SATURDAY MORNING SESSION

December 5, 1964

The Saturday morning session convened at 9:15 a.m. Mr. Judson P. Germany, Jr., Germany's Nursery and Landscape Co., Fort Worth, Texas was moderator.

MODERATOR GERMANY: Our first speaker this morning is Dr. Gustav A. L. Mehlquist from the University of Connecticut.

SOME POINTS TO CONSIDER IN THE BREEDING and PROPAGATION OF RHODODENDRONS

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Most nurserymen who have tried to carry a reasonably complete line of Rhododendrons and Azaleas have probably found, first, that a fairly large number of varieties are required and, secondly, that in the Northeast at least it is difficult to obtain dependable varieties in each category. Assuming that one wishes to provide at least four colors say — red, white, pink, and blue (lavender) during the main flowering season, it would be necessary to have an early, a mid-season, and a late variety in each color. This alone would bring the number to twelve; and if one were to consider having each of these in a dwarf, a medium and a tall variety, the number would rise to thirty-six. One need only to be aware of the fact that there is considerable variation in texture and flower size to realize that a really complete assortment of varieties would be large indeed.

Unfortunately, it is difficult to find dependable varieties in all these categories. Of course, it is also difficult to define dependability accurately, but if with "dependable" one means a variety which will be bud and plant hardy in any winter regardless of when and where it is planted, very few varieties, if any, will meet the specifications. To make the nursery production of Rhododendrons profitable, nurserymen often attempt to obtain additional flushes of growth in order to produce a large plant in a relatively short period of time. It has been my experience that plants which have been given enough water and fertilizer in the field to make two flushes of growth in a season instead of the usual one are much less cold hardy than those which have made only one. This applies to both plant and bud hardiness. If, in addition, such soft nursery grown plants are planted in the garden in the fall, in a fairly exposed place with insufficient protection against wind and sun, the results are not likely to increase the sales of rhododendrons. It may be expedient for the wholesale nurseries to get their stocks distributed

to the retail outlets in the fall but, in that case, the plants should be held under protection until spring when planting can be done more safely.

With the variation in climate which exists in southern New England (and probably most other areas) from season to season, place to place and garden to garden, it is no wonder that nurserymen have tended to stick with those varieties and forms which show the greatest amount of hardiness regardless of other qualities. This desire to save replacement costs has resulted, in our area at least, in the use of large numbers of collected plants of *R. carolinianum, R. catawbiense* and *R. maximum* as well as seedling plants from the hardier hybrid clones. Together with the fact that some of the most desirable clones are difficult to propagate, this has led to a situation where many of the better clones are not readily available.

I do not mean to imply that it is necessarily bad to sell the public collected or seed grown plants of our native species whether it be *R. carolinianum, R. catawbiense, R. maximum* or what have you, but I do mean to say that the forms usually offered in this group often are uninteresting, to say the least, and not likely to enhance anyone's interest in the genus *Rhododendron.* This is unfortunate, for not only are these species in their best forms good landscape plants, but they are the backbone of any breeding program aimed at the production of really hardy rhododendrons.

Of course, if a good range of color and types were available at a reasonable price in perfectly hardy and dependable clones, there would be little interest in the ordinary forms of these species. Since this is not the case, the problem becomes one of improving the offerings in this group. Do not misunderstand me, I am not against the great effort now being made to produce better hybrid clones, for actually I am one of those working with this problem, but this will require a good deal of time. Efforts to raise the quality of seed-propagated plants will not only help to fill a void but will also help to hold the public's interest in this remarkable genus until suitable clones are generally available. It is with this objective in mind that the following notes were prepared.

When a population of plants is raised for the purpose of using the population as a whole rather than for the selection of a few to be propagated as clones, it is generally desirable that the population be relatively unform and, of course, of sufficient overall quality to be used as a whole. To produce such populations two conditions must be met. First, the genotypes of the parent plants must be such as to be capable of producing the required quality. Generally speaking, the higher the quality of the parent plants the higher the likelihood of obtaining high quality progeny. The old proverbs "like begets like" and "the apple does not fall far from the tree" are indeed based on factual observations. Homozygosity, on the other hand, is harder to come by; and complete homozygosity probably never obtains, but

