SEDDLING PROPAGATION OF SOME BROADLEAF EVERGREENS AND DECIDUOUS AZALEAS

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INTRODUCTION

I must emphasize the word "some" in my subject title because our recent seeding experience has been limited itemwise in broadleaved evergreens to *Enkianthus campanulata palibini, Kalmia latifolia, Leucothoe catesbaei, Oxydendron arborem. Pieris floribunda, Pieris japonica,* and Rhododendron species and hybrids and such deciduous Azaleas as *calendulacea,* Exbury, Knaphill, Slocock Hybrids, Mollis Hybrids, *Mucronulatum, flavum, poukhanense, schlippenbachi,* Ghent Hybrids and *Kaempferi.* Since the methods used have been constantly successful for the past several years this paper will therefore generally center on methods rather than the science of growing broadleaf evergreens from seed. I hope that it will be of some benefit to you today as well as to subsequent readers. Interestingly it will treat practically the same broadleaf evergreen items as did the paper of Zophar Warner presented to this Society at Cleveland in 1954. (1)

WHAT TO GROW

Many of the species are considered to "come true" from seed produced from a parent that has been pollinated with pollen from the same species. In many instances the characteristics of the resulting progeny are remarkably identical. However in many instances there will result progeny with widely different characteristics though generally they can still be considered of the same species. These differences may be in leaf size or form, rate of growth, plant habit or shape, flower form or color, hardiness, disease resistance, etc. In a few instances selected "strains" have been inbred by being crossed repeatedly and over the years, with culls or rogues removed from the line, there has resulted a "strain" with acceptable fixed characteristics. These are called "line-hybrids'. Progeny resulting from the crossing of two species are called cross-breeds. I have mentioned that frequent variations occur. These when selected and propagated for perpetuation by asexual or other than sexual means are referred to as horticultural cultivars or varieties. Progeny produced from seed of these cultivars most generally yield plants unlike the parent and most often more like the original species from which the parent cultivar was selected. When two different species are crossed and produce seed the progeny are called "hybrids". Here again we find that progeny or seedlings produced from seed of a hybrid will not be identical to the parent. All of this may lead one to believe that seedlings resulting from cross-breeds or hybrid crosses are worthless. This is far from the truth for most of the cul-

tivars in use today originated in this manner. The great caution that must be exercised is to discard the inferior and keep only the equal or superior. Of equal importance, the parent cultivar name should *not* be applied to any of the seedlings produced from it. In other words, and I think it safe to say this, no cultivar will produce seedlings identical to it. Therefore unless the cultivar is reproduced by other than sexual means, the cultivar or variety name can not be attached to it.

SEED COLLECTION AND STORAGE

Producing seedlings starts with the collection of the seed itself. We maintain many stock plants from which seeds are collected. We also purchase seed from reliable collectors and accept seed from those who are interested in having seedlings produced from seed which they themselves have collected. Collection begins in the Northeast U. S. generally in September-October after the first fall frost. The seed pods then have turned from green to brown and have just about started to crack open. Timing is important since a lot of valuable seed can be lost if the pods open too widely before collection. The pods are picked carefully and placed in clean separate containers and labeled as to name, location and date. Cleaning is a tedious job. When distance or time are factors in the collection phase, we sometimes collect pods that are still green or have not cracked open sufficiently for easy extraction of the seeds. These green pods are placed in shallow cartons or flats and placed in the greenhouse. Care must be taken that no direct moisture falls on the pods. We have pipe framed greenhouses and so can place the cartons or flats up high where they will get plenty of light, heat and no direct moisture. This is generally sufficient to get the pods to open up. On rare occasions we place the pods outside on sunny days when the temperature is below freezing and in a position sheltered from wind. This often helps crack the pods but sometimes they have to be gently crushed to extract the seeds. Leach states seed may be collected in August, oven dried for 3 days at 100° F, extracted and sown immediately, with good germination. (2)

The actual cleaning is done with small sifters or screens. We have 6 of these each with different mesh screens. The seeds are run through these sifters starting first with the widest mesh and then successively down the line. The number of siftings depends on the size of the seed and the amount of dust present. When the seeds have been thoroughly cleaned they are placed in clearly identified screw top glass tubes or jars with caps screwed on tightly and stored in a refrigerator. Generally best germination occurs with current years crop but we have been successful with seeds up to 2 or sometimes 3 years old.

