

THURSDAY AFTERNOON SESSION

December 4, 1958

The meeting was called to order at one-forty o'clock by President Steavenson.

PRESIDENT STEAVENSON. The meeting will please come to order

For this afternoon the program moderator is Dr Stuart Nelson, of the Experimental Farms Service, Ottawa, Ontario, Canada, who will handle the panel on Greenhouse Propagation and Management. Dr Nelson!

Dr Nelson assumed the chair. (Applause)

MODERATOR NELSON: Thank you, President Steavenson. We have a full panel this afternoon, in addition to several papers remaining from this morning's session. There will be a short question period after each paper. For those questions which cannot be handled there will be ample opportunity for you to bring them up during the Question Box period Friday evening

The first speaker on this afternoon's program is Mr. E. Stroombeek. Most of you had an occasion to see his setup yesterday on the tour. However, here is Mr. Stroombeek to describe his method of loghouse propagation in greater detail

Mr. Stroombeek presented his talk, "The Propagation of Softwood Cuttings in the Foghouse." (Applause)

THE PROPAGATION OF SOFTWOOD CUTTINGS IN THE FOGHOUSE

E. STROOMBEEK

*Warner Nursery
Willoughby, Ohio*

INTRODUCTION

When reading the title of my paper I hope you did not become confused by the word, foghouse. The only reason I used it was to distinguish between the intermittent mist system and the use of a new type of humidifier which I am going to discuss

During the last 6 years, the use of intermittent mist devices, in the field of plant propagation has become common practice. Through the years we have seen steady improvement and greater efficiency, especially in the use of outdoor mist frames. However, for many nurseries, greenhouse propagation had been the established pattern of operation with the accent on fall and winter propagation. The intermittent mist set-up made it possible to make more efficient use of these greenhouses during the summertime. The big problem had been how to keep the humidity up and at the same time the temperature below extreme levels. Intermittent mist seemed to be the solution. We at Warner Nursery are already using an outdoor mist frame with good results, however, two, up-to-date greenhouses gave us considerable trouble when used the

conventional way during the hot months of June, July and the early part of August

We checked with various people on the advisability of using an intermittent mist system in these houses, but got mixed reactions. It seemed that with certain plants like rhododendrons and holly, the saturation of the peat-sand medium which inevitably took place, was detrimental to the rooting process. This was one of the important reasons why we postponed the installation of an intermittent mist setup, since these two items make up our main greenhouse crop.

In the summer of 1957, I had the opportunity to visit my home country, Holland, and spent considerable time in Boskoop. Right after the war I had served my apprenticeship at the nursery of Siem van Klaveren, one of the foremost propagators in that nursery-town. The previous year he had switched his entire propagating operation from frames to greenhouses. Mr van Klaveren had been faced with a problem similar to ours, although their temperature range is not as extreme as here in the States, ie, how to keep humidity up and air temperature down while using open benches. After some experimenting he had found a solution, that struck me as quite unique, simple, but efficient. He had lined the inside of his houses with polyethylene and was using a Swiss made "Defensor" humidifier to maintain a constant, heavy fog.

This humidifier of an altogether new design was built strictly for industrial purposes and had proven itself to be effective, and quite reliable thru the post war years. I visited van Klaveren's Nursery several times during the month of August, and judging by the fine results he had with his new gadget, it seemed to be well suited for greenhouse use also. For instance, from February 1957 until November of that year he raised his total output of softwood and evergreen cuttings by 200 per cent and had to hire two extra men to keep up with his production. Now, as several of the 'Boskoopers' in the audience well know, these amazing results, achieved in Boskoop did not mean that the same could be duplicated here in the States, although it was always worth a try.

