

did not root well. Would it not have been better than making them in July to have made them in May?

MR. FILLMORE: That is quite possible. I can't say I know, really. That is quite possible. You see the April second cuttings rooted fine, too, and of course, they would only have last year's growth.

PRESIDENT CHADWICK: I am going to ask you to hold the rest of your questions until the Friday evening session when we will have a discussion period.

You will recall last year we started an exhibitor speaker session at these meetings, and that appeared to be very successful. Consequently, we decided to continue that arrangement this year. Some of you may have had an opportunity to see some of the exhibits which are in the lounge room at the other end of the hall. If you have not, be sure that you do see them before you leave here. The man responsible for these exhibits and the panel symposium is Mr. Roger G. Coggeshall of the Arnold Arboretum. I would like to introduce him at this time and he will carry on the afternoon session.

Mr. Roger G. Coggeshall took the chair.

MODERATOR COGGESHALL: Thank you very much, Dr. Chadwick.

It certainly has been a pleasure for me to correspond during the past two months with the large number of persons who have contributed material for the exhibits.

Today, we are going to have seven speaker-exhibitors. In addition to these seven speakers, there are some ten other persons who have set up exhibits for this meeting. Any questions concerning these exhibits should be asked directly of these people who have them set up, as they will not speak from the platform today.

As you can see by your program, there will be four talks this afternoon and three tonight.

In general, we are allowing two minutes for an introduction, 15 to 20 minutes for the actual talk and approximately nine or ten minutes for a question period.

The first speaker of the afternoon is Mr. William Flemer III, Princeton Nurseries, Princeton, New Jersey. Mr. Flemer will speak to us on the "Propagation of *Mahonia aquifolium* from Softwood Cuttings".

PROPAGATION OF MAHONIA AQUIFOLIUM FROM SOFTWOOD CUTTINGS

WILLIAM FLEMER III
Princeton Nurseries, Princeton, New Jersey

Ladies and gentlemen, fellow propagators: You may wonder why I have chosen the subject of "*Mahonia aquifolium* From Softwood Cuttings", because as is generally known, *Mahonia* grows very well from seed, almost as well as barbery. You simply level off a piece of land, break up the soil, spread the seed in a suitable manner, cover with sand and wait until spring, when up they will come by the thousands.

The reason for vegetative propagation of this variety lies in the tremendous variability of the seedlings and this talk should perhaps better be a talk on selection rather than on propagation.

It seems to me one of the most important functions of the propagator in any nursery, because of his peculiar position of working closely with the plants themselves and observing them from day to day in the field, should be that of selecting better strains of each and every kind. As most of the better strains that are selected do not breed true from seed they have to be propagated vegetatively.

I brought some examples here this afternoon to show you some of the variability of *Mabonia* seedlings and to bring out the characteristics which I think are worthy of selection and worthy of the extra expense of vegetative propagation.

As you know, *Mabonia* seedlings vary in their habit of growth. Some are incompact growers, some are compact bushes, some are tall and shiny and some have a lot of foliage while still others are sparse.

Poor quality plants from a lot of seedlings will have rather dull, papery leaves, subject to windburn and sometimes partially deciduous under winter conditions.

The type of seedlings which we consider worthy of propagation have bigger leaves, better fall coloration and a shiny, waxy appearance. Naturally, we select not only for the glossiness of the foliage, but for growth habit, too. You want a plant that makes up rapidly into a nice compact rounded specimen.

Still another important variation in *Mabonia* is the resistance to winter burn, particularly in our location on the east coast where we have in the months of February and March, a combination of frozen ground and hard driving winds which dry out whatever moisture is in the plant.

In general, the waxier leaf you select, the more resistant that leaf is to drying-out.

One of our selections has a little different leaf habit. It has a leathery leaf - *Mabonia bealei*. This particular clone has come through winter relatively undamaged in our most exposed nursery blocks. That is an important point when growing *Mabonia*.

