MR. H. M. TEMPLETON: I want to apologize for reading this. There is so much I should like to say that I feel I must be efficient. I can't afford to ramble around.

Mr. Templeton discussed "The Phytotektor Method of Rooting Cuttings." (Applause)

## The Phytotektor Method of Rooting Cuttings

H. M. TEMPLETON
*Winchester, Tenn.*

It is an honor to address this assembly of experts. It seems queer for me to stand here before you as a plant propagator because I am not. I am a machine operator. But I can tell you about a machine that apparently does know how to propagate plants. It is a device of wire and plastic and electrical equipment.

Since it has to have a name, we have called it the Phytotektor System. Each unit is 48 feet long and there can be as many units as you wish under one control system. It is an attempted union of the English sunframe idea and the new mist humidification.

The ideas came from Sheat's book, *Propagation of Trees, Shrubs, and Conifers,* from Mr Wells' excellent articles in the American Nurseryman on mist humidification, from advice of Professors Stoutemyer and O'Rourke, and from eight or ten thousand hours of thought and experiment on our part.

Its object is to root cuttings in soil, where they can grow-on without being lifted, potted, or transplanted, until such time as they are saleable or are strong enough to be mechanically transplanted into the field.

It is not a method of merely producing rooted cuttings. If it is your intention to lift the cuttings and pot them, you can beat this system with a greenhouse. You can beat it with a sash house and on some objects with the common cold frame. Again, if you intend to lift your rooted cuttings you can possibly beat it, under some conditions, with open air mist systems.

But, if you need large quantities of heavy, bare root liners with good secondary root systems, we don't believe you can equal it in either costs or results, except with some methods of open field production in the deep south.

Our procedure has been developed—and the control system is required—because we can't afford to throw continuous mist onto cuttings in soil. There simply isn't any place for the water to go, there isn't any drainage.

The controls used this year, humidistat and timer, were set up with the idea we wanted to keep the air within the enclosure saturated. The more we got into it, the less we thought of this concept, and the more convinced we became that what we really wanted to do was keep the leaves wet all of the time.

With the old humidistat and timer control, at a power cost of $1.00 a month, the equipment, in effect, "examined" all of the cuttings once each five minutes, night and day, and supplied them with water each time they seemed to need it. That is 288 times a day, 8,640 times a month, for $1.00. You could literally put in a batch of cuttings and go off and forget about them.

However, if you accept the wet-leaf concept that is only approximate control.

We plan to use a little aluminum painted can for our new control. We think of it as the electronic leaf. It is not fully proven but we believe that it will "examine" our cuttings every instant of every day in 1954 and supply them with precisely the amount of water required to keep them wet.

You understand, as soon as a bed of cuttings is rooted we harden them up a little, remove the equipment and use it over again as many as three times a year, leaving the cuttings to grow in full sun, right out in the open, right where they rooted. There just aren't any handling costs.

Temperatures inside in the summer are very high, 115 degrees, in the winter very low. We can't really do anything about them, so we just don't pay any attention to them.

One thing is necessary, the cuttings must not be put in very deep, just deep enough to keep them from falling over—one inch, a half an inch, a quarter of an inch. That is what the thin layer of sand is for, it's an easily worked medium for holding the cutting upright. This shallow placement is a very real advantage with certain plants, barberry, for example, just stick it in one internode deep. You don't have to clip any thorns.

If the subjects require heavy hormone treatment, we place them about an inch deep in nail holes punched in the sand, and then simply flood them in. If no hormones are needed, we just jab the base of the cutting into the sand deep enough to hold it upright. This can be a very fast operation.

There are many interesting points that I do not have time to go into, but I would be very glad to discuss the method further with any of you who may be interested.

