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About the Institute

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

ngalen copy - double space - felled work sheet style For the amateur working without heated greationse facilities a comparable apparations There is no advantage in soving agalea tech before moderately warm weather. In the neighborhord of wash for DC this may be late march or mid April according to the season. Germin at in is somer than under greenlinsse emditions and may spread wer a longer period before it is complete. The young seedings will be conspondingly slower in diveloping true leaves As under greenbronce and trons it is possible to strut priding me the seedlings into transplant flats as som as the winner cares to begin the work, but the writer has found more data y dung Invitalté forme panjicak Doedmerration there were 3 or 4 good leaves before beginning.
If it is possible or do all complete this peration
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work touch as was possible for the writer, the your plants develop more uniformly. In transplanting the worker new rul muche any conscious effort to transflant the seeding at precisely the same level it occupied in the seed flat but slembs err always in having I a letter deeper, a new roots will form on the radical above the fint where the original root amerges. This is an advantage in handling any seedly that may have been beame drawn and Elingatis before transplanting 4 completed.

It In handling the address plants feals, morstone Thould be theparter from by watering and the seritore Rumi dity in the frame should be high but not excessive. A pane of glass over the flat for the first week is helpful. Full transplants readily in reduced light, the growth becomes more active more light can be admitted but it should not be frighten that afaleas in their sail stages are not demanding of light, Infact the more the worker stadies them, the were he becomes aware of their trevauce of reduces light with as seedling and as small cut norted entires. Watering, as for seed flats Should be effected by ihm setting the flats Digitized by hung institute for Botan day Documentation the bottom of the flat. For the wolher Mis has ample room and abundant help, the seedlings are set about two indies aport each way no matter home small they appear at this time. In those This do not, the trans plant can be set closely. The with regularly put 200 penuts to the flat that would have contained not none them les by the other method. The dis advantage I the latter method practice is that the lake fromth of the seeding is not as fresh as symmetrical as that of widely - Set seedlings, and there is not much likelihood of branching on the original main shoot, nor of the formation of new

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shools from the base, until after the pearly are set in nursey beds. As the writer has set a slow development In his work, the seedling were kept growing by so that they would be large enough to go known that winter in the frames or pit beds the following spring as soon as danger a short kitchen Knife, between the rows and between the pints in the ins. They can then be lifted gottes now made, The can be set into the walt + does. of the beds can then he shaded light no watering will be needed for a week, In the writers garde the shade was from by a correin of branches. These this shade is removed, watering showed follow as needed. As practiced here, the beds were cultivated Light with a hand fork and then waterro by hand with a light pose. If the tool mixture in the had contains enough peat on other humas, mee well touked it is Il new only light water, it is onaintain wen mosture. As som as the plants had grown enough, a light mulding of half-decayed leaves is spread, almost fitted between them, after the took had been well toaker, This admits

watering by hore or can without any risk that the young plants be crushed to earth sitter seems & retard granth somewhat. best growth during July a august, only slowing up as nights begin to cool by mid-teptember. The works has no upherence in the neasonable to assume that since the Mole plant is made up 3 "mus growth", it should not be encouraged to grow to late that it some be entirely immature who frosts arrive growth is most larily checked by Reducing the watering. In the writer's experience with seedling handles Digitized by Juntapptimete for Botatricata Dofumeration Condi tions wisher which he worker, there was negligible water loss. Very few plants have been killed outright. Though of there which lost the tops, the majority sprowbed from the crown of the ground line, and with a letter care in watering som made poor plants most of which came though the seems write in the oro injury. hworch flants will flower the third spring to keep excitant high and after the Kind spring the painful business of culling the "discard" becomes a major task, It he added to the tasks I record taking , I the leadings are hybrids valuable new varieties. The beginner, olimber limit his kulling to the removal of plants with

emoficions poor flowers, in color or form. The experience from man safely destroy also three that are obviously plants that will dividio poor habits. nothing has been vaid about the distance at Mich plants should be set in transplant beds. This is determined by the space available and the convenience of the worker. The young plants will produce flowers, even if commed aur only the symmetry of the bush habit may be obscured. The writer, who has been limited in both time aux space has followed the conder tystem, but offers no defense for it often than his necessity and the fact that Digitize the Plant In distributed to Borgicano Documentarion sasties more vulnerable yearsagolea.