But first, let me explain about this humidifier and the way it is put to use in the greenhouse

THE DEFENSOR HUMIDIFIER UNIT

The Defensor model 3000 and the improved model, 3001 consists of a centrifugal unit with a lamellar device on top of new design, which is driven on by a high speed electric motor. This apparatus is placed in a shallow pan of water. When operating, the water is sucked up thru a cone-shaped hollow attachment below the driveshaft. It is next pushed at high speed by centrifugal action thru 18 small holes which encircle the top of the cone and then it is guided by 2 revolving saucer-like disks to the atomizer grid, which is an aluminum ring with narrow slit-like openings thru which the water is forced at very high speed and then completely vaporized. Finally, the plastic propellor on top of the driveshaft will suck the vapor upwards and distribute it thru the greenhouse. The portable Defensor weighs about 18 lbs. The motor output is 1/10 H.P. Voltage can either be 220 or 110 volts, 50 cycles AC. The consumption of current is about equal to that of a 75 watt lamp.

By means of an insertion collar on top of the humidifier one can regulate the fineness of the fog and the output of water. When the temperature goes up we use a somewhat coarser fog by raising the collar. By so doing there will be a very slight film of water deposited to keep the leaves moist and prevent burning.

The apparatus has to be cleaned every three to four weeks as does the water, since algae will soon develop under the hot humid conditions. Then, there is the question of the use of a humidistat. We do not feel the need for one. For one thing, when it is sunny and warm, a constant fog has to be maintained anyway, while under other circumstances, like intermittent sunshine or cloudy but bright skies, the person working in the boiler room can manipulate the timer according to the need. Of course, a humidistat could be of value if it could be rigged up to an alarm device that would be set off if the humidity dropped suddenly.

The actual measurement of the water particles is somewhere between 1-5 microns, that is 1-5 thousandth of a millimeter in diameter. This is very important, because it explains why we are dealing with a fog and its typical qualities rather than some form of mist.

In the first place, this is one of the reasons why this vapor-like fog acts like a gas and penetrates evenly through the whole area. Secondly, because the water particles are so small the fog is relatively dry in fact, during its operation in the daytime there is hardly any precipitation on the cuttings and the medium. However, the air humidity is always very high, even if the humidifiers are not operated constantly. When the temperature starts to drop at night or on cloudy days there is considerable condensation both on leaves of the cuttings and the polyethylene. The latter results in some runoff because of the pitch of the house. Most of it disappears behind the edge of the bench, although some will end up in the medium. This, by the way is the only form of watering which the peat medium receives during the entire rooting process.

GREENHOUSE PREPARATION AND MANAGEMENT

The capacity of one humidifier lies between 10 to 15,000 cu. ft. of greenhouse area. We are using 2 units in a 50 by 9 ft. greenhouse and we are able to maintain a thick and even fog through the entire house at all times.

I want to stress the importance of using polyethylene lining within the house. This tight, inside cover will prevent the greenhouse from cooling off too rapidly during the night since the air space between the glass and plastic lining acts as an insulator. More important, it seals in the fog. We believe it would be impossible to maintain a heavy fog without the plastic cover, because the water particles would constantly condense against the relatively cooler glass and run off through the cracks.

The greenhouse is kept fairly heavily white-washed through late spring, summer and early fall with a heavier coating along the lower edge. This will be sufficient in the early morning and late afternoon hours, during sunny days or periods of intermittent sunshine. During hot days, an additional shade is rolled out between 9 in the morning and 4 o'clock in the afternoon. Even then, the temperature will rise

rapidly and often hover between 90 and 100 degrees F. During very hot days we will occasionally rinse the newly stuck softwood cuttings with a fine mist nozzle in order to cool the leaves somewhat.

FOGHOUSE PROPAGATION

Under the fog-like conditions we can create with these humidifiers, it is possible to keep practically even the softest type of cuttings in a turgid condition. As a matter of fact, it happens time and again that soft cuttings are dropped between the rows and they root just as readily without any drying or wilting. As has been demonstrated with intermittent mist, generally the softer the cutting the easier it will root. In this constant fog the cuttings do not require much moisture from the medium. Consequently, the medium can be relatively dry and, what is very important, very loose with plenty of oxygen available for the rooting process. The medium we use in our foghouse consists of 3 parts Dutch peat and 2 parts coarse perlite. The perlite is soaked with water while still in the bag and then mixed with the dry, shredded peat. This guarantees us a uniformly moist mixture, which is then dumped loosely in flats. We stick the cuttings quite close in this medium without any packing. We then rinse the flats lightly with a mist nozzle before they are carried into the foghouse.