ordinarily species come closer to homozygosity than any hybrid. Consequently, crossing two species or a species to a hybrid is more likely to produce a reasonably uniform group of plants than any combination of hybrids. Picking the right parent to produce whatever the objectives call for requires experience and knowledge. Probably no one hits the jackpot every time, but close attention to available information and good judgment help to insure success. In this connection it should be pointed out that good judgment is usually nothing but paying close attention to the nature and behavior of the available parent material and acting accordingly. With behavior I mean not only the individual behavior of prospective parents over several seasons but also the results from crosses, for in breeding work a good parent is one that produces good progeny. If combinations of the worst looking rhododendrons in the world produced good progeny, they would have to be considered good parent. Fortunately, the objectives and circumstances limit the choice of prospective parent plants considerably. For instance, if the objective is to produce a population hardy enough to be grown in the Northeast, there are not many species that qualify. Among them, however, are three American species, *R. carolinianum, R. catawbiense* and *R. maximum* all of which are good parent species provided the right forms are used. Since lepidotes *do not ordinarily cross with elepidotes*, *R. carolinianum* is at once seperated from the other two, both of which are elepidotes. If, in addition, wind and heat resistance is desired in the progeny, *R. catawbiense* is to be preferred since it is superior to *R. maximum* in this respect. On the other hand, if late-flowering hybrids are desired, *R. maximum* is superior to *R. catawbiense.* Needless to say, the best form of the species should be used or rather the one best suited to the objectives of the cross.

Selecting the hybrid parent is more difficult, and it pays to obtain as much information as possible pertaining to cultural characteristics, breeding behavior, etc. Little is known about color inheritance in the genus *Rhododendron;* but the more that is learned from various other genera, the more apparent it becomes that certain results are the same for many different genera. Thus, in general, if both parents are of the same color, all or most of the progeny will be of the same color, the remainder being usually recessive forms. If, on the other hand, the two parents differ widely in color, the progeny may be intermediate, like one of the parents, or different from both. Recessive forms (dwarfs, albinos, light-colored flowers, etc.) often give the same results in cross-breeding as the normal forms since the recessive genes of one parent may be counteracted by normal genes of the other. A most striking instance of this is when two pure-breeding albinos produce nothing but colored

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* **lepidotes,** scaly-leaved rhododendrons
elepidotes, non-scaly-leaved rhododendrons

progeny when crossed, due to complementary action of the genes.

To illustrate some of the principles set forth above, let us consider a few crosses to meet certain objectives. Since red-flowered Rhododendrons are so much in demand today, let us start with this color. There are no really red hybrids dependably hardy for this Northeast area, but there are several such as 'Mars,' 'Vulcan' and 'Jean Marie Montegue' which will survive in sheltered locations. The so-called hardy reds such as 'America,' 'Atrosanguinea,' 'Kettledrum,' 'Nova Zembla,' etc., are really deep pink or cerise. Any one of the three first named crossed to one of the reddish forms of *R. catawbiense* would be as good a bet as any. Although even the reddest forms of this species are not really red compared to the first named hybrids, they are nevertheless dependably hardy. The resulting populations would undoubtedly be highly colored, deep pink or almost red, of reasonably good habit and far superior to the commonly sold collected forms of *R. catawbiense* but perhaps not quite so hardy. A more highly colored progeny but somewhat less hardy might be obtained by crossing either 'Mars' and 'Vulcan' to such acknowledged standbys as 'Atrosanguinea,' 'America' or 'Nova Zembla'. Such crosses, however, would be likely to produce less uniform progeny, but the chances are that most of the plants would be saleable.

White-flowered progeny of good merit might be had by using one of the white forms of *R. catawbiense* such as 'Catalgla' or perhaps better 'LaBars White'. Since all the white forms of *R. catawbiense* that have been discovered to date have a rather poor growth habit, it would be advisable to cross them to hybrids of better habit though probably less hardy.

Likewise, bluish or lavender progeny might be had by crossing such hybrids as 'Blue Peter' or 'Purple Splendor' to a bluish form of *R. catawbiense* or to such hardy hybrids as 'Purpureum Elegans' or 'Purpureum Grandiflorum.' There are very few good pink-flowered forms of *R. catawbiense*, and most of them are not free from bluish overtones. If they are crossed to clear-colored hybrids they might produce some plants with muddy-pink flowers, but even so, the chances are good that the plants as a whole will be better than most collected plants.

Since most forms of *R. catawbiense* flower in mid-season, most hybrid progenies with this species as a parent will also tend to flower in mid-season. If a late-flowered progeny is desired, it would be better to use *R. maximum* which also is available in many color forms. 'Russell Harmon' allegedly a natural hybrid between *R. catawbiense* and *R. maximum*, and in itself a pretty good rhododendron, might also be of value in this connection.

