

MR. CHARLES HESS (Hess' Nurseries, Mountain View, N.J.): I will answer that in my discussion later.

MR. FLEMER: I would like to ask whether in the opinion of the experts, *Magnolia stellata* is a true species or a selected type. We have raised *M. stellata* seedlings and many of them resemble *M. Kobus* and take a long time to bloom.

MR. GALLE: I think that it is a botanical species. Also there is a very distinct possibility of cross-pollination between these two. Many of the seedlings come into bloom later than *M. stellata*, but probably not as late as *M. Kobus*.

CHAIRMAN MEAHL: Ladies and Gentlemen, because of the time, I think that we should defer further discussion until the open discussion period at the close of this afternoon's panel. At this time we are to have a discussion of magnolia propagation by cuttings. You will notice on the program that Mr. Tom Dodd Jr., of Dodd Nurseries, Inc., Semmes, Alabama, is scheduled to give that report. However, Mr. Dodd is unable to be here. His paper will be read by Mr. Ray Keen, of Kansas State College, Manhattan, Kansas, who is at the present time a graduate student at Ohio State University.

Mr. Ray Keen read Mr. Tom Dodd's paper, entitled "Propagation of Oriental Magnolias from Soft-wood Cuttings." (Applause)

Propagation of Oriental Magnolias from Soft-Wood Cuttings

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Mr. President, Ladies, and Gentlemen: I am very glad to bring to you this report on MAGNOLIAS FROM CUTTINGS. Dr. Snyder called me last October and asked that I take part in this meeting and I deem it a distinct honor and privilege to do so.

As you probably already know, the Oriental magnolia is a very important crop with the nurserymen in southern Alabama. It is the largest deciduous crop we have and second only to broadleaves in propagation and sales. I would estimate that there are upwards of two and one half million cuttings rooted annually in Mobile County alone. However, in this report, I refer to our own experiences, although our method of propagation is general throughout the county.

The most desirable wood for cuttings is the softest and most succulent wood on the stock plants. To get this type wood, we apply a liberal amount of commercial fertilizer, such as 6-8-4 or 4-10-7, at a rate of about two thousand pounds per acre after the last killing frost which occurs usually before March 15th. Such an application of fertilizer helps to stimulate an earlier growth, thus giving us the desired cutting wood. We

sometimes apply the same amount of fertilizer to our lath-house and small field magnolias whenever we feel that a sufficient number of cuttings may not be had from the stock plants.

We begin making cuttings the first or second week of April. However, the time sometimes varies, depending on the weather conditions experienced during March.

The length of the cuttings depends largely on the variety, and may be as short as three inches or perhaps as long as ten inches. For instance, *Magnolia stellata*, from three to five inches; *M. Soulangeana*, from four to six inches; and the varieties *Lennei* and *Superba Rosea*, from six to ten inches. All of the varieties are cut at the node, which accounts for the different lengths of the cuttings.

Each cutting is defoliated of all except the two top mature leaves, which are clipped off about half, and the terminal bud is cut out. The cuttings are then placed in a basket and submerged completely in a vat of water containing a prescribed amount of fungicide, usually Othoricide. After removal from the fungicide solution and given a sufficient amount of time to properly drain, they are ready for the rooting medium, which in our case, is sand or vermiculite. We use these two separately, but never as a combination. Our experience has shown vermiculite to be far superior to sand on most all varieties except *M. stellata* cuttings, which root just as well in sand.

Immediately before sticking the cuttings into the rows, we treat the butt end of each with Hormodin No. 3 to stimulate an earlier root system.

We thoroughly drench the vermiculite or sand before and after sticking the cuttings. Vermiculite is ready for the cuttings after the first drenching, and under no circumstances, do we use any other method for packing. But to pack the sand we use a specially constructed "T" shaped tamper.

After the cuttings have been placed into the rooting medium, it receives the second and last thorough drenching. However, we syringe the foliage three to five times daily during the five to six week rooting period. The number of syringings depends on the temperature and humidity. We want to maintain the highest temperature possible, but absolutely devoid of any direct sunlight, and the highest possible relative humidity. The temperature outside the greenhouse during this time of the year usually ranges from 85° to 95° Fahrenheit. We have seen the temperature inside the greenhouse go as high as 115° F. during a cloudless day. Not more than thirty minutes is the most any of the men are exposed to this temperature.

Our paramount problem during the rooting process is the control of fungus or "damping-off." Under ideal weather conditions control may be effected by a weekly application of a fungicide. However, if we are plagued with excessive rain and cloudy weather, as is sometimes the case in southern Alabama, the "damping-off" problem is much greater, because fungi really thrive under these conditions. In this case, more applications of the fungicide are required, with, perhaps a little hoping.