MEDIA FOR GERMINATION

All of our broadleaf evergreens and deciduous Azaleas are sown in flats. We used to follow a rather exacting procedure

in preparing our seed flats. We were aware that seeds sown in sphagnum germinate very well but we determined subsequent growth would be restricted unless nutrients were later added. A fair percentage of our flats are sold throughout the summer and fall and even into winter when customers find they have some spare greenhouse space that they want to utilize profitably. The combination germinating-growing medium we used permitted us to sell or transplant a strong healthy growing seedling without any subsequent fertilization rather than one that has germinated and then marks time until transplanting. The first step in preparation was a layer of coarse peat on the bottom of the flat. This was leveled and lightly tamped and a tablespoon of Agrinite sprinkled evenly over the entire flat. Next came a layer of growing medium which for us is or is supposed to be ⅓ Birdsboro silt loam which has been treated with Methyl Bromide at the rate of 2 lbs. per 100 sq. ft. (approximately 50 cu. ft.), ⅓ granulated sphagnum peatmoss and ⅓ fine horticultural grade Perlite. However we most often wind up with more peat and perlite than soil, perhaps 20/40/40 rates in the order previously given. Various combinations, even pure peat and/or pure leaf mold can be used. The flat was filled to about full and the medium settled, especially around the edges, and then leveled to about ¼ inch from the top. Over this was screened through a ¼ inch mesh screen more growing medium to a depth of about ½ inch. This was leveled and then firmed in by pressing it down with a broad flat stick. When finished the medium was just below the rim of the flat on the edges and mounted up about ¼ inch toward the center. The next step was to screen a thin layer of dry German peatmoss over the medium. Using a 12 x 12 mesh screen the dust was first removed and discarded. The remaining peat was then gently forced through the screen by rubbing. This formed a very nice spongy surface to accept the seeds.

That was how we used to do it. What a lot of work! Our medium now is simply pure Wisconsin milled sphagnum moss which in the trade is called 'Nodampoff'. It comes in 8 lb., 2 bushel sacks. A sack fills about 7 of our shallow flats for a price per flat of approximately 50c, labor and flat price excluded. Our flats are still 12 x 19 but only half as deep (1¾") as a standard flat. This saves 50% on medium cost and we find it completely satisfactory.

The moss it moistened with water to the point where if squeezed hard in the hand it should drip only slightly. It is then very firmly packed into the flat taking great care that there are no air pockets of 'soft spots'. A stick the width of the flat and about 2-3 inches wide is used to press the moss in. The fingers are used around the outer edges of the flat. Care is taken to see that moss level at the center of the flat is higher than around the edges, sort of gently mounded. The first two years that we used milled sphagnum in shallow flats we

used Peters soluble liquid fertilizer 20-20-20 and had to irrigate rather frequently. This year in our second sowing the flats purchased were inadvertently deeper by about ¼ in. We found the seedlings grew twice as large without any fertilization whatsoever and required less frequent irrigation. We are wondering if and how the extra ¼"made the difference.

SOWING THE SEED

Some weeks prior to anticipated sowing date we run germination tests. This is very important since it dictates the thickness of subsequent sowing. We strive to produce in a 12 by 19 inch flat approximately 300 to 500 seedlings. The number is determineded by the ultimate size the seedlings will obtain prior to the first transplanting. The larger leaved sorts are generally limited to 300 to 400 and the smaller leaved sorts to 400 to 500. Some exceptionally fine seeds are difficult to manage even though we premix these small seeds with extremely fine particles of sand. This acts as a carrier or in other words dilutes the amount of seeds in the sowers hand or vibrator if you use one. We do not. Dad is the sowing expert and does a remarkable job in getting just the right amount of seed in a flat using the index and middle finger of his hand. The seed is caused to a run down the little valley formed by the two fingers by a sweeping shaking motion of the hand. Several passes over the flat are used in preference to trying to get an almost impossible even sowing with one attempt. Even so sometimes with the tiny seed sorts we'll wind up with as many as 600 or 700 seedlings in a flat. The seeds are gently pressed into the surface using a broad flat dry stick, again the width of the flat and 2-3" wide. At this time the flats are watered with Morsodren (¼ tsp. per gal.). We use a small watering can with a fine rose and go over the flat at least two or three times to assure a thorough soaking. Seed can also be sown in outdoor frames in late spring but since one has very little control over the seed's environment during germination we do not follow this practice. The time to sow will depend largely upon your own schedule. We prefer to start transplanting about the first of April so that the transplanted seedlings can be grown outdoors through the summer and be of sufficient size and vigor that they will be able to remain outdoors the next winter with protection. I will explain that a bit later. We therefore start first sowings in mid-December filling up the space available. A second sowing is made in March generally for summer and fall sale.

