FOGGING IN TUNNELS

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Ellis Brothers is a slowly expanding young nursery and until the I.P.P.S. French trip in 1983, where we first saw fogging units being used, we were without a modern propagating unit. We need to propagate a wide range of subjects and realised that fog was the solution.

In the spring of 1984, with the help of MacPenny we installed a compressed air and water fogging system in a single 4.2 × 20 metre polythene tunnel. We have since expanded, and now have a fog system in three tunnels.

The original cost of the whole fog unit seemed at the time to be very expensive at £1,100 so the choice of structure had to be cheap, hence the tunnels. The tunnels in fact are double clad for energy saving and winter protection, and they are as well-built as possible with tightly fitting, fog proof, doors. The air to inflate the tunnel skins comes from a small fan situated in the building where the cuttings are made. This means that warm dry air from the working area is used, thus giving greater frost protection during the winter.

The two tunnels which are mainly used for rooting cuttings have basal heat in only half the floor area. This was originally done because of economy, but now we have found that due to high summer temperatures, rooting on the 'unheated end' is successful with easy subjects. This area has the added advantage of being a close at hand weaning area, in a similar environment.

In the MacPenny system, low pressure fog is produced by mixing compressed air at 70 p.s.i. with mains water at about 10 p.s.i. The sequence control and compressor are placed close to the tunnels for convenience and greatest pressure. Each 20 metre tunnel has two special fogging nozzles, one by the main door and one 15 metres away facing the other, this generally means that there is less fog at the far end, for weaning or working.

Most nurseries' fogging units have a humidistat incorporated, but with more than one tunnel being fogged at one time, this is impractical. To overcome the problem that English weather gives us while the cuttings root, the amount of fog needed during the day is constantly assessed and altered manually. During the night and at weekends the amount of fog needed is estimated, and the unit is programmed, with the aid of a time clock.

This small propagating unit is quite capable of producing 50,000 rooted cuttings at any time using the same area up to three times in a year. This is ample for the requirements of the nursery. However, we have been direct sticking more and more, and now

about 30 per cent of our production is rooted in pots. Fog lends itself to this system very readily.

The fogging system we use is a closed system, indicating that we very rarely ventilate even in the brightest summer days. The high temperature means we must maintain very high (up to 99 per cent) humidity. We can achieve this easily. Moisture in the air remains in suspension for some time, depending on the brightness of the sun, but on the average, 5 to 8 minutes. The droplet size can be altered (it is usually about 10 microns) by increasing the air: water ratio in the fog mixture; this makes the fog wetter or drier.

Fog in tunnels creates a very humid environment, with high air temperatures of up to 40°C which we consider ideal conditions for rooting deciduous and broad-leaved evergreen shrubs. Obviously during the duller winter months there is lower air temperature and humidity, good conditions for rooting conifer and firmer broad-leaved cuttings. In addition to rooting cuttings during January and February, our limited seedling production and bench grafts are also subjected to fogging.

Bench grafting fills our propagating time in February and all the grafts are boxed up and placed in the fog tunnels—*Prunus, Malus, Robinia, Cytisus* and *Acer* all have the same treatment. The grafts are callused and allowed to break bud, after which they can be potted. About 90 to 100 per cent take can be expected with most cultivars.

Cuttings of some subjects, such as *Weigela, Forsythia, Fuchsia, Potentilla,* and other deciduous flowering shrubs root in 10 to 14 days. Generally speaking, softness is not a problem with rooting—if the cutting does not wilt, then it usually roots. Quickly-rooted easily-potted subjects are still inserted into trays of 50 per cent sharp 2mm grit and 50 per cent medium grade moss peat. More difficult to root subjects are direct stuck in pots either singly, double, or treble, in a medium of 20 per cent Cambark 100 and our liner compost which is nursery mixed. We find difficult-to-root plants usually do not tolerate root disturbance at the first potting, and if multiple stuck have a greater chance of survival.

Plants such as *Cotinus, Garrya, Acer palmatum, Photinia,* and *Convolvulus cneorum* do well under foggy conditions. Direct sticking of cuttings in our fog tunnels gives us greater evenness and uniformly of rooting, resulting in a better quality liner produced quickly, especially advantageous for cultivars where propagation speed is essential. Rooting grey-leaved subjects such as *Santolina, Senecio,* and *Helichrysum,* poses no problem, although weaning soon after rooting helps quick establishment.

As two or three nozzles produce enough humidity for rooting, in the future we hope to direct stick a tunnel of cuttings, and move the nozzles into the next tunnel and repeat the process. This should overcome the handling of so many rooted cuttings in pots, ulti-

mately rooting in their two or three litre saleable pots. This seems only possible in the warmer months when bottom heat is not necessary.

Algal growth is not a problem with our unit, either on the polythene or paths. However, heavy shading is important to reduce the brightest sun. Having a fairly heavy shade, high temperatures, and high humidity we have encountered few problems of weaning-off cuttings before they are potted, however a good watering-in is important.

Fogging in tunnels is a very adaptable system when using variable amounts of fog throughout the year. We can root our cuttings, callus grafts, and germinate seeds as well as rooting conifers and weaning micropropagated material. We find the equipment easy to manage and problem-free.

THE SPECIFICATIONS FOR NEO PLANTS' NEW PROPAGATION UNIT

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INTRODUCTION

This paper describes how the specification for Neo Plants' new propagating house was drawn up. Decisions have to be influenced by existing circumstances, so while the ideal would be a bare field site and unlimited finances, few small companies would be so fortunate.

Neo Plants needed to expand its facilities in 1983 and bought a typical west Lancashire tomato nursery at Freckleton. It consisted of a 6ha site with a large bungalow, 1ha of venlo glass and two large sheds. Both laboratories and offices were housed in the bungalow and the nursery had good growing facilities which could be adapted into weaning and growing houses.

THE FIRST WEANING UNIT

Four years ago weaning micropropagated plants was a new science, especially for Neo Plants. Initially, only part of the available growing area was needed.

A weaning unit was set up in an existing 1000 sqm house, using three bays of the seven bays. Flexiheat electric underfloor bed heating was installed. Air heating was piped from a small package boiler and a fixed thermal/shade screen of woven polypropylene material and a MacPenny fogging system were installed. The weaning area

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