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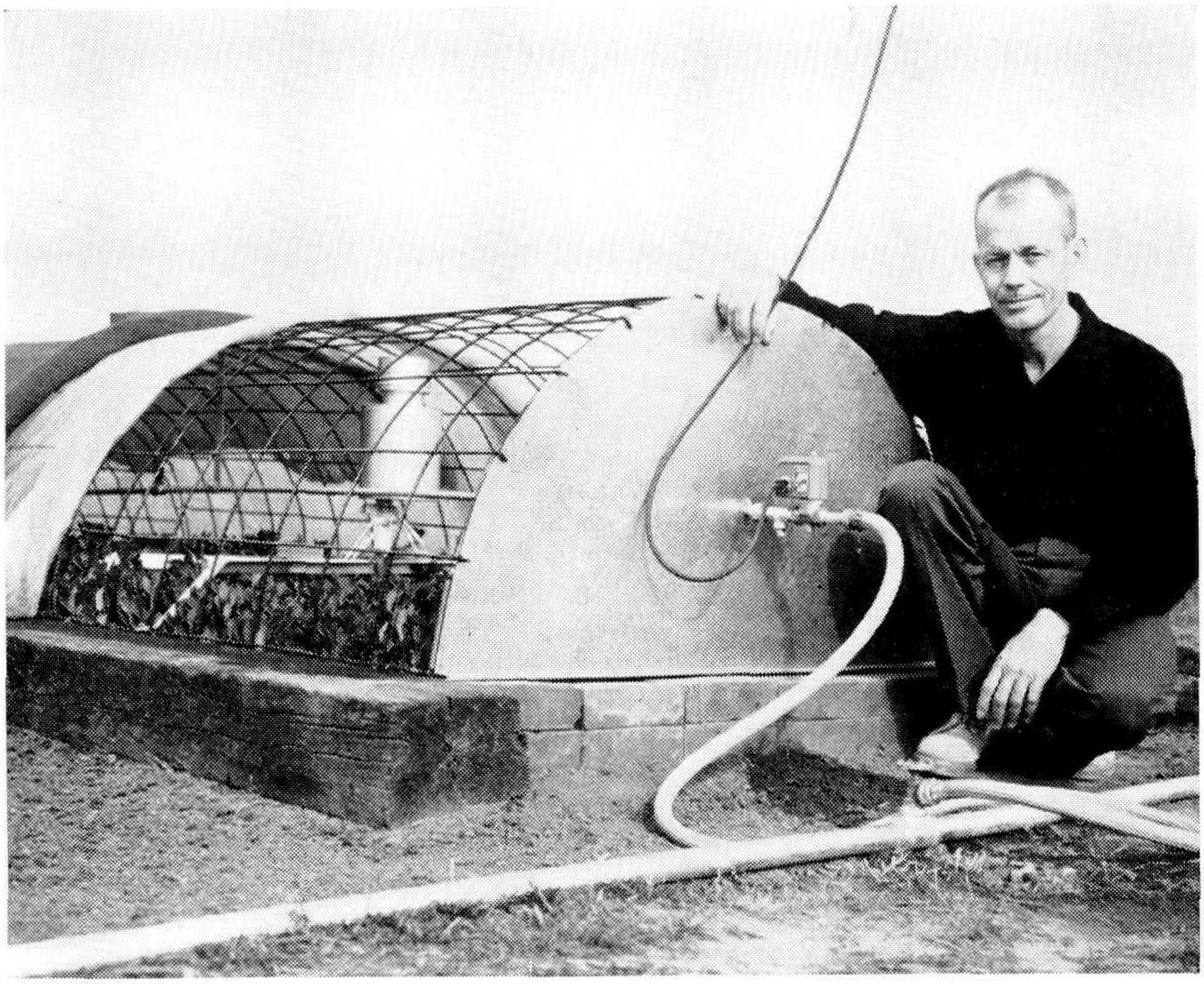
MR. CASE HOOGENDOORN (*Hoogendoorn Nurseries, Newport, R.I.*): What is the reason you put those cuttings only in a quarter to a half inch?

MR. TEMPLETON: We put them in shallow because if we put them in deep they don't root. We have a clay soil which gets very wet. There is not much aeration.

