

Agriculture at Beltsville, Maryland, which describes a new apparatus for controlling intermittent mist.

(Editor's Note: This apparatus has been described in a recent issue of the American Nurseryman. May, Curtis' and Edward Hacskeylo. New Control Unit Developed for Intermittent Misting of Cuttings. American Nurseryman 103 (8):18. 1956)

MODERATOR MEAHL: Our first speaker this afternoon is Mr. Charles E. Hess, a graduate fellow in ornamental horticulture at Cornell University. Charlie has spoken to this group on several occasions and is well known to most of you. This year he will discuss results of the work on rooting and over-wintering the pink flowering dogwood.

Charles E. Hess presented his paper entitled "Propagating and Over-wintering of *Cornus florida rubra* cuttings." (Applause)

PROPAGATING AND OVER WINTERING *CORNUS FLORIDA RUBRA* CUTTINGS

CHARLES E. HESS

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Nurserymen have tried for many years to propagate *Cornus florida rubra* from softwood cuttings, yet none have ever reported success at a commercial level. In a few instances one or two cuttings were rooted and overwintered successfully, but whenever large scale production was attempted, only a few cuttings remained alive the following spring. It became apparent that the difficulty in propagating *Cornus florida rubra* from softwood cuttings is found only partially in the process of rooting, but is mainly a problem of carrying the rooted cuttings through the first winter of dormant period. Many methods have been attempted commercially, such as burying the cuttings of peat moss in a cold frame, or keeping the cuttings inside a greenhouse, but none have resulted in any degree of commercial success.

The problem was divided into two parts. The first was to find the most efficient procedure for rooting the cuttings. The second was to find the reasons why the rooted cuttings do not survive the first dormant period and then develop an economically feasible method of overcoming or preventing the cause.

To find the best method of propagating *Cornus florida rubra*, fifteen hundred softwood cuttings were taken on July 1st from the second flush of growth. These were split up into three groups; open bench, double glass and intermittent mist. In 30 days there was 60% rooting in the open bench, 67% under double glass, and 92% rooting under intermittent mist. The medium in all three treatments was 1 part peat moss to three parts sand. The mist was controlled by a five minute timer, using 1 minute on and 4 minutes off.

Attempts to solve the overwintering problem were from three directions. One was to try and prevent the onset of the dormant period by extending the length of day and keeping the cuttings in active growth

during the winter months. Although it was possible with a daylength of 16 hours to extend the growing period four months beyond the normal onset of dormancy, the cuttings eventually became dormant by February 15th. Furthermore, this method could not be considered practical because the savings gained by making a cutting instead of a graft would be lost in the expense of maintaining the cuttings in a greenhouse throughout the winter.

The second attempt to overwinter the cuttings was to try and prevent the loss of roots which occurs during the dormant period. Nutrients which were considered possibly deficient due to the immature condition of the original cutting were applied but no practical results were obtained.

The third approach was to try and break the dormancy of the rooted cuttings by cold treatments. Cuttings were placed in commercial freezers at different temperatures and for different periods of time. It was found that in order for cuttings of *Cornus florida rubra* to completely break dormancy, the cuttings must be exposed to 1000 hours of temperature between 32°F. and 45°F. Below 32° the roots were killed and the stems split. The cuttings would break into growth, wilt and then die. At temperatures above 45°F., the cuttings did not receive sufficiently low temperatures to break dormancy.

The following year this information was applied on a commercial scale. The cuttings were handled the same as the previous year. In the fall they were placed in a cold frame which was heated just enough to maintain the temperature above freezing. Although the temperature would occasionally go up to 50°F. during the day there was plenty of time throughout the winter for the 1000 hour minimum between 32-45°F. to accumulate. The 32-45°F. period does not have to be in one continuous exposure but can be made up of many short exposures below 45°F. In May 96% of the cuttings broke dormancy and continued to make vigorous growth throughout the spring and summer. The second winter the plants survive normal field conditions and breaking dormancy is not a problem.