As far as the actual propagation is concerned, it is a very simple matter indeed. The long *Mabonia* cane can be cut up into a number of cuttings, but we found the terminal, the first cutting from the tip, roots much more readily and gives a better percentage than additional cuttings made down the length of the cane. In other words, there may be anywhere from 4, 5, or 8 leaflets. They are removed and just the last two are left intact.

The cuttings are then cut just below a node, or sometimes through the node. We don't scarify them or wound them in any way. They are put into Hormodin No. 3 and stuck in sand in a humid greenhouse under controlled conditions.

We try to get the cuttings in before we have a severe frost. Anywhere from the 1st to the 15th of September is about right. If you take them earlier than that, you have a high percentage of rooting, at least under our conditions, and later than that there may be frost injury which causes them to break down later in the bench.

A cutting stuck the 15th of September and removed from the sand just before I came here, it is now thoroughly rooted, almost rooted too much. It is ready to be potted.

There is one additional advantage in making mahonias from cuttings. The root system is highly branched in contrast to the average seedling, which has a taproot with very few feeder roots. If you plant a seedling without cutting back the roots sufficiently you tend to get a sparse, straggly-root system which is not adapted to balling.

Our losses in balling from seedlings, which we have grown and dug, have run sometimes up to 15 or 20 per cent. The customers complain that the plants didn't live and when they send them back we see they had too sparse a root system. With cuttings the little roots grow out and form a nice bushy root system. This way our replacement losses on cutting-grown plants is much lower indeed than with seedlings.

The production cost of a seedling is at about five cents apiece, perhaps a little better - three and a half to five cents apiece. The cost of producing a cutting and potting it, then planting it in the field and picking up the pots, is about twelve and a half cents apiece. It may be fourteen cents apiece, but when you consider the amount of losses avoided and the fact that the plants are more immediately saleable, the advantages of vegetative propagation become heavy.

This is a very small subject and not worth going into too extensively, but I will be glad to answer any questions. (Applause)

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MR. JACK HILL (D. Hill Nursery Co., Dundee, Ill.): Have you made an effort to select one plant or a limited number of mahonias that you feel best or do you simply lift your seed lines and select the ones that appear best?

MR. FLEMER: That was the way we did it at first. That gave us a large number of plants. We transplanted them and grew rooted cuttings from them checking on the rooting percentage, which varied a good deal. Some rooted considerably easier than others. Now we have groups of 20 or 30 different clones, each of which is held separately. We are currently engaged in cutting down those to still fewer. What we would like to get is one ideal mahonia which we don't intend to sell at any premium.

MR. CONSTANT DE GROOT (Sheridan Nurseries, Sheridan, Ont.): Do you prefer glossy leaves over the dull. I came across a dull-leaved one which with us is the only *Mahonia* that doesn't lose its leaves during the winter.

MR. FLEMER: That was an exceptionally hardy seedling. Our experience is the more glossy the leaf the better it comes through. You can probably get hardy ones among the dull ones, but why propagate them since they aren't as saleable as the glossy ones?

MR. ALBERT LOWENFELS (White Plains, N. Y.): You didn't make quite clear how many leaves you left on the cutting.

MR. FLEMER: We have left 4 leaf stocks on the top and trimmed the individual leaves down to two leaflets on each little stem. It could be

2, it could be 4, sometimes trimmed down to the stalk. They can be stuck close in the bench. You either have to stick them further apart, if they have more, or cram them close together and water lodges in there. It facilitates sticking.

MR. JACK SIEBENTHALER (The Siebenthaler Co., Dayton, Ohio): Did you give any indication of the percentage of rooting on those?

MR. FLEMER: No, I didn't, but 75 to 80 per cent rooting is good.

MR. CHESTER E. HUGHES (Cincinnati Park Commission, Cincinnati, Ohio): You mentioned taking the cuttings in September under controlled conditions. What were they?

