7. Robinson, J.F., and J.P. van Buijtenen. 1979. Correlation of seed weight and nurserybed traits with 5-, 10-, and 15-year volumes in a Loblolly pine progeny test. *Forest Sci.*, 25:4,591-596.
8. Wrześniewski, W. 1982. Physiology of Scots pine seedlings grown from seed of different weight. I. Differentiation of seed characteristics. *Acta. Physiol. Plant.*, 4:1-2,31-42.
9. Wrześniewski, W., 1982. II. Imbibition, germination, respiration and early growth. *Acta. Physiol. Plant.*, 4:1-2,43-51.
10. Wrześniewski, W., 1982. III. Differentiation of seedling growth during the first growing season. *Acta. Physiol. Plant.*, 4:3-4,139-151.

PLANT PROPAGATION OBSERVATIONS IN NORTH AMERICA

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I travelled in North America for a two-month period from June to August, 1985, on a Nuffield Farming Scholarship study of nursery management. I visited nurseries in the Virginia, Maryland, Delaware area, Lake County Ohio, and the West Coast from Los Angeles to Vancouver, B.C., Canada.

Propagation, per se, comprised a relatively minor part of my study, but I did have an opportunity to view a wide range of propagation practices.

Climate is an important consideration in choosing a propagation system and almost, without exception, summer temperatures were higher than in the U.K. Spring frosts finished earlier and autumn frosts were later. Mist, both outside and under protection, was the most widely used system and seemed ideally suited to the climatic conditions.

Mist units were controlled by time clocks with a few exceptions, where solar controls were used. The majority of nozzle types were large and applied high volumes of water by comparison with conventional U.K. types. Rooting composts needed to be more open and less water retentive. Various mixtures of perlite, peat, bark, vermiculite, and sand were used in the rooting composts — with perlite being the most widely used ingredient. Combined with high temperatures, the above factors provided excellent humid rooting conditions.

Cuttings were gathered from growing crops. Early potting, continous liquid feeding, and production in large (1, 3, and 5 gal) containers necessitated frequent trimming to produce strong, bushy plants, thus yielding large quantities of cutting material. Stock beds were used in some cases, i.e. with culti-

vars where trimming was not required, or by specialist propagators without access to growing crops.

Rooted cuttings were generally potted into 3 in. square pots. In some instances handling was reduced by sticking direct into the liner pot and grown on *in situ* after rooting. The use of high volume mist nozzles facilitated subsequent watering of the liners. In virtually all cases liquid feed was applied through the irrigation system.

In general, propagation standards were high, and I was particularly impressed to find a wide variety of ornamental trees, e.g. *Malus*, *Prunus*, and *Acer*, being successfully rooted and grown on from softwood cuttings stuck in June. A limited range of blue spruce cultivars, e.g. 'Fat Albert', were also being successfully rooted from a January insertion.

Fog and cold frame propagation were used to a much more limited extent ffor rooting cuttings. The results from fogging were excellent and it seemed ideally suited to rooting in higher temperatures, although unreliability of the equipment had caused problems with some systems.

I was impressed to find that micropropagation was supplying a considerably wider range of plants to the industry than in the U.K., both from in-house micropropagation departments in large firms and from specialist firms. In addition to the rhododendrons and azaleas that are currently being imported in the U.K. from North America, there was a widening range of micropropagated shrub material coming into the U.S. market. Most were sold rooted and weaned as small plantlets needing potting on into liner pots, with some being sold unrooted in agar medium for subsequent rooting at the host nursery.

My impressions of crops grown on from micropropagation were that their habit, vigour, and quality were at least as good as those propagated by conventional means. I expect that the technique will make further inroads into the U.K. industry in the near future.

In general, I found the range of propagation techniques and systems used in North America very similar to those used in the U.K. Climatic variations accounted for many of the differences from our own systems. Although these differences would have little direct application here, they contributed considerably to my understanding of propagation, and hopefully I shall be able to put this knowledge to good use in the future.