When the writer first undertook to grow apaleas and mododerstrons from beet, he followed The instructions gran him by the lake william H. Hatfield (verif first names). The flats were filled with a typical agalen soil mixture to which are third by wilk of coarse vous was added to intue quick draings.
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and covered with a Min layer of sphagnam moas that has been scorner through a screen. The Shols flat was set in a pan of was draw with no nine moisture van out. echowledont resitute for Boranical Documentation truface + then crevel by a thin layer of screenes ophaguem. The flat was corent In time this was modified at the h.s. Plant sworders and sanday, by the des observation that the young plants grew best I towns planted early and were kept growing without further check, Since their root systems were entirely in the sphafnum layer, it was obvious that the soil below was not needed , for the period of germination and time weeks following. Thereafter the much shallower flats were of their who imply chopped sphagnen in place of on this was spread the same surface layer

Former sphagners but the seeds after forming were not corner with a second layer of screened knows. The great advantage of their same in the reduced handling weights. The later advantage affector in the fact that home of the common damping of organisms were able to survive on the sphagners hears. and there was no touce of infection from below. It has been shown that plants can be keft growing slowly, no matter how consider if the monthure is keft at a reduced lively for from two to four years.

There reserves are sometimes of great value of the original transplants traffer accident in loss.

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The only word of warning is that a flat should oppose the sure twice, even it has been corner with a fresh layer of new screenes sphagram.

In his own work the writer looks when the sphagram seed flat merely as a germmating apparatus from which the plants are removed as finished as formible. He has formed it practicable to some line he has seed, not broadcast, but in lines about I in che broad and one I mich apart. This makes pomble the towning of an enormous number of seed in me flat.

Which saves space sand in the year.

The disadvantages of This method appear only of the worker is slow in southing his Mans planting as the seedlings or M become drawn and leggy as would any other conded feedly. Recovery from leggirers defends somewhat upon the Hood lines in volved, all y which is observed quickly enough by the worker. For there who have ample room, more generous enditons are of course preferable, with this tood-Cast towing in larger surface areas. Typen ments have been made in using other Weile media for germination, but none combines all the practical advantages by the splugnum ed by Hymo Institute physotapical Documentation results in II come if the gamer works out the routine best for him, that in II permit him I keep the seedling growing steadily from germin ation until the first check hy winter remperatures, This tempo may be fast a slow according to his facilities, but I stends be uniform. Under the writer's

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with no other core than single glasist sash and two layers of hurlap sacking the provide shade. Henperatives always reach 507 and sometimes 007 or less as an experiment, seed of several hybrid lots were kept grammy is a cool greenlinese, with no red, firm germination with first flowering. These first plant or bloom Broduces flowers in It months, but nevor required 183, about half the time of outside plantings. There has not been enough need to rush flowering to warrant general use of this practice. The example was of interest also in that the cerses involves a considerable amont I blook of R. indicum which is rist one of the species mist responsive to greenhouse life: Digitized by Hunt Institute for Botanical Documentation

For the amateur working without greenhouse facilities or comparable apparatus, there is no advantage in sowing azalea seed before moderately warm weather. In the neighborhood of Washington, D.C., this may be late March or mid-April according to the season. Germination is slower than under greenhouse conditions and may spread over a longer period before it is complete. The young seedlings will be correspondingly slower in developing true leaves.

the seedlings into transplant flats as soon as the worker cares to begin the work, but the writer has found more satisfactory results come if he waited until there were 3 or 4 good leaves before beginning. If it is possible to complete this operation by continuous work rather than by intermittent work such as was possible for the writer, the young plants of the writer, the young plants develop more uniformly.