I will now give you a chronological report of our summer propagation sequence in the foghouse. We started out on April 16 by trimming the soft growth off the flats of transplanted evergreen azaleas, which have been overwintering in the greenhouse space up until this time. Without recutting, stripping or pinching we stuck these tiny cuttings, 500 to a flat. They rooted within 3 to 4 weeks, were transplanted in flats after 5 weeks and put in an outdoor frame.

On an experimental basis we did the same thing with hybrid rhododendrons on May 15th. They rooted well, within 5 weeks. During the latter part of May and early June we made softwood cuttings of red maple *Prunus cistena* and Newport, Pink dogwood, *Magnolia stellata*, *Rhus cotinus*, *Cotoneaster salicifolia floccosa*, and *Ilex pernyi*. I realize that most of these species can be rooted in intermittent mist frames. However, the point is that we rooted these items from very soft wood quite early when here in Northern Ohio the nights are still too cool to use the outdoor mist facility, efficiently. Besides, rooting under fog is so very rapid and profuse that the transplanted cuttings hardly suffer any transplant shock but keep right on growing vigorously. One reason for this may be the fact that there is absolutely no leaching during the rooting process.

ADVANTAGES OF FOGHOUSE PROPAGATION

Some of the important advantages of the foghouse came to light when we were able to stick our first batch of rhododendron cuttings at the end of June. These by the way, were somewhat harder than the previously mentioned softwood cuttings, although still in a condition which were difficult to root under intermittent mist. These cuttings were cut, wounded, stripped to 3 leaves, and dipped in a weak solution of IBA in alcohol. They were uniformly rooted after 6 weeks and we kept repeating this operation on a limited scale after each growth period.

of our rhododendron stock plants. The rooted cuttings were then flattened up and kept outdoors like the evergreen azaleas. For the first time we will be able to overwinter all this material in coldframes instead of heated greenhouses. The last batch of rhododendron cuttings was made between August 24 and September 12 and we are in the process of transplanting these at the present time. Percentages and number of roots vary from good to very good. The interesting observation we have made is that the red and the more difficult to root varieties root very well when taken early in a soft condition. Another important item in September was *Cotoneaster apiculata*, which again rooted quite easily. All the softwood cuttings I have mentioned were dipped in a weak solution of IBA, in alcohol and water. In most cases the cuttings will root within 2 to 3 weeks.

The most important advantage of the foghouse is the fact that we have found a reliable and fairly easy way to effectively operate our greenhouse through the summer. We also are able to start our propagation program more than 2 months earlier than usual. We have rooted sizeable quantities of cuttings at a time when they still had a whole summer's growing season ahead of them. For example, we transplanted *Prunus cistina* and Newport cuttings into peatpots, planted them out in peat beds in early August and got 6 to 8 inches of growth by the end of September, plus a heavy root system.

Another advantage is the fact that the foghouse is easy to run. It requires just a little more care than a mist frame. We control the humidifiers with a one hour timer which can be set from continuous down to any time interval within one hour. However, we are considering the use of a different timer next year. The water level in the pan is maintained by a simple float device. This year we kept this pan filled by hand, although next year we intend to install a small central tank to feed both pans. During continuous use the Defensor unit will consume from $\frac{3}{4}$ to 1 gallon of water an hour which is low indeed compared to intermittent mist. The one extra job involved in the foghouse operation is the need for practically daily shading of the house during the hot summer months.

We were surprised to find no fungus problems whatsoever, although we expected the opposite. During dark cloudy weather we occasionally added some Natriphene fungicide to the water which the humidifiers spread evenly through the entire house and which seemed to be adequate for fungus control.