R. carolinianum being a lepidote (scaly-leaved) does not cross readily with the elepidotes (to my knowledge only one such hybrid is known) and, as a matter of fact, it does not cross readily even with other lepidotes to give large hybrid popula-

tions. Since it can be grown to flowering size from seed in only three ot four years, selfing the better forms would be advisable. Many of the better forms of this species come relatively true from seed, and saleable plants can be produced very reasonably.

Dwarf and especially semi-dwarf rhododendrons are much in demand today, and although it probably will not be easy to produce uniform hybrid progenies of this type, it is well worth trying. There are compact forms of *R. catawbiense*, but, unfortunately, they tend to be of rather harsh colors. The hybrid 'Boule de Neige' is a good semi-dwarf which tends to transmit its compact habit to its progeny. Because some of its seedlings do not flower readily at an early age probably due to it being of *R. caucasicum* ancestry, this hybrid should be mated to something which tends to impart floriferousness to the progeny. A much heralded Japanese species *R. Yakusimanum* looks very promising, but due to its scarcity it has not yet been utilized to any extent except by people who are primarily interested in the production of fine hybrid clones.

There are undoubtedly many other Asiatic species which could be used in similar manner, but as yet I have not had sufficient experience with them to warrant making any definite suggestions.

What I have said about the typical rhododendrons might well apply to that section of the genus known as Azaleas as well but, since plants in this group normally produce larger numbers of cuttings, the incentive to grow large hybrid populations except for the purpose of producing new clones is not so great. However, some of the deciduous types are not so readily rooted from cuttings so their seed propagation based on the principles stated above might be advisable.

The question is often asked as to the direction in which a cross should be made. Although there are some authentic cases in which the results are different depending on the direction in which the crosses are made, by far the greatest number of crosses give identical results regardless of whether a parent is used as seed or pollen parent. However in practice it pays to take advantage of the fact that some forms of species and many hybrids produce pollen sparingly but set an abundance of seed when pollinated with good pollen. Thus, when 'Mars' and 'Vulcan', which I regard as good parents in the production of highly colored hybrids, are pollinated with pollen from many hybrids and species they will produce an abundance of good seed but when the pollen from these hybrids are used the result is much less seed. In other words some forms and hybrids are what the plant breeder would call good receptors but poor donors.

There are also instances when certain plants will not produce seed freely in combination with certain individuals of the species but will in combination with others regardless of the quality of the pollen. This phenomenon which is known as incompatibility occurs in the genus *Rhododendron* but is not wide-

spread enough to interfere seriously in the production of large hybrid populations as outlined above.

MODERATOR GERMANY: Our next speaker is a very erudite gentleman who recently, I understand, celebrated the 100th anniversary of his firm. This morning he is going to give us a talk on chemical weed control in seed beds, Mr. Tom Pinney, Jr.

CHEMICAL WEED CONTROL IN THE SEEDBED

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Hand weeding of seedbed areas is a costly operation. It will reduce our firm's profits this year by $4,435.13. This figure represents only the direct labor costs and doesn't include applicable overhead items such as social security, workman's compensation, group insurance, etc.

Our cost estimating system reveals some rather interesting facts concerning the cost of hand weeding our seedlings. Although our field inventory showed we had approximately 5,750,000 salable seedlings as of August 15th, 1964, past sales records and transplant production schedules indicated that we could expect to market or use only 3,450,000 of these seedlings. This represents just 60% of our original inventory! The difference is mainly caused by: a. over production of specific items due to lack of market forecasts, coupled with inadequate preparation and use of production schedules. b. destroying of desirable seedlings in the hand weeding operation. c. weed competition. d. winter kill. Since the field inventory includes one, two and three year old seedlings, the figure of 3,450,000 was developed with the assumption of one "turn" every 2½ years. Too often costs are developed, and then quoted, based on the total plants a nursery has to sell — rather than what will *actually* be sold or used.

If we include the overhead items applicable to this situation, we would need to add 7.0% to the direct labor charge of $4435.13. The figure would then amount to $4745.59. Since we estimated that we would sell or use only 60% of our inventory of 3,450,000 seedlings, the cost per 1000 plants would be $1.38 or approximately $1.40 per year. If the item is a two year crop — the cost would be $2.80 per 1000 and on a three year item — $4.20 per 1000 plants. This often represents 20% of the selling price. Looking at it another way, we have approximately eight acres in actual seedling production which means it costs us approximately $600.00 per acre, per year, to hand weed these areas.

Other than overhead, hand weeding is our most costly expense in the production of seedlings. Therefore several years ago it became apparent that we must consider a chemical weed control program for our seedling production. The development