As under greenhouse conditions, it is possible to start pricking out

In transplanting, the worker need not make any conscious effort to transplant the seedling at precisely the same level it occupied in the seed flat but should err always in having it a little deeper, as new roots will form on the radical above the point where the original root emerged. This is an advantage in handling any seedlings that may have become drawn and elongated before transplanting is completed.

In handling the transplant flats, soil moisture should be kept uniform by watering and the humidity in the frame should be high but not excessive.

A pane of glass over the flat for the first week is helpful. Full sunlight should strike the transplants during this interval as they make new roots readily in reduced light. As top growth becomes more active, more light

Digitized

can be admitted, but it should not be forgotten that azaleas in their early stages are not demanding of light. In fact the more the worker studies them, the more he becomes aware of their tolerance of reduced light both as seedlings and as small rooted cuttings. Watering, as for seed flats, should be effected by setting the flats in pans of water so that absorption is from the bottom of the flat.

For the worker who has ample room and abundant help, the seedlings are set about two inches apart each way, no matter how small they appear at the time. For those who do not, the transplants can be set closely.

The writer regularly put 200 plants to the flat that would have contained not more than 60 by the other method. The disadvantage of the latter practice is that the later growth of the seedling is not as great or as symmetrical as that of widely-set seedlings, and there is not much likelihood of branching on the original main shoot, nor of the formation of new shoots from the base, until after the plants are set in nursery beds.

Digitized

As the writer set a slow development for his work, the seedlings were kept growing only so that they would be large enough to go through the winter in the frames or pit without cold injury. They are set out in nursery beds the following spring as soon as danger of frost is over.

Transplanting is accomplished by cutting with a sharp kitchen knife, between the rows and between the plants in the row. They can then be lifted out with a prism of fibrous soil usually full of the root mass. They can be set into the nursery beds, in holes that are then filled with water and closed.

If the beds can then be shaded lightly, no watering will be needed for a week. In the writer's garden the shade was given by a covering of bare branches. Once this shade is removed, watering should follow as needed.

As practiced here, the beds were cultivated lightly with a hand fork and then watered by hand with a light hose. If the soil mixture in the bed contains enough peat or other humus, once well soaked, it will need only light waterings to maintain even moisture. As soon as the plant had grown enough, a light mulching of half-decayed leaves is pread, almost fitted between them, after the soil had been well soaked. This admits watering by hose or can without any risk that the young plants will be crushed to earth or splattered. Neither is fatal, but either seems to retard growth somewhat.

The writer has no experience in the use of fertilizers for seedlings, but it seems reasonable to assume that since the whole plant is made up of Digitized "new growth", it should not be encouraged to grow so late that it would not be entirely immature when frosts arrive. Growth is most easily checked by reducing the watering.

In this area, seedlings often make their best growth during July

and August. only slowing up as nights begin to cool by mid-September.

In the writer's experience with seedlings handled in this way, and under the far from ideal conditions under which he worked, there was negligible winter loss. Very few plants have been killed outright. Of those which lost their tops, the majority sprouted from the crown at the ground line, and with a little care in watering some made good plants, most of which came through the second winter with no injury.

Enough plants will flower the third spring to keep excitement high and, after the third spring, the principal business of culling the "discards" becomes a major task, to be added to the tasks of record taking, if the seedlings are hybrids made with the purpose of creating valuable new varieties.

The beginner probably should limit his culling to the removal of plants with conspicuously poor flowers, in color or form. The experienced grower may safely destroy also those that are obviously plants that will develop poor habits.

Nothing has been said about the distance at which plants should be set in transplant beds. This is determined by the space available and the convenience of the worker. The young plants will produce flowers, even if crowded and only the symmetry of the bush habit may be obscured. The writer, who has been limited in both time and space, has followed the crowded system, but offers no defense for it other than his necessity and the fact that the plants do shelter one another in their earlier more vulnerable years.