GERMINATION AND CARE

The finished flats are placed in deep benches in the greenhouse and covered with glass sash or clear polyethylene. The poly is about 5" above the surface of the flat. The greenhouse is covered with 6 mil polyethylene and 52% polypropylene shading. The shading is removed in January or February. We

try to maintain 70 degree day and 60 degree night temperatures in the house while temperatures in the germination bench run about 75 to 80 degrees. When we used sashes these were lifted each morning to remove condensation which might cause drip spots. If the house temperature was too low this was delayed to later in the day. This we called dripping the sashes. Now with polyethylene cover we do the same except that the sections of poly are lifted instead of the sashes. The poly is fastened to the bench side at the rear. In the front it is allowed to hang over and weighted with 1″ x 2″ wooden strips. Each section is 10′ long and overlaps at the edges. The strips can be hung on the greenhouse rafters when desired to permit easy access and working in the bench and also to ventilate. At this time the flats are checked and watered if necessary using a Fogg-It nozzle on the end of the hose. Germination occurs in about two to four weeks depending on the subject. Now comes a critical period when the germinated seedlings are given a little more air each day. This continues until it is determined that the poly can be left up all day, however it is generally put down again at night for the next few days especially on real cold nights when house temperatures can not be maintained. After a number of days of this treatment the flats are removed from the case, the poly removed and, using wooden stringers over the benches, the flats are placed on top of the benches where they will be subject to more air circulation and more light. We continue using the Fogg-It nozzle for watering.

Greenhouse ventilation is accomplished using the fan and perforated poly tube system. The system is operated every day if possible to effect a complete change of air. This reduces the chance for occurance of *Botrytis* Leaf Blight. When blight spots are noticed we dust them lightly with Fermate using a small hand duster. As a precaution the entire house is lightly dusted occasionally. The whole process from sowing to transplanting takes from three to four months although some sorts could be transplanted earlier if necessary. Broadleaf evergreens in general are responsive to photo period treatments and we have treated some of the very slow growing seedlings like *Kalmia latifolia, R. keiskei, R. racemosum, R. smirnowi,* etc., to hasten growth so that they could be transplanted along with the others.

TRANSPLANTING

Transplanting starts usually in late April or early May. We try to get it all done in a matter of 4 to 6 weeks if possible. The earlier the better even though some of the tiny seedlings are hard to handle. Women and girls are exceptionally adept at handling the transplanting and have the patience required for the job. At the time of pricking off the seedlings are graded and planted in the same sized flats (12″ x 19″) but 3″ deep. The smaller ones can be spaced 70 to a flat, the larger ones 40. We find potting fits our program much better how-

ever and so the graded seedlings are potted into 2¼″ Jiffy pots and also placed in flats, 40 per flat. (Medium used is that discussed earlier.) The finished flats are placed in a heated mist house where they receive intermittent mist as required. Temperatures remain about the same — about 70/60.

SUBSEQUENT CARE

After about two to three weeks they will have sufficient root attachment. After all danger of frost is past they are removed to Saran or poly propylene, the latter preferred, covered houses with about 50% shade where they are grown on until sold or are again transplanted. Prior to first fall frost these houses are covered with 6 mil white polyethelene which stays on until the last spring frost. These houses are simple but practical. Our first five were inverted 'V' or some say 'A' frame although we do not have the cross member. The bars are nailed to railroad ties laid on the ground and spiked together at the ends. This is classified as a temporary structure which is quite important in the urban areas where growers are confronted with strict building codes. They can be made any length. We chose 99′ to accommodate the commercially available 100′ lengths of poly. However new tapes and adhesives or a generous overlap make any length desired practical as so dramatically pointed out by Dick Vanderbilt last year in Newport. (3) A 13′ width is working well for us. We now use ¾″ EMT or thin wall conduit, with 2 10′ lengths formed into a bow and fastened at the top. The material cost is slightly more than wood, considerably less than pipe and a lot easier to erect.

Irrigation is accomplished with 10 Buckner Midget Rotary Sprinklers #1124-1 suspended from an overhead main. The water dispersion and rate of application are almost perfect. We fertilize with Peters Soluble 21-7-7 and 20-20-20 intermittently using a GEWA proportioner and a hose. Fertilization can be accomplished through the irrigation or by dry broadcasting. Seedlings are ready for bedding or canning in one year. If put in larger pots or spaced more widely in flats they could stay 2 years in the poly houses, then transplanted, even directly to the field.

I won't go into the growing on phase as this would exceed my time limit and my topic assignment which is "propagation". I believe I have said more than Zo did in 1954. That in itself is an accomplishment. I hope it has been said as well and is as meaningful.

LITERATURE CITED

1. Warner, Zopher P Azaleas From Seed Proc IPPS 4 137-139
2. Leach, David G Rhododendrons of the World: 352 1961
3. Vanderbilt, Richard T A Low Cost Overwintering Structure Proc IPPS 16 238-241.