

N. DUNN: Standards haven't improved compared to improved techniques; we could have done better.

A. WOOD: In an age of specialization, we should concentrate on one aspect to improve quality.

D. WHALLEY: We cannot afford to grow poor stock. In the 1970's there was an increase in area of stock, but not in the amount of available labour.

## GRAFTING OF PINUS, PICEA, AND ABIES

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### STOCK PLANTS FOR SCIONS

The most important procedure before any grafting can be undertaken is the establishment of stock beds of true-to-name cultivars. Stock plants need to be planted with plenty of space for full development. Even the dwarfs can soon fill out to take more space than allocated. Good cultivation is important, as is a regular spraying programme, for the control of conifer spinning mite on spruce and adelges on *Pinus sylvestris* forms. It must be appreciated that, with the dwarf cultivars especially, some years must elapse before commercial quantities of scions become available, dependent upon the number of each cultivar planted.

### UNDERSTOCKS

We produce a few of these ourselves because of the wide variety of cultivars we produce and a need for stocks of varying thickness. The bulk are bought-in and can be acquired, graded for grafting purposes as two-year transplants. These arrive in spring and, after potting in 3" pots, are placed in a net tunnel. We use *Pinus sylvestris* for all two-needle pines, *Pinus strobus* for five-needle pines, and *Abies grandis* for *Abies*. I suspect that *Abies alba* is a better understock, but it is not grown much now because of disease and is, consequently, difficult to obtain from forest tree nurseries. *Abies* are, however, compatible within the range and do not present much of a problem.

**Methods.** Somehow the idea that understocks should be dried off appears to be fairly widespread and, although this may or may not be true with angiosperms, it is not in our experience a critical factor with conifers.

Understocks are brought into a glasshouse or slightly heated tunnel in batches; the first in mid-December ready to start grafting soon after the Christmas break. Ideally, root tips should be showing white indicating root development, and the root ball should be uniformly moist.

We normally begin with the pines, followed by firs, and then the spruces. A side graft is used, except where the stock is much thicker than the scion, when we make a cut leaving a flap. The end of the scion is then cut to a thin wedge, covered with the flap; one side of the scion should be aligned with the cambium on the same side of the stock. The tie is made with  $\frac{1}{2}$ " polythene tape, which is a tying and sealing medium. Some practice is required to become proficient and speedy but I think it is well worth the effort. The grafts are best plunged in moist peat just above the pot. They are inserted at a  $45^\circ$  angle with the scion at the top, then covered with thin polythene over wire hoops and sealed down if possible. Gentle bottom heat is applied.

#### AFTERCARE

Now we come to the most important phase of the entire grafting process; however good the carpentry, success or failure is governed by aftercare. Careful watch must be kept for drying out, which will inevitably lead to losses, more especially in the firs and spruces than the pines. The effective sealing by the use of polythene tape means that quite heavy watering can be applied when necessary without harm. After five to six weeks the grafts can be looked through and those that are showing movement of the terminal bud of the scion can have the rootstocks headed back by half. Grafts must be regularly inspected for pests. A mild winter can lead to a quick infestation of aphid when stocks are brought into warmer conditions. As in all cases, prevention is easier than cure so we spray once or twice with Metasystox, which controls both red spider mite and aphid. At twelve weeks most grafts will have made their extension of growth; when the terminal buds on the new growth are visible the stocks can be headed back to just above the union. At this stage we cut the polythene tie to release it. When training staff I try to impress upon them the importance of aftercare and draw the analogy with a hospital patient who has just undergone an operation. It is the careful nursing afterwards which ensures the success of the operation.

A propagator with a batch of grafts in his care must also look to proper shading onwards from the end of March. A sunny weekend in early April without sufficient shade will kill many grafts; it is imperative not to be caught unawares.

## SUMMING UP

Successful grafting of *Abies*, *Pinus*, and *Picea* then, along with most other species, depends upon:

1. Ample supply of healthy scions.
2. Pot-grown understocks of the correct stem thickness with some root activity at the time of grafting.
3. Use of a good sharp knife and correct carpentry.
4. Dedicated aftercare. By this I mean, amongst other things, before the propagator disappears for the weekend at the end of March, he should pause to think whether the grafts require shading in case the weather changes. Careful attention must also be paid to the pest control programme.

## BENCH GRAFTING UNDER HEATED GLASS

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This paper covers the bench grafting of deciduous trees which have proved, in the past, to be very difficult to propagate by conventional field propagation techniques. This mainly covers the production of ornamental cultivars or species of *Alnus*, *Betula*, *Fagus* and *Quercus*.

### SOURCE OF SCION MATERIAL

Scion material is procured from specially established stock "mother" trees. These are planted at a spacing of 12 ft between the rows, and 6 ft apart in the row. This allows tractor access for grass mowing, strip herbicide application and spraying for pest and disease control. A branch framework is established at a height of 3 ft like a bush apple tree. The trees are pruned hard back to the framework each year once the required scion material has been removed. Cuts are then painted over with a fungicidal paint.

### SOURCE OF ROOTSTOCKS

Basically there are two methods of producing good well-established pot grown stocks.