When the writer first undertook to grow azaleas and rhododendrons

Digitized from seed, he followed the instructions given him by the late William H.

Hatfield (verify first names). The flats were filled with a typical azalea soil mixture to which one third by bulk of coarse sand was added to insure quick drainage. This was firmly pressed to a level and covered with a thin layer of sphagnum moss that had been scoured through a screen. The whole flat was set in a pan of water over night. By morning all was uniformly moist. The flat was allowed to drain until no more moisture ran out. The seeds were sown broadcast on the surface and then covered by a thin layer of screened sphagnum. The flat was covered with glass and one thickness of newspaper.

In time this was modified at the U. S. Plant Introduction Garden, Glenn Dale, Maryland, by the observation that the young plants grew best if transplanted early and were kept growing without further check. Since that the soil below was not needed, for the period of germination and some weeks following. Thereafter the much shallower flats were filled with roughly chopped sphagnum in place of soil, pressed firmly and levelled as before. On this was spread the same surface layer of screened sphagnum but the seeds after sowing were not covered with a second layer of screened moss. The great advantage of this came in the reduced handling weight. The later advantage appeared in the fact that none of the common damping-off organisms were able to survive on the sphagnum moss and there was no source of infection from below. It has been shown that plants can be kept growing slowly, with no losses in such flats, no matter how crowded, if the moisture is kept at a reduced level, for from two to four years.

These reserves are sometimes of great value if the original transplants

Digitized suffer accident or loss tute for Botanical Documentation

The writer has used both methods and can testify that the sphagnum method is entirely satisfactory under "home" conditions. The only word of warning is that sphagnum should never be used twice, even if the surface has been covered with a fresh layer of new screened sphagnum.

In his own work, the writer looks upon the sphagnum seed flat merely as a germinating apparatus from which the plants are removed as quickly as possible. He has found it practicable to sow his seed, not broadcast, but in lines about one inch and one inch apart. This makes possible the sowing of an enormous number of seed in one flat which saves space early in the year.

The disadvantage of this method appears only if the worker is slow in transplanting as the seedlings will become drawn and leggy as would any other crowded seedling. Recovery from legginess depends somewhat upon the

blood lines involved, all of which is observed quickly enough by the worker.

For those who have ample room, more generous conditions are of course preferable, with thin broadcast sowing on larger surface areas.

Experiments have been made in using other sterile media for germination, but none combines all the practical advantages of the sphagnum method.

In growing these plants from seed, the best results will come if the grower works out the routine best for him, that will permit him to keep the seedling growing steadily from germination until the first check by winter temperatures. This tempo may be fast or slow according to his facilities, but it should be mafirm uniform. Under the writer's conditions, seedlings sown in March average five inches by October. Under greenhouse conditions, with February sowing, they would average at least three inches more, and most would probably show secondary shoots from the base.

Here, an ordinary cold frame sash has been ample winter protection for seed flats with no other cover than single glazed sash and two layers of burlap sacking to provide shade. Temperatures always reach 5° F. and sometimes 0° F. or less.

As an experiment, seed of several hybrid lots were kept growing in a cool greenhouse, with no rest, from germination until flowering. The first plant to bloom produced flowers in 14 months, but most required 18, about half the time of outside plantings. There has not been enough need to rush flowering to warrant general use of this practice. The example was of interest also in that the crosses involved a considerable amount of blood of R. indicum which is not one of the species most responsive to greenhouse life.

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Rough dout date space -

Tathering of Jeed. It has been customary of say that when agreen leed is nipe, the capsule opens makerally. Observation here, suggests that the capsules, of ripe, open only after a frost. Since the writer was primarily emerned with the harvest of seed resulting from crosses, he had no wish to risk any promble loss of seed by tech casual opening. Florely It seemes desirable therefore to risk one repair harvest about October to, a date beneally safely before the usual "first first" The capsule were full tige, but entirely green in color.