We can usually root two crops of Magnolias if we have ideal weather conditions, etc., and can use the same rooting medium for rooting azaleas, *Ilex*, and other broad leaf evergreens.

The preceding is my attempt to give to you in as much detail as possible, our method for propagating Oriental magnolias from soft-wood cuttings. But by no means do I wish to preclude the fact that we still have our biggest problem facing us after the rooting has been effected. This is the task of transplanting the rooted cuttings into the outside beds, and we can experience disappointment if we are not extremely careful, because the winds are usually very hot and dry during May and June.

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MR. LOUIS VANDERBROOK (Vanderbrook Nurseries, Manchester, Conn.): Tom Dodd mentioned in his article that the men in the greenhouse were subjected to a temperature as high as 115 degrees Fahrenheit for not longer than thirty minutes. I wonder how many of the propagators here have given thought to having their men stick the cuttings at night, as we have done. The cuttings are made during the day, covered with moist burlap until evening, and stuck at night. It takes until about midnight and we give the workers a full day's pay.

MR. HARVEY GRAY (Long Island Agricultural Institute, Farmingdale, N.Y.): This past season it was noticed that with cuttings of *M. Soulangeana* and *M. stellata* carried under mist that there was continued growth if the terminal bud was not removed. With the continued top growth there developed an internal rot in the soft growth. Cuttings without the terminal bud did not develop this condition.

PRESIDENT WELLS: One of the major things that I noticed in our summer propagation was the complete absence of all the normal propagation troubles on all the magnolias that we carried under mist out-of-doors. Now that does not mean to say that we did not have a few cuttings which evidenced the conditions which Mr. Gray mentioned. We did, but they were the few that did not root.

MR. HOOGENDOORN: Do you remove all the terminals from the magnolia cuttings?

PRESIDENT WELLS: No, we use soft cuttings from young plants. We like to take cuttings from the one-year liners if we can and under the constant mist you can take those cuttings so soft that they can hardly stand upright. Such cuttings will root with great rapidity and evenness.

MR. HOOGENDOORN: What do you use?

PRESIDENT WELLS: Hormodin No. 3 is too strong on most of that material. We wound all cuttings, use sand without any peat. I know that the Boskoop recommendation is for a mixture of sand and peat, but we have found that peat is definitely harmful.

MR. PIETER G. ZORG (Fairview Evergreen Nurseries, Fairview, Pa.): Since I have been here in the United States I have found that I

was wrong. I have lost both *M. liliflora nigra* and *M. Soulangiana* by using about 95% peat. This year, with a 50-50 peat moss and sand mixture and Hormodin No. 2, the cuttings are exceptionally good.

PRESIDENT WELLS: I think I am ahead of you because I didn't have to mix the peat and sand and I didn't have to use peat at all.

MR. PIETER G. ZORG: I don't agree with you.

CHAIRMAN MEAHL: Were your cuttings under mist, Pete?

MR. ZORG: My cuttings were not under mist. They were in the sweat box.

CHAIRMAN MEAHL: If they were under mist I don't think they would have withstood the peat.

MR. ZORG: I don't know.

MR. ROGER COGGESHALL (Arnold Arboretum, Cambridge, Mass.): In regard to fungus in the cases where the temperature and humidity are both very high in the summer, we have had a lot of trouble with fungus in mediums of sand and of sand and peat mixture. Where the plastic foam was added to the sand and peat, we didn't have any trouble at all. I understand from the manufacturer that somewhere in the manufacture of the plastic, a bromide is used. Whether that bromide has a definite inhibiting effect on the development of fungus, I don't know.

MR. AART VUYK: I would like to ask Mr. Wells if he has any trouble with wind blowing the mist?

PRESIDENT WELLS: We had no trouble with wind blowing the mist. The fog line was set up in a sash house with the sash removed. The walls of the sash house come up about two or three feet above the surface of the bench. Therefore, there was a small amount of side protection but no top protection of any kind.

MR. HUGH STEAVENSON (Forrest Keeling Nursery, Elsberry, Mo.): This past summer we placed polyethylene panels around our shade house to the height of the nozzles. We had no difficulty with wind blowing the mist away. As a matter of fact, the wind movement probably was beneficial. There was a certain amount of movement of the mist. I believe that the nozzles could be spaced farther apart in a completely enclosed structure. We did have three problems, however. One was that there was not sufficient time to root some of the materials. I think this can be corrected by taking the cuttings earlier. The second problem was lack of adequate drainage in of the beds. There was some bottom rotting on those materials which required a long time to root. The third problem concerned the hardness of the water. Some of the plants actually became white with the deposit of lime.

