a 72% success rate.

DOUGLAS-FIR - In grafting, hot-callusing Douglas-fir, bare-root trees (rather than container-grown trees) were used as the rootstock. Trees were veneer grafted, tied with rubber grafting bands, and hot-callused with the scion placed uppermost on the pipe. Success rate was 84%.