The capsules were gathered, put in open, small cosh swellopes at left at room temperatures. Tradual darkening of brown orlor followes on the capsules of themselves, but many of them showed no organ of spering after 2 months. All were then speried by crushing, using a small bottle as the crusher, and the seed by crusher, and the seed by proved ask in each case the only with differences.

Digitize days the ment of the being slight less intense than that of bush ripened and

Germination the following spring threed no difference sitter in time nor in the vigor of the resulting seedlings.

Time to son seed. As far as has been observed there is no test time, other than that time which fits best into the genoris routine. The ideal goal is that the newly germinated teedly dhould have as long an uninterrupted first years growth as may be possible. If no has the facilities and can thave the space the seed can be soon aburst immediately offin harvest, and with what ever adaptations of facilities my be needed to provide when light in winter, the leedly can be left in continuous growth as a normal bush batis. The albert that one one

using the normal facilities of greature space at the U.S. Plant Mirrotaction trailer, Alenn Dale, Md., kept bro bets of Lybrid tedd involving of species and clones of the Obtusum tat-teries in continuous active granth to that the first flowers appeared in 14 (?) months This material ma, have been more favorable than most time its bloodline contained a large percentage of a garden clone that flowers said under works a large percentage of a garden clone that flowers said under works and or the conditions. Very little other evidence of their him was apparent in the populations. He

without having tried it experimentally, the writer can of report that he would be inclined to don't if continuous growth could be had from definitely decidences officies. It is articled promite that their period of dormancy could be whatever and broken by cold treatment, but their dormances could be whatever and broken by cold treatment, but their

booking as an amateur, without greenhouse facilities and my

would not after the cyclic pattern.

John seed in Shareh to which time there is trufficient van hear to Digitize transmy told pranter girl unharbed to the three is trufficient van hear to bulge prenter girl unharbed to the transmit are found in health houses, where seed can be sown confortable of from mid-January n. If it is sown larlies to of no additional light is provided, the seedling tend to a state resentling winter dormancy for lake decenter as to have February, from shick it is not always easy to rouse them into equal growth. The difficulty is note apparent or the seedling shododendims, using that wond in its popular sauce to denote.

The writer admits that his working routine builds up delays time the seedlip are shower to reach the transpeart stage and he is shower to get all the work done with the result theat some work that should have been completed in third is baref privited by the and I find if he has thousands I seedlip to handle. The temps of all parties, however, is adjusted to his work schedule and he has to accept the loss I a year, before he may expect flowering.

It seems worth while to recome the experience ned one to encourage others who may lack professional equipment, but to show once more how easily the agalea will accept a wide range of growing enditions. As further evidence it may be noter that self sown teedlings under the parent bushes, where conditions are even more competitive, pattern develope with an even shown tempo but according to the same stay them.

First transplant method of soning To use any other method than that

I strong on sphagnum moss seems complete folly.

I shallow flat on pot of convenient vige is ples to Hinch from this brinn with right packer chapped sphanum moss that has never been used before. The flat or pot is set in a container of water and allower to stand over night. It is then shood aside to hermit all excess water to drain away. Press the surface level and then cover it with a layer of sphagnum that has been scrubbed there to see the second of the second of

uniform most. The seed is the son on the surface, the receptable correct with a pane of glass + a sheet of reuspaper. to more attention will be needed with long after germination

has taken place.

Huperatures ranging between 60-70° 7 bing on germination within this weeks for must afalcas. Armen temperatures perduce stower results. The may watch the seed absorbing most ture to fathering before the tip of the radicle begins to show. It is interesting to watch the seeds though germination as occasionally me foods a lot that are must not uniform in time.

the moss is fresh, there will be no losses from any of the damping of finingi. Common in This area. The writer learnes by experience that an old flat even if completely resurfaced with a deeper layer of tifles sphagrum no longer

protects the germinating teedlys.