MR. LESLIE HANCOCK: This is of very great interest to me because it uses soil as the rooting medium. We have developed a method at Cooksville, which will be described to you on Saturday afternoon, using soil as the rooting medium. I am curious to know how efficient it is to put



*Mr. Templeton and The Phytotektor Apparatus.*

the cuttings in and then to put all those gadgets over them. Is there a lot of equipment in the way to reduce efficient placement of the cuttings?

MR. TEMPLETON: No, cutting placement is very easy. First, we erect the entire apparatus, including the wire and spray line. We then take off one section of the wire at the end of the bed, set it aside, and put a temporary tent-house shelter over that section. The spray nozzle is turned on and the boys go into the tent house to stick the cuttings. As soon as that section is filled, the wire frame is put back in place and covered with plastic. We are then ready to start another section. The entire operation is very quick and easy.

PRESIDENT WELLS: Have you tested the possibility of providing drainage beneath the rooting medium so that the cuttings could be put in deeper?

MR. TEMPLETON: I don't think that it is necessary to put the cuttings in deep. It is easy to put them in shallow and they root satisfactorily. There seem to be two or three factors involved there.

PRESIDENT WELLS: What are the percentages of some of the things you have rooted in these frames?

MR. TEMPLETON: That we don't know. We don't count the cut-

tings when we put them in and don't count them when we take them out. We get what we think is an effective per cent. By that I don't mean that every cutting roots, obviously, they don't, but the first growing season we lost more cuttings because they choked themselves to death than we lost by not rooting.

MR. HOOGENDOORN: Do you firm those cuttings when you stick them?

MR. TEMPLETON: We stick them loose. It doesn't make any difference whether they are firmed or not. You won't believe this, and I didn't mean to tell this, but it is not even necessary to stick the cuttings at all. They will root on top of the soil.

MR. HOOGENDOORN: Do you use any shade after removing the plastic cover?

MR. TEMPLETON: Actually, you can just remove the cover. It hurts the cuttings a little, but you can get by with it. In practice, it is better to harden them off about a week. We do that by giving them air.

MR. HOOGENDOORN: Won't the cuttings get burned by taking the cover off all at once and exposing them to the sun? Wouldn't it be better to have shade over them for a week or so?

MR. TEMPLETON: With some plants I think so. Some broad-leaved plants show some sign of burning, but you can put them right out in the sun.

MR. CHARLES HESS (Hess Nursery, Mountain View, N.J): In New Orleans over 75 years ago, belljars were used. Propagators put a little sand on top of the dirt, put the cuttings in and covered with the belljar. The bell jar was tipped a little for ventilation. This is a somewhat similar procedure.

MR. SIDNEY WAXMAN (Cornell University, Ithaca, N.Y.): Roots will grow where there is oxygen and usually don't grow where there is no oxygen. If you have your cuttings stuck in sand, not dirt, you will have roots growing in the sand, but they will die if they are down where there is no oxygen. What makes you think they are going to grow into the dirt? You said before in dirt they will die and yet you take off the cover later on and leave them out in the sun.

MR. TEMPLETON: There is apparently enough oxygen there to encourage them to go on down into the dirt, because they do go on. There is no dying of roots. There is no sign of unhealthy roots. Roots start in the sand and on top of the dirt. By the time they are rooted, they are all down in the dirt.

MR. WAXMAN: Yet, you said that they won't root in the dirt.

MR. TEMPLETON: By that, I mean not as well. We can put cuttings in the dirt if it is very loose and if we don't use too much water. However these cuttings will not do as well as those in a sanded surface.

DR. SNYDER: You are suggesting that there might be a difference between the oxygen required for the development of the roots and for growth after the roots have formed.

CHAIRMAN FILLMORE: I think that it is very possible.

MR. MAURICE H. WILSEY (Wilsey Evergreen Nursery, Corfu, N.Y): In Professor O'Rourke's class at Michigan State, I have seen him put easily-rooted cuttings in wire baskets and just hang them on the well. The cuttings rooted in a very short time without any media at all.