A program for rooting *Cornus florida rubra* on a commercial basis would be as follows: Take softwood cuttings from the second flush of growth, in the Northeast this period ranges from June 21st to July 15th. Propagate under intermittent mist, using 1 part peat and three parts sand for the medium. Pot in 30 days or whenever rooted sufficiently. This insures a long period for the cuttings to reroot and become well established before the overwintering period. After potting or in the fall place the cuttings in a cold frame in which you can maintain the temperature above freezing but below 45°F.

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MODERATOR MEAHL: Thank you, Charlie, for this interesting discussion. We will have a few minutes for questions and discussion.

MR. CASE HOOGENDOORN (Hoogendoorn's Nursery, Newport, R.I.): If you make the cuttings between June 21 and July 15, then you don't wait until growth stops. Is that correct?

MR. HESS: We purposely take them when they are soft and when there is actually some elongation taking place.

MR. HOOGENDOORN: Will you describe the resistance rod you mentioned in the discussion?

MR. HESS: It is similar to lead covered heating cable and is placed around the sides of the frame. The purpose is to keep the air temperature from going too low.

MR. CARL GRANT WILSON (Cleveland, Ohio): What root-inducing material did you use?

MR. HESS: The first year we did not use any material and obtained about 92% rooting. The second year we used Hormodin No. 1. The percent rooting was about 95, but the cuttings were more heavily rooted.

MR. ROGER COGGESHALL (Arnold Arboretum, Jamaica Plain, Mass.): Was there any relationship between the over-winter survival and the continued or new growth of the cuttings the previous summer under the mist?

MR. HESS: With the dogwood there was no indication of any relationship of this sort. However with Japanese maple there is some indication of this.

MR. COGGESHALL: We have stored cuttings comparable to yours which were rooted in the case. They did not make new growth and were all dead in the spring.

MR. ARTHUR W. PARRY (Parry Nurseries, Signal Mountain, Tenn.): What advantages does this method have over grafting or budding?

MR. HESS: We feel you can propagate by cuttings more quickly and economically than by grafting but not than by budding.

MR. PARRY: Isn't over-wintering quite a problem compared to budding?

MR. HESS: That is why I didn't say budding. In the South a nice plant is grown from budded material. In the Northeast, where I haven't seen budding done successfully, you don't get the growth you do in the South. Certainly the costs are much less than grafting because it is not necessary to maintain a greenhouse, you don't have the cost of grafting, and you don't have to raise the understock.

MR. JAMES S. WELLS (Bobbink Nursery, East Rutherford, N.J.): Did you wound any of the cuttings?

MR. HESS: No, we did not. In many instances there were only four leaves on a cutting and we didn't cut them off. We made a slant cut on the base and stuck them in the medium.

MR. HOOGENDOORN: Where was the basal cut made?

MR. HESS: We tried them both under and above the node. We found in some cases we make a little more rooting above the node. It wasn't worth while to take the trouble to try to select the cut.

MR. WALTER PEFFER (Level Green Nursery, Trafford, Pa.): What soil mixture did you use to pot the rooted cuttings?

MR. HESS: It was a mixture of two parts top soil, one part sand, and two parts peat moss.

MR. ROBERT SIMPSON (Simpson Orchard Co., Vincennes, Ind.): Why isn't budding a success in the north and east?

MR. HESS: I don't know. I haven't done it myself.

MR. WILLIAM FLEMMER III (Princeton Nurseries, Princeton, N.J.): I would say that budding is not a failure in the Northeast. It has been very successful with us.

MR. HARVEY GRAY (Long Island Agric. & Tech. Inst., Farmingdale, N.Y.): It has been our observation that budding turns out to be a failure because of the improper timing of the operation. Now in the case of budding dogwood, there is a rather critical period when the stock is right and when the bud is the right size to do the work. If you are a bit ahead of time you will find that the stock will push the buds out. If you are late, you will find that callusing is poor. It is a matter of careful timing.