The one fact that we can now root hybrid rhododendron cuttings from June on, makes the Defensor worthwhile for our type of operation. We feel that this foghouse setup will make it possible for smaller nurseries with limited propagation facilities to grow more difficult-to-root material themselves. Before I mention some of the disadvantages I want to note that the foghouse is no competition to the intermittent mist facility. We will still root our large quantities of easy to root material like *Ilex*, *Pyracantha*, *Viburnum*, *Euonymus* and *Juniperus hetzi* in the outdoor mist. We consider the foghouse the ideal supplement to our intermittent mist setup, which enables us to make good use of our greenhouse space for rooting the more difficult to root species of plants.

DISADVANTAGES OF THE FOGHOUSE

Now let us mention some of the disadvantages of the foghouse. The main one is in the difficulty that is caused when the flats of rooted cuttings are taken out of the foghouse and have to be gradually hardened off. If this is not done properly, especially during June, July and August, the cuttings will literally burn up. At first we placed these flats in frames under heavily whitewashed sashes to keep them very cool. After several days we gradually gave them more light and finally after one week we ventilated the frame. This was a slow and cumbersome process. Next time we built an intermittent mist line over this frame and ran it on a 2 minute cycle, while shades were kept on during the first several days. This method proved to be very satisfactory and we intend to use it in the future. Incidentally, the rhododendron cuttings are easy to harden off giving us no trouble from September on in outdoor beds under shade.

The second disadvantage is one the foghouse has in common with the intermittent mist. In both cases we are depending heavily on mechanical devices and these might fail us at some time or other. In such a case cuttings in the foghouse would be even more vulnerable than those under mist. If power failures or obstruction of the water flow is not noticed immediately it will mean the total loss of the crop. In case of an emergency we are prepared to cover the whole greenhouse with heavy reedmats, and use mist nozzles to keep the cuttings moist. Fortunately we have not had to resort to this technique as yet.

CONCLUSIONS

How reliable the Defensor will turn out to be has yet to be proven. However, judging from its record in Europe and by the fact that it is Swiss made, we are confident that it will be a worthwhile investment. We use the Defensor humidifiers from April until November, that is, during the time that sun heat is of importance in the greenhouse. Last year we used one until the middle of December, but did not notice any beneficial effects. The fog seems to keep the house too cool and the heat of the pipes makes the fog disappear immediately after the humidifier stops.

I have told you about the use of the Defensor humidifier in respect to the rooting of cuttings, but I am sure that it has many more applications in the field of propagation. Last year we put some seed flats of rhododendron and *Hydrangea petiolaris* in the foghouse and we noticed a very quick germination, which resulted in a dense, even stand without any signs of fungus invasion.

While I was in Boskoop I was told that a nurseryman there had quick and good results when he put his summer grafts of Blue Spruce in a fog section. We intend to conduct some tests to see what can be done with grafts in this fog environment.

There is a somewhat comparable American product on the market which has been frequently advertised in the American Nurseryman magazine. I have tried to find its specifications and other details without much success.

The representative of Defensor Inc. in the U.S. is: Mr. Rene Forster, c/o Rene Forster Co Inc, 432 Fourth Ave., New York 16, N.Y.

As a final comment I feel that I should caution against too much enthusiasm for this humidifier. To me it is just another good application of mist propagation, one that increases the potentialities as well as the worries of the propagator. Also I want to express my gratitude to my former employer, teacher and friend, M. Siem von Kalveren of Boskoop, Holland. Thank you.

* * * * *

MODERATOR NELSON: Thank you, Mr. Stroombeek, for that most excellent description. Are there any questions to be directed to Mr. Stroombeek?

MR. ALBERT LOWENFELS (White Plains, New York): How did you know you had to shade your houses in the summer? Did you try it without shade?

MR. STROOMBEEK: I definitely did, but when I saw the first sign of burning I knew what I had to do.

MR. LOWENFELS: What was the temperature?