MR. TEMPLETON: I have seen that done also. One of our men wanted to impress his father, so he tied a little bunch of cuttings and hung them inside one of the units. The cuttings rooted.

MR. MARTIN VAN HOF: How large are the cuttings you use?

MR. TEMPLETON: Apparently we can root cuttings just as big as we can get into the tent It is a compromise between a few large cuttings and a large number of small ones.

MR. VAN HOF: Then it makes no difference what size they are? Could they be eight or ten inches if they will stand up?

MR. TEMPLETON: Yes, place them thick enough so they will support themselves. You can't do this if you put a whole lot of little cuttings and a few big ones because the large ones do not get enough support from the small cuttings.

MR. DONALD S. McCONNELL (Port Burwell, Ontario): I was wondering if you had much experience with evergreen cuttings?

MR. TEMPLETON: Evergreen cuttings take a long time to root. It is a winter-time proposition with us. We put them in because we don't have anything else to put in at that time of the year. It takes evergreen cuttings the usual long time to root.

MR. McCONNELL: What is your experience with Japanese yew?

MR. TEMPLETON: We don't grow yews down there. I have made only limited experiments. They rooted well.

MR. HOOGENDOORN: You root mostly broad leaf evergreen plants?

MR. TEMPLETON: Mostly broad leaf.

PRESIDENT WELLS: I have the greatest respect and admiration for what Mr. Templeton has done and is doing, yet, I still think that in a few years he will have thrown his plastic away, because I believe that the future of propagation lies in the controlled use of water. I think water is the vital factor in his system and in a lot of other systems. I think he is on the right line in wetting the leaves and keeping them wet. His plastic simply is an artificial means of trapping heat which aids in propagation, but given the normal heat of a hot summer sun, I think it can be done just as well without any plastic. Incidentally, we rooted cuttings that accidentally had fallen off on the bench without being stuck and

without any plastic. That is out in the open, simply by keeping them covered with water. Some cuttings would root far more readily if they had a greater light intensity, which could be provided by eliminating the plastic and shade.

MR. C. S. INGELS (Henry Nurseries, Henry, Ill.): Do you have any trouble with the nozzels plugging up and, if so, how do you get to the nozzles to clean them out without damaging the cuttings? How often do you check the apparatus?

MR. TEMPLETON: Yes, we have trouble with the nozzles clogging. I suppose we always will have trouble with low capacity nozzles. We have to clean about two per cent of them each day. We check them every morning. The boys simply walk down the lines of beds and look in a small square hole which is provided for inspection purposes. They turn the system on so all of the nozzles are spraying. If a nozzle is spraying, it is all right. If they find one that is not spraying, they mark the place and come back later. The nozzles are easily cleaned.

MR. HOOGENDOORN: There is a new apparatus, called the Evis Water Conditioner, which it is claimed will remove the minerals from the water. This should eliminate all nozzle trouble. It costs about $95.00.

CHAIRMAN FILLMORE: We are very grateful to Mr. Templeton for bringing the model of the Phytotektor to this meeting and for his excellent discussion of this method of rooting cuttings, however we must proceed to the next speaker.

The next discussion will be presented by Charles E. Hess, a graduate student at Cornell University, who will describe a simple timing device for controlling lights and nozzles.

Mr. Hess described a simple and inexpensive time clock for regulating mist in plant propagation procedures. (Applause)

## A Simple and Inexpensive Time Clock for Regulating Mist in Plant Propagation Procedures

CHARLES E. HESS and WILLIAM E. SNYDER
*Cornell University, Ithaca, New York*

In the field of horticulture, time clocks are used to extend the length of day by turning lights on at dusk and turning them off again after the desired daylength is reached and for cyclic control of mist for plant propagation.

Three different timers were designed, built, used and then discarded in the development of the timer to be described. The first three timers failed to meet all the requirements of a practical instrument, namely, simplicity, economy, availability of parts and adaptability. This timer, therefore, is the result of testing three different designs, selecting the