been unnamed and the entire range of named clones need to be tried before any definite results can be achieved. It does seem, however, that my work indicates that when selecting material of "Leyland Cypress" for propagating, it is important to ensure that it be in the juvenile state.

RESEARCH AND THE PRACTICAL PROPAGATOR[1]

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Experience and skill are prerequisites for successful propagation, but nurserymen are becoming more aware of the opportunity offered by research for improving existing techniques and developing new propagation methods against a background of decreasing availability of skilled labor and increasing production costs.

A most important discovery by research workers was the role played by hormones in controlling various responses in plants, including root initiation in cuttings, leading to the manufacture and use of synthetic auxins which have become an essential and singularly effective tool in the nursery.

There is evidence, however, that auxins are not necessarily used in the most effective way by propagators, underlining the need for applied research of the type done at the East Malling Research Station by N. Nahlawi, whose paper entitled, "The effect of dipping depth and duration of auxin treatment on the rooting of cuttings", won the 1970 Graduate Student Award of the Society.

He has discovered relationships between the rooting response of hardwood cuttings of plum rootstocks at a range of IBA (4 (indolyl-3) butyric acid) concentration and their dipping depth in the hormone solution and its site and duration of application. This work demonstrated that in propagation research, as in other biological fields, account must be taken of the fact that plants, or cuttings, rarely respond to one influence, such as auxin treatment, in exactly the same way under different conditions of treatment and environment. For this reason it is essential that techniques are based, wherever possible, on a sound understanding of the mechanism operating within the plant, so that the technique can be exploited with species or in conditions not previously experienced.

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[1]An abstract of a paper in which examples were drawn from the postgraduate studies of N. Nahlawi, which is given in full on page 292

Such an understanding has led to the successful widespread development of the mist technique for rooting softwood cuttings, the main feature of which is that leafy cuttings with minimal energy reserves can be kept in an environment which allows the accumulation of essential carbohydrates from photosynthesis (1, 2).

It has been demonstrated that the leaf area of cuttings and light intensity under mist influences rooting (3), but in cuttings comprising leaves, petioles and stem it is usually only the leaf which significantly contributes photosynthates, while the petiole and stem utilize them in survival and growth. Therefore carbohydrates available for rooting are the balance between photosynthetic input and respirational losses, termed net-photosynthesis.

The ratio of leaf to stem was not found to be important under the favorable conditions of the mist bench, but in the unfavorably warm and shaded conditions of a traditional closed case, cuttings with relatively large leaf area to stem survived and rooted best. (Table 1).

Table 1. Response of various types of hop cuttings to unfavourable propagating conditions in a closed case.

Cuttings[1]		Net photosynthate (*dry wt*)	Rooting (*potential under mist = 100*)
Two-node	low leaf to stem ratio	loss	6.3
Trimmed leaf bud		loss	4.6
Leaf bud	high leaf to stem ratio	gain	28.6

[1] For description and diagram of cuttings see Howard and Sykes (2).

It is important for research workers to establish, and for nurserymen to appreciate, these complex interactions between the plant, its environment, and applied treatments. With this objective forty-two nurserymen have agreed to participate in a number of experiments carried out on their own nurseries and co-ordinated from East Malling Research Station, aimed in the first instance at establishing to what extent techniques such as wounding cuttings, and inserting buds by various methods are soundly based and of general value.

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SECOND SESSION

ASPECTS OF PROPAGATION IN FORESTRY

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SUMMARY

Comparatively few forest trees are raised vegetatively but poplars and willows are grown in the open nursery from hardwood cuttings and several horticultural cultivars, including Leyland cypress and selected clones of elm, are produced under mist indoors. The methods of propagating these are discussed and brief reference is made to recent research on the subject.

INTRODUCTION

Every year some 100 million plants are raised from seed in Forestry Commission nurseries. Most of them are conifers, principally the spruces, pines and larches, and only about 1 percent are broadleaved trees, mainly oak and beech. Normally the seeds are sown broadcast on to raised beds; the subsequent seedlings take one or two seasons before they are large enough for lifting and transplanting, then the transplants need a further one or two years to reach a size suitable for forest use. In the south of the country, plants large enough for planting out can be raised in two years, but in the north three years are normally needed. The techniques of raising forest trees from seed are well known and are amply reported in forest literature.

In contrast, comparatively little vegetative propagation is undertaken by the Forestry Commission; probably fewer than 100,000 plants are produced annually, and only small quantities of stock raised vegetatively are actually planted in forest conditions. In the