MR. GEORGE T. HOYSIC (Hoysic Bros. Nursery, Rochester, N.Y.): We are located in the same area as you. In the first year, our budded plants make up larger than those cuttings. During the second year, they make excellent growth.

MR. HESS: I am not going to argue cuttings against budding. What I am trying to argue is cuttings against grafts. As I said, I am presenting what is more or less the standard procedure of grafting dogwood.

MR. JAMES ILGENFRITZ (Ilgenfritz Nurseries, Monroe, Mich.): I would like Harvey Gray to tell us how he tells when the understock and the scion wood are ready for budding, and I would also like to have him say a few words about irrigating the understocks before and after budding.

MR. GRAY: In answer to that question, it is a matter of chance to a certain degree. I think the details would be similar to apple. If the bud can be readily seen and taken hold of, it is probably the right stage. Get the buds from the flower portion of the bud stick, but not way down at the very bottom because at that point, the buds are in a tight state and with a latent tendency. As you come up the stem, they are of a larger size. In the mid-section of the bud stick are the ones, which, in our experience, have proven to hold on the understock when inserted.

If the understock is cut much before the latter part of August or the early part of September, in which you are going to attempt to insert these buds, you will find the growth of the understock will be quite rapid, and it will push the buds out, and the buds at that date are not too well developed. Or, to put it another way, try to hold off the budding as late as you possibly can. Still you must have the wood so it will slip, and doesn't hold too tightly, or you can't get your cut to open up.

Now, in relation to the irrigation practice, again there is one thing that you have to watch out for, for if you have too much moisture in the soil the chances are you will tend to keep plants actively growing too long, and the action of the cambium will split out the bud and push it

out. Sometimes the wood may be perfect, but the understock may be growing so fast it will push the buds out.

If you have any control over the moisture of the soil, through irrigation, that is the thing to watch out for. In other words, don't irrigate in advance of inserting the buds, but do it when the wood is more or less on the firming up side, but the wood will slip.

MODERATOR MEAHL: We will have to close the question period on this topic at this time, but we should give Charlie a good hand here for his presentation. Thank you very much, Charlie.

Our next exhibit about which we will have a discussion is one having to do with the effect of the length of day on the growth of plants, and this, as I mentioned earlier, is work which has been done by Sidney Waxman, a graduate student at Cornell University. Unfortunately Mr. Waxman was unable to be here, but his work and his paper will be presented by one who is well qualified to do so—Dr. J. P. Nitsch, who is Assistant Professor of Ornamental Horticulture at Cornell. He has been there since September, following Bill Snyder's move to Rutgers.

Dr. Nitsch comes to us from France, receiving his undergraduate, as well as some of his graduate work in France. He took graduate work in this country at the California Institute of Technology under Dr. Went, and, after that continued postgraduate studies at Harvard University. He comes to us, then, with a very fine background and he is going to present to us the material of Mr. Waxman on photoperiodism.

DR. J. P. NITSCH: I won't be able to present his work entirely. I am here for the first time, and I am not a nurseryman and most of the things you are talking about are new to me, but very interesting because I am interested in the ultimate mechanism of propagation and plants. I am not going to read the paper, just try to summarize it.

. . . Dr. Nitsch read Mr. Waxman's paper on "The Effect of the Length of Day on the Growth of Woody Plants." (Applause)

THE EFFECT OF THE LENGTH OF DAY ON THE GROWTH OF WOODY PLANTS

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It was as far back as the year 1686 that the length of day was observed to effect the growth of plants.

Between 1890 and 1905 many workers used arc lamps to determine the effect of additional light on the growth and flowering of various greenhouse plants.

Garner and Allard in 1920 carried out a great amount of research proving definitely that long days and short days effected the growth of many herbaceous plants in different ways.

The name they gave to this daylength effect was Photoperiodism.

To cite an example of the effect of the "photoperiod" one can use the chrysanthemum. It will keep growing all summer when the days are