MR. FLEMER: A tight greenhouse. We don't have a mist system yet, so we use more primitive methods to get humidity. We have a good tight greenhouse. A man goes through 3 or 4 times a day and sprinkles down the walk and wets down the pipes so we get high humidity.

DR. J. R. KAMP (University of Illinois, Urbana, Ill.): You didn't mention the temperatures you are trying to maintain in the greenhouses.

MR. FLEMER: The temperature of the greenhouse at that time of the year runs in the neighborhood of 75 degrees during the day, about 60 at night.

MR. HANCOCK: I would like to add one point. We have propagated one shiny leaf variety with perfect success and our experience corroborates what you have said. One thing we have noticed when we had a humidifier we got practically 100 per cent and as soon as we left the Mahonia cuttings without adequate humidity the leaves dry and get practically no rooting.

MR. FLEMER: That is right; you must keep the humidity high.

Another thing we found, not only with *Mahonia*, but with rhododendrons as well, is to take the cuttings and invert them before the final cut is made, dip them into some of the plastic materials, leave them upside down until they dry, and then make your cutting. If your greenhouse is dry, you can up your stand considerably by that extra operation.

MR. PARK (Magnolia, Pa.): Have you had any experience with rooting *Berberis Julianae* or some of the evergreen types?

MR. FLEMER: We root many every year. They are not the same genus but in the same family as *Mahonia* and they are just as finicky in their requirements. You have to take them when the wood has become firm, but before they get considerable frost damage.

MODERATOR COGGESHALL: I am sorry, Bill, but I am afraid I must interrupt you in order to go on. Thank you very much.

The next speaker on the program is Mr. Merton L. Congdon, Congdon's Wholesale Nursery, North Collins, New York.

Prior to my correspondence with Mr. Congdon I never realized that layering was practiced to any great extent in this country. Perhaps some of you did not realize this also. It is then with great interest, that I am looking forward to his talk. Mr. Congdon will speak to us on "Mass Production of Deciduous Shrubs by Layers".

MR. MERTON L. CONGDON (Congdon's Wholesale Nursery, North Collins, N. Y.): Fellow members and guests: I consider layering, next to the actual division of plants, about as simple a method of propagation as there is. In order to cover it most thoroughly and perhaps to avoid some questions later on, I prefer to read my talk. I have a limited number of slides which I will show at the conclusion of my talk showing the actual layering process and the results we get at the end of two years in the field with these layers.

MASS PRODUCTION OF DECIDUOUS SHRUBS BY LAYERS

MERTON L. CONGDON
Congdon's Wholesale Nursery
North Collins, N. Y.

When I was asked to present this talk on the mass production of layers, my first thought was that there are many nurserymen that are much better qualified to present this subject than I. However, at our nursery we have perhaps developed some methods that have speeded up the actual layering process to a point that they may be worth presenting here.

In this discussion we are going to touch upon the following topics:

- History
- Types of Stock
- Row Spacing of Beds
- Soil Type
- Time of Layering
- Procedure
- Follow-up
- Gathering
- Costs

HISTORY: Some history of my experience is necessary to present this subject properly. Prior to 1940 when my brother and I were operating the H. E. Congdon Nursery we were concerned only with the propagation of small fruits. It was at that time that we were approached by Mr. Ralph Lake and Mr. Bert Lake of the Shenandoah Nurseries, Shenandoah, Iowa about the possibilities of growing deciduous shrubs for them in our favorable climate and soil. At that time they were concerned most about a good source of *Hydrangea A. G.* and *P. G.*

At first we bought all of our lining-out material or Lake's had it sent to us. We noticed that in every case, layers produced better stands and growth than liners produced from soft wood cuttings. Liners grown from field grown hardwoods did better yet but we soon found that this method was unpredictable and expensive. We had considerable experience with tip layering of raspberry and felt that layering of deciduous shrubs was the field where we should start.

Armed with that information we set out to find the best method of establishing and maintaining a layer bed. It is at this point that I should give