MR. STROOMBEEK: The temperature runs up to 100° F. if it is in the fog. I thought that would be detrimental to the cuttings.

MR. ARIE JAN RADDER: Mr. Stroombeek spoke about the American made humidifier. I have used the Walton Humidifier, made by the Walton Laboratories in New Jersey.

MR. STROOMBEEK: No, I referred to the one from Standard Engineering Works in the East.

MEMBER: He is referring to the one advertised in *The American Nurseryman* for many years, by Standard Engineering Works, Pawtucket, R.I., and there are numbers of them still in operation in various greenhouses throughout the country.

MR. JAMES WELLS: There is a machine made by the Bahnsen Company in Winston Salem which I think is very similar to this one. It has a much larger capacity in that it will blow mist for at least 300 feet down the greenhouse. Mr. Owens at Columbus is using that machine in a number of his houses very successfully.

What was the concentration of indolebutyric acid used to root your cuttings?

MR. STROOMBEEK: I used a weak solution, 160 micrograms to 1000 c.c. of 50 per cent alcohol.

MODERATOR NELSON: Are there any other questions or comments?

MR. STROOMBEEK: This is Model 3001 with a thermal safety switch. Of course, it is built for nursery purposes. I wanted to mention this because the switch will cut in as soon as the temperature goes above 75° F., at a time that you want to have your fog very badly. If you don't specify you may get the same model without the thermo-nuclear switch.

MODERATOR NELSON. Thank you, Mr. Stroombeek.

This next talk promises to be an interesting one. I am sure that some of you got up this morning and took a look at yourself in the mirror and said, "What is it worth?" Well, standards like those can be switched up and down, depending on the occasion. However, the standard of the red and blue of the ledger sheet is one that cannot be ignored in the industry and, therefore, it is with pleasure we have Mr. Henry A. Weller, Director of Perennial Production, from the C. W. Stuart Company, Newark, New York, to talk to us on "Propagation — Dollars and Sense." Mr. Weller.

Mr. Weller read his prepared manuscript. (Applause)

PROPAGATION — DOLLARS AND SENSE

HENRY A. WELLER
C. W. Stuart & Co.
Newark, New York

In the four years that I have attended these meetings, I do not recall anyone ever stressing the actual cost of propagation. Is not being aware of the cost of propagation, and doing something about it, just as important to the nurseryman as the "know-how" of propagating?

Although propagation has been practiced since almost the beginning of time, and procedures have been basically the same, there are ways of modifying these that will result in a better plant, greater yields, and an actual decrease in cost of production.

The two words, dollars, and sense, have a direct bearing upon each other. Using common sense when producing plant material does result in a greater profit, dollar-wise. We are all vitally interested in propagation, or we wouldn't be here today, but I wonder how many of us are aware of, or know how much a given item costs us to propagate and grow. Do we know if it is profitable to keep certain items in our line?

Since I have been keeping accurate cost figures we have eliminated approximately 10 varieties of plants, simply because, no matter how we propagated these, they were not profitable to keep in our line. This idea of keeping cost on every variety grown might seem unnecessary to you, but during one season of growing *Phlox subulata*, we showed a loss of \$900.00. If I had not kept accurate cost records on this specific item, we would probably have continued to grow it the same way, year after year, with the loss being absorbed by the profit of another variety. Now we will either have to find a more economical way of propagating and growing *Phlox subulata* or eliminate it from our line of growing.

Let me give you a brief explanation of our cost program. All expenses incurred from the time a cutting is taken until it reaches maturity are charged to that given variety. It requires a lot of time and effort to keep these daily records straight, but it gives us a picture of where and for what we are spending money. With this program we are able to determine: (1) if an item is profitable to grow, (2) the most economical method of propagation and growing, (3) the cost to grow the item, and (4) the sale price.

There are three phases of operation within our nursery where I feel we have been able to reduce cost considerably, namely: (1) storage of rooted cuttings, (2) weed control, and (3) mist propagation.