Prideing of . This again is a matter of convenience, related It facilities. In the worker in the greenhouse there Imopheric humidity can be maintained, it is perfectly sche to transplant the leedling the before any true leaf has formed. In the conditions timilar to there & the writer, It is much better to wait until In 3 true leaves have formed.

The voil mixture for the transplant flet should be the usual agalea voil mixture with about me third coarse vand by both I insure rapid draining. The flats should need little drainings makinal as tuch , I the voil mixture is correct. They can be prepared, watered copional andrained before using in they may he used at once, and then stood in water with moreture slews in this ourface, when they will be removed to their place on grem house beuch or frame. Thate must be given ho additional Waln will be needed for several weeks, by which time there should he active figures of growth. Them home temperatures - 7°.

brush the state for Boldinical Documentation trugh, they can be pulled out of the sphagnerm and dibbled into the prepared transplant flat. Thomas the nort in hypocotyl be damaged, plant as if some and whole, have a little deeper Than normal, how rook will be themon of out from This hypocotyl o of to accident a seedling falls over on the Leed flat, roots can be observed all along this hypocotyle, as well as from this genoing radical end. The one sate must be that soil ministance + atmospheric humidity are atoms constant: their degree does not appear to be as important as kien uniformity.

Ung seedly's not needed can be left in the niginal seed pan almost indefinity and without feeding. To present too rapid gardh, the degree of moisture slimbs he much less than that given to seedling in active growth.

The writer works under limited space conditions and sors his seed in broad nows that are spaces atm I "apout. Hermination is excellent. Mr Serious, convoled. If it were possible to prick out the leedly's grickly us harm could follow. It is not and the result is that may seedly become seriously elongated before they are handled. The damage has resulted if they are planted were deeply than they had been giowing. These data are included not as advitable a tractice but it show a desirable fractice but it show a depart that the afalia is not as difficult as to certain older that the afalia is not as difficult as to certain older that they afalia.

Space between seedlings in the transplant flat must be determined by the space at one's command. and the speed with which they can be rehandled for the next shift. As the

Plant Interduction Taxon the are usuall Dhace which happach each Ha; in the writer's home gardon, never over I"apart and a few whose for good measure. The widely spaces plants are ready for permanent newsey beds the vame season: the writer's

the following Spring.

newseng transplant. The well grown seedlings described above are ready for planting out go doors in news condition by lake summer or early Rutumon. The decision must be made by the grower and will depend upon the severity of his climate aux the amount of hard word present at the base of the plant. The quently there is almost none. When it is possible, the first winter should have in a cold frame, dacking frames, a light mulch of leaves to a cover of brush will happine. The cowdest smaller seedlings must go through the winter in a frame, but need no special protection. They can be set out as early in the spring as desired and of they are

assiduously cared for in almost catch up with the better plantafter the summer's growth is finished.

In this climate, and so presumate, in others, the general plants should be set out at a distance to that they will truck one another of the car of summer and provide mutual

sisteria the following withen.

between the and to between the plants in the nor and lifts out the individual plant with its square prism of norts. Occasionally in the enroded by stem a plant of here hade a crother main noor that is cut off too close to the plant. In that case the top shouls be cut back two thirds. In queeral practice, one may plant out the young seedlip at any time of day in any temperature, provided, about 1/2 point of water is powered into the hole as the plant is set the hole closed as the water disveppears. A light shelter the hole closed as the plant is the hole closed as the plant is the hole closed as the plant is set the provided by the hole closed as the plant is set the hole closed as the plant is set the hole closed as the plant is set the plant is set the hole closed as the plant is the ho

Int the while has mores mall seeding successful in midful with me shading shattoer, Rarely is there any wilting and These or occur, it disappears after the pist might. The more grickly the plant is established the more quickly it can recurre the summer's full measures of growth. Subsequent mercany care is the same as for any other small plant, with

regular attention to moisture a food.

