Cost of Treatment (1 year plants)	**per 1000 plants**
Aaterra incorporated	£3.50
Rovral, 1.25% dust incorporated	1.00
Rovral drench — 3 week intervals, 14 treatments	2.50

CONCLUSIONS

1. Drenches every 3 weeks would be ideal.
2. Compost incorporation was very effective, especially after potting and before drenching programmes could commence.
3. Drenches, when combined with compost incorporation, gave excellent results.
4. Treatment of the propagation trays was very effective and resulted in superior plants for later potting on.
5. Trials work suggested that the volume of drenches could be reduced.

Recommendations. The Agriculture Department and Advisory Service (ADAS) is currently in discussion with the manufacturers of Rovral, who are interested in extended the recommendation of Rovral to include Ericas and Callunas as a label recommendation in the future.

THE ECONOMICS OF GRAFTING

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REASONS FOR GRAFTING

I am committed to grafting as a way of propagating plants because:

I worked in Boskoop for 2½ years and, during this time, I went to Sweden doing contract grafting roses for the glasshouse industry. The money I received for this work purchased the liners and stock plants which helped to start my business ten years ago.

It is ideal for the small nurseryman.

There is a need for a quick turnaround of plants.

I consider that grafted plants produce a better end product if handled properly in containers, i.e. grafted Viburnums are superior to Viburnums produced from cuttings.

COSTS INVOLVED IN GRAFTING

Materials and labour		Cost range, pence/plant
Grafting stock		
handling on arrival (varies with type of stock)		10 to 20
trimming prior to potting (100 plants/40 minutes)		2 to 2
Potting		
pot		¾ to ¾
compost, laying out	machine potting 1300 plants/hour	1½ to 2
Empot trays at 26p (written off over 3 years)		½ to ½
Spraying		
weed and pest control — chemical £4, 2 hours at £5	£14	
Picking up ready to dry out		1 to 1
Collection of scions		
home produced, 5p		
purchased from Holland, 5 to 9p		5 to 9
Grafting		
preparation of stock — drying out		
trimming/heading back		6 to 7
grafting ties		
putting on to bench after grafting		
Aftercare		
airing, spraying water and fungicide, removal of dead material and suckers, hardening off after callusing		1 to 1
Removal to over-wintering quarters		1 to 1
Heading back, grading for potting, planting		2 to 2
	Totals	30½ to 46
Assumed loss, 30%; say 10p (14p) added to costs		10 to 14
		40 to 60
Assume 20% of grafting stock re-usable, subtract from costs		2 to 4
	Final total costs:	38 to 56

These costs can be compared with the following, taken from two French and one Dutch nursery catalogues:

		£
Cedrus atlantica 'Glauca'	12-20 cm	1.00
Chamaecyparis obtusa 'Nana'	8-12 cm	0.87
Viburnum × *carlcephalum*	2 year cutting	0.77
Hibiscus	1 year	0.51
	2 year	0.63
Cedrus atlantica 'Glauca'		1.09
Chamaecyparis obtusa 'Nana'		0.90
Viburnum × *carlcephalum*		0.86
Hibiscus		0.57
Corylus avellana 'Contorta'		1.09
Cedrus atlantica 'Glauca'	transplant	1.26
	graft	0.90
Chamaecyparis obtusa 'Nana'	transplant	1.08
	graft	0.82
Viburnum × *carlcephalum*	transplant	0.90
	graft	0.58
Hamamelis	transplant	2.16

It is the only way to successfully produce certain types of plants such as *Hamamelis* and *Picea pungens* 'Koster'.

I have committed 25% of my new propagation unit to bench grafting, an outlay of £12,000, therefore, in my case, grafting must be economical.

Is grafting economic? In short "Yes" — if handled by *production line techniques, because grafting is really living* carpentry, with a bit of know-how, which you learn rapidly after you lose a few pounds.

One further comment is that you must know your glasshouse or tunnel or frame before attempting any grafting.

To adopt production line techniques it is necessary to consider the following:

Minimize handling. Use Empot trays; plastic pots instead of clay pots; and shelved trolleys, enabling you to move 360 grafted plants at one time. Cover trolleys with polythene to make a tent, and to stop drying out before moving into grafting benches.

Planned work area. Have a sturdy bench and good seating, in good light but not in direct sunlight. Organize the grafting materials in front of you, and handle with trolleys or pallets.

Organization of work. Scions pre-collected or bought in and stored at +2°C. Potted stocks are headed back, pre-trimmed, and brought in on a trolley ready for the grafter. Scions are pre-prepared, i.e. cut ready for grafting. Materials are all put to hand — scions in an open bag in front of grafter, grafting strips/ties in a container and not spread all over the place. Stocks for grafting are on the left, empty tray on the right, scions and ties in the centre of the work position. A multi-shelved trolley is made into a tent for holding grafted plants in a turgid condition until the trolley is filled. Grafted plants are then put into a peat bed at an angle of 45°. One grafter needs one sweeper/learner to assist. The grafter must not move at all except for meal breaks. I expect him, after a period of two weeks, to have grafted a total of 20,000 plants, depending on cultivar and condition of stocks.

J. STANLEY: What are the indirect costs of grafting?

W. MATHEWS: The glasshouse cost £12,000 and I am writing it off over seven years. I reckon the indirect cost per plant is about 1p, if we do 20,000 grafts each year; that is, 140,000 grafts in the seven years.

B. RIGBY: What is the rate of pay for the Dutch grafters?

W. MATHEWS: £250 net per week; they work a long 11 hour day and we expect them to do 12 to 1500 grafts per day, so that all the grafting is completed in two to three weeks. We expect our own staff to do 50 grafts per hour.

WINTER PROTECTION AT YOUR NURSERY

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After spending 5 years in northeastern America, and with our experience in this country of the coldest winter on record, I decided it would be relevant to discuss methods of protecting plants used at two different nurseries in the U.S.A., and to discuss what we plan to do at our nursery in Boningale.

My first 3 years in the states were spent at Jim Wells Nursery as a student and then manager. The Wells Nursery was located 30 miles south of New York on the East Coast with temperatures ranging from 100°F (38°C) in July to −15°F (−26°C) in January and February. Wells specialized in growing rhododendrons and azaleas, which were subject to damage by the extreme cold if unprotected, therefore every precaution had to be taken to minimize the risk of damage.

The first thing Jim Wells did was to select a hardy range of rhododendrons and azaleas able to survive harsh East Coast winters. Rhododendrons he selected for their hardiness were the 'Iron Clad' group, including the cultivars English Roseum, Roseum Elegans, Nova Zembla and the Catawabiense cultivars — Catawabiense Album and Boursult. The deciduous azaleas chosen were the Exbury and Ilam groups: 'Gilbraltar', 'Balzac', 'Klondyke', 'Red Velvet' and 'Fireball'. The evergreen azaleas were chosen from the Kurume group — 'Hino Crimson', 'Polar Bear' and 'Lorna'. Although proven hardy cultivars, all these required some protection. The very first operation each year was to cover all the tunnels with 6 ml clear polythene (by December 10th). This was sprayed with paint to exclude strong sunlight and to reduce high temperature. Next, plants would be graded into selling sizes and containers moved up, pot-thick, leaving unsaleable plants on the two outer edges to give protection to saleable material. Plants were then well watered and the watering system drained down to the lowest point to prevent damage to pipes. Watering was then carried out when needed, each time draining the system completely afterwards. The polytunnels were closed top and bottom at both ends by a