# AN INTRODUCTION TO THE MICRON 5 FOG SYSTEM

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## INTRODUCTION

The use of "fog" or humidification systems is becoming increasingly popular for propagation in the UK and is producing encouraging results.

The objective is to raise the humidity of the growing environment. This is done by producing water droplets that are sufficiently small to remain in suspension in the air long enough for them to evaporate and increase the relative humidity.

There are two basic forms of fog system, the air and water system which requires a compressor, and the high pressure water-only system, the Micron 5 Fog system being the latter type.

**How 'Fog' is Produced.** In high pressure water-only fog systems the droplets are produced by forcing water at high pressure through a specially designed nozzle.

The stainless steel nozzle used in the 'Micron 5' fog system operates by channelling the incoming water through a small orifice producing a fine jet of water. This is shattered on impact with an "anvil", positioned directly in the jet, creating a cone of fine water droplets.

The nozzle orifice is less than 0.03mm in diameter and, in order to prevent blockage, a ceramic filter is incorporated to remove any particles in the water supply.

**Droplet Size Analysis.** Fordingbridge Engineering and AFRC Engineering (formerly the National Institute of Agricultural Engineering), have performed research to determine the diameter of droplets produced at varying operating pressures by the nozzle used in the Micron 5 system.

Measurement of droplets size was done using a particle size analyser which operates by analysing the shadows cast by droplets passing through a laser beam.

The results are expressed as the percentage by volume of the number of droplets having a diameter less than 10 $\mu$m and as we expected, an increase in operating pressure resulted in a decrease in droplet size.

Increasing the pressure above 1000 psi leads to only small improvements in the resulting droplet size, so the recommended operating pressures of the Micron 5 Fog system is 1000 psi which produces droplets, 50 per cent of which have diameters less than 10 $\mu$m.

**Design and Manufacture of the System.** The pump pressure set basically provides water to the nozzle at sufficient pressure to produce the required atomisation.

Water from the mains is first filtered to remove particles down to 5 $\mu$m before entering a break tank from which it is then drawn into the pump and pumped into the lines via a flexible hydraulic hose. For most units the pump is driven by a 1 hp motor via a belt drive enabling 45 nozzles to be run off one unit; however larger units are available.

There are two basic safety features incorporated in the design. They include a float switch to prevent dry running of the pump and a pressure relief valve to prevent operating the unit above 1200 psi.

To prevent the nozzles dripping after a fog burst, a dump valve opens, discharging any excess water pressure back into the break tank.

The pump pressure sets and fog lines are assembled in the factory and are fully tested before dispatch.

**Installation Design.** When designing an installation it is the number of nozzles and their positioning within a greenhouse that is of most importance.

Each nozzle produces 5.8 l/hr at 1000 psi and it has been found that between 17 and 20 cu.m. should be served by one nozzle. This usually results in the spacing of the nozzles being between two and three meters and the spacing of the lines being around 3.5 m. However these are only guidelines, the final design depends on the type and size of structure involved.

It is recommended that, as far as possible, the propagating house be relatively draught free as even a mild amount of ventilation can result in excessive use of the fog system to increase the humidity of the incoming air.

The use of a screen above the propagating area is also recommended as this restricts air movement, thus maintaining the humidity. Many screen materials have been tried but surprisingly good results have been obtained using materials such as 'Agril' and 'Agronet'.

Experience is also beginning to show that placing the nozzles in a vertical position approximately 0.5m above the propagating bench is providing very good results.

**Typical Results Using Fog.** Mr. David Tristram, proprietor of Walberton Nurseries in Sussex, who was very much involved with the development of the Micron 5 Fog System, now has two systems, one of which has been installed for over a year.

Both systems are installed in rather old greenhouses approximately 7m wide by 20m long. The pump pressure sets are located at the top end of the structure with the fog lines running at approximately 0.6m above the ground down either side, the nozzles being angled at 45° towards the centre of the house.

The cuttings are propagated in trays without any base heat with the fog on a time-burst sequence only. Mr. Tristram feels at this stage that he is probably over-fogging, the humidity being in the

region of 100 per cent most of the time. However, this has had no adverse effect on his cutting take; in fact, he reports significant increase in the take of deciduous azaleas to around 100 per cent, an increase of 25 per cent over his conventional mist propagation system. Clematis has also improved with a 15 per cent increase in take. He has also seen quicker rooting with plants such as spirea and dogwood, but is not sure of the advantages of using fog with conifers at this stage.

The improved rooting of so many plant cultivars under fog, has interested Mr. Tristram in moving toward direct sticking procedures next year, again without the use of base heat. He is also intending to purchase a further fog unit at the beginning of next year, to have three mobile units—the intention being to fill a particular house with cuttings, propagate, and wean off using the fog then move the fog on into the next house leaving the plants *in situ*. Mr. Tristram feels that direct sticking and reducing the handling of the cuttings will result in more economic production.

## CONCLUSIONS

Since the introduction of the Micron 5 Fog System, nearly one year ago, it has received great interest from British growers, primarily for humidification control, but also for cooling and shading. Its practical attributes, including its ease of installation and operation, its low running costs, and even humidity distribution, have resulted in many systems being installed.

## THERMABED—FAILURE THEN SUCCESS

CHRISTOPHER FAIRWEATHER

*Aline Fairweather, Beaulieu, Hampshire, U.K.*

With the increasing demand for rooted shrub cuttings and liners we decided in 1986 to double the heated space we had available for propagation.

Our first house was installed in 1979, and our first installation was a simple hot water system using alkathene pipe and a second-hand 120,000 B.T.U. boiler for which we paid only £10. This original system is still working well and we find it generally satisfactory. The main drawbacks are the considerable work involved with the installation. The other disadvantage we have noted over the years is the uneven temperature. There can be as much as five and sometimes 10 degrees drop, with the highest temperature near the boiler, dropping away at the farthest point.