MR. CARL WILSON (Thompson Products): I can't harmonize three statements that were made here, and while the gentlemen are in the room, I wonder if they would clarify some of the points about fungus

infection in relation to the use of mist. This morning, Mr. Zorg talked about spraying juniper cuttings three, four, or five times during the day, but discontinuing the spraying at night so that fungus would not develop. Mr. Templeton has the mist on one minute and off several. Now Mr. Coggeshall from the Arnold Arboretum has discussed a closed case in which the humidity is extremely high.

MR. CHARLES E. HESS (Cornell University, Ithaca, N.Y.): In reply to the question of the relation between high humidity and the use of mist with regard to development of fungus, these are two entirely different situations. Even with a humidity as high as 95 per cent there is a certain amount of water loss from the plants and, if the sunlight is bright, the materials may burn. Under the mist system, however, there is a film of water on the leaf, even when the mist is not on. This film of water has a cooling effect which is not obtained under conditions of high relative humidity. Besides the cooling effect, the film of water markedly reduces the loss of water from the leaf and the plant does not wilt, but constantly remains turgid. The spores of many of the fungi, such as *Botritis*, will not gain entrance into the tissue. Another thing which may help is the possibility that when the fungus spore comes in contact with the leaf it is washed off by the mist.

MR. RAY KEEN: A third factor which should be considered is that the mist is thoroughly saturated with oxygen and there is a possibility that there is enough oxygen there to actually inhibit the growth of the fungus.

MR. CHARLES E. HESS: Another example of the effect of mist on fungus infection can be cited in connection with roses, growing in the greenhouse, which were infected with both mildew and black spot. Two weeks after these plants were placed under mist, the infections had disappeared. Of course, there is a danger that mist might be considered as a "cure-all". Let's not play it up too much and destroy its usefulness. For those of you who have not used mist, I suggest that it be tried out on a limited scale until you are satisfied that it is or is not satisfactory under your conditions.

MR. ROGER PEASE (University of West Virginia, Morgantown, W. Va): There are two points about mist which I would like to bring up. One is that there is a drop in temperature up to 18 degrees inside the frame when mist is used. The temperature reduction is greater with hotter days. The second point, is the suggestion which I made at the meeting last year that possibly we are beginning to over-emphasize the use of mist.

MR. MAURICE H. WILSEY (Wilsey Evergreen Nursery, Corfu, N. Y.): In our propagation, we watch the temperature of the media very closely. I wonder if Mr. Wells or Mr. Templeton can tell me what the temperature of the medium is under their mist conditions?

MR. W. M. TEMPLETON JR. (Winchester, Tenn.): I do not have any idea since we don't measure it.

PRESIDENT WELLS: We do not measure it either.

CHAIRMAN MEAHL: It is time that we continue with the next method of propagating magnolias. If there are further questions, bring them up later in this discussion or save them for the Plant Propagation Question Box tonight. Propagation of magnolias by seeds and by cuttings have been discussed, now it is time to turn our attention to the use of grafting in magnolia propagation. A very experienced gentleman is going to give us the benefit of his experience, Mr. Charles Hess of the Hess' Nurseries, Mountain View, New Jersey.

Mr. Charles Hess' presented his paper, entitled "Magnolias from Grafts." (Applause)

Magnolias From Grafts

CHARLES HESS

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Before going into grafting, I think the first thing to discuss is the growing of the proper understocks. We have found in our experience that *Magnolia Kobus* is the most outstanding understock for all Oriental varieties of magnolias. It is easy to grow and makes a wonderful root system, however, our biggest problem has been to get good seed from the Orient. It is only occasionally that we get seed which has been properly handled. In our experience with *Magnolia Kobus*, once the seed dries out it loses its germination power. One year we had a bed of seeds from Japan which gave us about a five percent stand the first year, but an excellent stand the second year. It also came up the third, fourth, and fifth year after we planted the seed. I am not able to explain why, but we have found that unless we could get Japanese seed early in the fall and have it packed in damp peat moss, it just will not germinate.

Years ago, we planted our own *M. Kobus* with the idea of growing our own seed. We have, at the present time, about ten specimen plants, which will average thirty feet or more in height and ten to fifteen inches in diameter. Really *Magnolia Kobus* makes a beautiful tree and I am surprised that it is not used more for a medium sized tree in landscape work. It is really a sight worth looking at. Not only are the flowers very beautiful but they have a very distinct odor, something most magnolias do not have. Also it has distinctive fall color of the leaves and the seed pods.

The trouble with growing your own seed of *M. Kobus* is that it blooms very early in the spring, about the same time as *M. Stellata*, and we get a crop only about once in five years. As a rule the flowers get damaged by late spring frost, however, we have bought some Hy-Lo oil-burning salamanders which we are going to use around the magnolia trees when they are in bloom. These salamanders are used extensively in California for protection of the citrus fruit crop. How much success we will have with this I am not certain.