

A "FOG" PROPAGATION SYSTEM USED AT PLANT GROWERS AUSTRALIA

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At Plant Growers Australia (PGA) propagation was previously carried out using conventional misting in polythene houses and, as is usually experienced, both media and foliage were alternately too wet or too dry. The effects were particularly noticeable in summer when foliage became leached of nutrients and then prone to fungal attack. The possibility of creating high relative humidity using fog and consequently reducing leaf transpiration seemed a very suitable alternative to misting.

Two such systems were investigated:

- 1) pressurized water fog,
- 2) pressurized air/water fog.

The second system was selected for the following reasons:

- 1) High pressure water lines used in the first system had been known to burst and could be dangerous in human terms. At that time, operating water pressures were quoted at around 900 psi (6200 kpa). In the air/water system, air pressures were quoted at around 60 psi (413 kpa) and water at about 5 psi (35 kpa), thus much safer. The lower pressures also allowed use of hydraulic plastic tubing instead of metal piping.
- 2) Many more nozzles were needed in the first system, and much finer nozzle orifices were required. Fine apertures had been found more prone to blockages even when using sophisticated filters and good quality water. Some blockages were caused by small metal particles flaking off the inside of the high pressure water lines, although this should not happen with the stainless steel or pvc piping used today.

The air/water fog system uses only 3 nozzles per 15 m × 6 m house and the mode of operation of the system allows for much larger nozzle orifices which are consequently less prone to blockage.

- 3) Finer fog particles are available from the air/water system giving better humidification. The interior of the nozzle is designed so that the air under pressure sets up a sonic wave which breaks water into particles of diameters from 3 μ upwards, depending whether a "dry" fog (fine particles) or a "wet" fog (coarse particles) is required. I understand that the

high pressure water system gives particle sizes from about 10μ upwards, thus giving a "wetter" fog. A "dry" fog is more suitable for many of the plants we propagate.

- 4) The air/water system introduces fresh air into closed polyhouses; the water fog system does not. This is also important, as plants in photosynthesis need CO_2 replacement in closed houses.

We have installed an air compressor of capacity sufficient to give us 8 ft^3 of air at 87 psi (600 kpa) stored in a metal receiver tank. Air passes from this tank through an oil filter to give clean air at about 60 psi (413 kpa) which is carried into the house in hydraulic plastic tubing to the upper inlet in each nozzle. Water at 5 psi (35 kpa) enters the lower inlet and is broken into fog particles inside the nozzle. The lines and nozzles run along the centre of the house about 20 cm below the apex of the roof.

Fogging is controlled by an electronic humidity-sensing device which is placed near the plant material. The sensor is connected to a control unit which activates fogging when the relative humidity drops below the set level. At the end of a fogging cycle, water is automatically cut-off while the air flows for a further 2 minutes to clear remaining water out of the water line, thus reducing mineral and algal build-up in the nozzle orifices.

In summer, houses are covered with white shade cloth to reduce both light and heat transmission. The minimum shade necessary to control heat build-up inside the houses is used to keep transmission at optimal levels for the cutting material contained in the polyhouse.

Using this system, we have found many advantages over conventional mist propagation:

- 1) fungal infections are reduced because plant material is in a less stressed condition.
- 2) cuttings root faster and more evenly,
- 3) difficult plant material strikes more readily,
- 4) tissue culture transfers (of plants as diverse as *Gypsophila* and *Grevillea*) can be made with virtually 100% success,
- 5) uncovered fine seed germinates more readily.

However, some precautions must be taken with plant material leaving a "fog" house. Plant material is much softer when grown in such ideal conditions and needs additional weaning in dry, hot weather. We overcome this problem by weaning trays of rooted cuttings in a non-"fog" house before tubing-up and by avoiding tubing cuttings on very hot, dry days.

Although there are new management techniques to be learned for successful use of fog houses, the benefits in propagation far outweigh any problems which may be encountered.