MR. VAN HOF: In the latter part of September the wood is still green, doesn't it bend when you stick it in the ground?

MR. WORTH: Oh, no, they are not that soft.

MR. VERMULEN. Do you have any trouble with the cuttings heaving out of the ground during the winter?

MR WORTH: This is a good question. They might heave out as much as one half of their length. We hire some schoolboys to put them back. They can put 100,000 cuttings back in the ground in a day.

MR HOOGENDOORN Did you ever try putting on a mulch after you get them stuck?

MR. WORTH: No. I have thought a lot about it.

MR. LOUIS SAUR: Have you tried making your cuttings and putting them in different kinds of soil, other than the sandy loam you described?

MR. WORTH: No, I have never tried it on any different type of soil.

MODERATOR HALWARD: Thank you, Mr Worth

The next speaker on the program needs no introduction. Those of you who were on the tour the other day saw him and what he has been and is doing The next paper is on "*Magnolia* and *Viburnum* from Hardwood Cuttings," by J Ravestein.

Mr Ravestein then presented his talk on the "Rooting of *Magnolia* and *Viburnum* from Hardwood Cuttings." (Applause)

ROOTING OF MAGNOLIA AND VIBURNUM FROM HARDWOOD CUTTINGS

J. RAVESTEIN
Gerard K. Klyn
Mentor, Ohio

We collect our magnoia cuttings from old plants which we have been using for a number of years to produce layers. We take the current season's growth which shoots up in the middle of our plant. The length of these cuttings doesn't matter and we cut them nearly any size. The longer these cuttings are the better, since through the years we have run our tests it has been shown that the stronger and longer the cuttings are, the better the percentage of survival you have, that is, if you have any at all.

The wood for our viburnum cuttings is taken from plants which have been budded the previous year. One such plant is *Viburnum carlesi*. Here also we prefer the longer cuttings. If I may go off the subject for a moment I would like to note that we have also in our tests the Japanese maples, Purple beeches, and the Cutleaf red maple.

We take our wood as soon as the dormant stage sets in, that is, in our part of the country, around the beginning of November In some years we have to take the terminal leaves off. After cutting they are brought into the greenhouse where we have an average temperature of around 70° F. We keep them in the greenhouse for about two days before they are made up. As I stated before, our cuttings are quite

long and we make a practice not to cut the tops at all. The reason for this will be evident later in this discussion. We give each cutting a side cut, that is, we wound it, and the cuttings being of considerable length our wounds average from two to three inches in length. All our cuttings are cut at the bottom above the first eye. The side cut is made rather deep, in other words is heavily wounded. These cuttings then are dipped in 2% indolebutyric acid powder.

I don't know what your reaction will be after I am thru talking about this procedure, but our tests are run different than any that I know of. Some may think that our way is old fashioned and maybe it is, but it seems to be the only way we get results. I hope that there are some of you here who have run similar tests so that we might compare notes later. At the warmest place in the greenhouse we reserve enough space to contain the anticipated number of cuttings we have taken for this experiment. As you all know, there are places in heat controlled houses that are warmer than others. We take out of the bench whatever rooting medium we have previously used and start by putting about 2 to 2½ inches of peatmoss in the bottom of the bench. This peatmoss is then moistened. On top of the peatmoss we place a thin layer of clean sphagnum moss which is also moistened. Our cuttings are then placed on top of this and by placing, I mean we lay them side by side making sure that the cuttings do not touch one another. On top of the cuttings we place a heavier layer of sphagnum moss which in turn is covered with peatmoss to a depth even with the top of the bench. We make certain that nothing is stored or placed upon this portion of the bench until we have completed this part of the experiment Once we made the mistake of placing some flats on top of this and the results were nil. We also make sure that no water is sprayed on them, since we feel that the moisture is high enough without adding any more. After about 3 weeks we plant our rooted cuttings. At this time we find that almost every one of them will show some sign of root formation and some will have roots one-half inch or longer. It is here that our trouble begins. We know that by having these cuttings for a length of time in the dark and at the same time very moist and warm that they should be handled with utmost care. Consequently they are handled very carefully, being planted in a mixture of peatmoss and sand in the best location of the bench space available where we will not disturb them until planting time arrives. Three years ago we had a perfect stand, but since then our results have been very poor.

Now you may ask why don't we do this process later in the season than November? We have tried this process at later dates and have come to the conclusion that the later you start, the faster the buds develop on your cutting. Because of this, root action is retarded to the point where your stand suffers at the beginning instead of dying later on. We all know that when a cutting starts growing on the top before root formation has started, the chances for a good percentage of survival is very small. In other experiments we have tried storing cuttings taken at various times in cold storage. The length of storage was also varied. Cold storage cuttings do not give as good a percentage of liveability as when they are used as previously described. From this description you see that we have tried in every way that we can think of

to obtain a satisfactory stand By a satisfactory stand I mean at least a 80% or 90% take

Field results are not conclusive, although after being planted out for one year there was no noticeable top growth but the root system showed considerable increase, thereby giving a good foundation for future development of the plant

I hope I have been able to offer information that will be of some benefit to all, because there is nothing more rewarding than starting out with an experiment and through trial and error come up with satisfactory results I wish to thank you all for the attention given and I am looking forward to answering any questions you may have during the discussion period

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MODERATOR HALWARD. We have time for a few brief questions.

MR. WALTER GRAMPP: Have you tried anything other than 2 per cent IBA?

MR. RAVESTEIN Yes

MR. SAUR: Do you think you get more root growth by having a long cutting than you would from a shorter cutting?

MR. RAVESTEIN. Definitely The bigger your cutting, the better rooting you have I don't believe in small cuttings.

MODERATOR HALWARD· That will be all the questions on hardwood cuttings. I believe Mr. Cumming has slides that he brought with him, and we have had some requests to show these slides. We will work them in now, before our last speaker of the morning.

Editor's Note: Mr W A. Cumming showed and discussed a number of colored slides which brought out particular features of his foregoing talk.

MODERATOR HALWARD. We are right on schedule, fortunately, and the last speaker of the morning is Mr. Hans Nienstaedt, Lake States Forest Experiment Station, Rhinelander, Wisconsin. He received his education at the Royal College of Agriculture at Copenhagen and at Yale University I present Hans Nienstaedt who will talk on "Fall Grafting of Spruce and Other Conifers."

Mr. Nienstaedt then presented his address on "Fall Grafting of Spruce and Other Conifers." (Applause)

FALL GRAFTING OF SPRUCE AND OTHER CONIFERS

HANS NIENSTAEDT
Lake States Forest Experiment Station
Rhinelander, Wisconsin

We in forestry are novices in the field of propagation, while you have been at the game for centuries. We have had to look at the experience gained in horticulture for the fundamentals to use in the propagation of our plant material. However, since our work schedule, our plant material, and our objectives often differ from yours, our approach to problems have sometimes followed new directions and have