The well grown plants will give almost 100 go bloom the Kind year Aherras the plants produced under the writer's more casual system, give only an indication reading the Kind year. Timest Howering In all cases observed by the writer, the flowers that the poor in sign or form can be immediately discourted. Colon sometimes improves a little and large flowers sometimes appear larger, but the total bloom with pinches corolla lobes, usually stays just that way.

Cathering of Seed. It has been customary to say that when azalea seed is ripe, the capsule opens naturally. Observation here suggests that the capsules, if ripe, open only after a frost. Since the writer was primarily concerned with the harvest of seed resulting from crosses, he had no wish to risk any possible loss of seed by such casual opening. It seemed desirable, therefore, to risk one year's harvest about October 10, a date generally safely before the usual "first frost". The capsules were full size, but entirely green in color.

The capsules were gathered, put in open, small coin enveloped and left at room temperatures. Gradual darkening to brown color followed on the capsules themselves, but many of them showed no signs of opening after two months. All were then opened by crushing, using a small bottle as the crusher, and the seed poured out in each case. The only visible difference Digitized was in color, the bue being slightly less intense than that of bush-ripened long seed.

Germination the following spring showed no difference either in time, nor in the vigor of the resulting seedlings.

An October harvest has become routine practice here.

Time to sow seed. As far as has been observed, there is no best time, other than that time which fits best into the grower's routine. The ideal goal is that the newly germinated seedling should have as long an uninterrupted first year's growth as may be possible. If one has the facilities and can spare and afford the space, the seed can be sown almost immediately after harvest, and with whatever adaptations of facilities may be needed to provide extra light in winter, the seedlings can be kept in continuous growth, at least in the case of those species that tend to continuous growth as a normal

bush habit. Mr. Albert Close, using the normal facilities of greenhouse space at the U. S. Plant Introduction Garden, Glenn Dale, Maryland, kept two lots of hybrid seed involving only species and clones of the Obtusum sub-series, in continuously active growth so that the first flowers appeared in 14 (?) months.

This material may have been more favorable than most since its blood line contained a large percentage of a garden clone that flowers easily under winter conditions. Very little other evidence of this line was apparent in the populations.

Without having tried it experimentally, the writer can only report that he would be inclined to doubt if continuous growth could be had from definitely deciduous species. It is entirely possible that their period of dormancy could be shortened and broken by cold treatment, but this would not alter the cyclic pattern.

Digitized by Working as an anateur, without greenhouse facilities and only after to office hours for work, the writer has found it more convenient to sow his seed in March by which time there is sufficient sun-heat to warm cold frame and unheated pit greenhouse. Germination and subsequent growth rates are slower than are found in heated houses, where seed can be sown from mid-January on. If it is sown earlier and if no additional light is provided, the seedlings tend to a state resembling winter dormancy from late December to late February, from which it is not always easy to rouse them into equal growth. The difficulty is more apparent with seedling rhododendrons, using that word in its popular sense to denote evergreen species.

The writer admits that his working routine builds up delays since the seedlings are slower to reach the transplant **mixe** stage and he is slower to get all the work done, with the result that some work that should have been completed in April is barely finished by the end of July if he has thousands

of seedlings to handle. The tempo of all operations, however, is adjusted to his work schedule and he has to accept the cumulative loss of a year before he may expect flowering. It seems worth while to recount the experience not only to encourage others who may lack professional equipment, but to show once more how easily the azalea will accept a wide range of growing conditions.

As further evidence it may be noted that self-sown seedlings under the parent bushes, where conditions are even more competitive, develop with an even slower tempo but according to the same pattern.

Method of sowing. To use any other method than that of sowing on sphagnum moss seems complete folly.

A shallow flat or pot of convenient size is filled to 3/4 inch from
the brim with tightly packed chopped sphagnum moss that has never been used
before. The flat or pot is set in a container of water and allowed to stand
over night. It is then stood aside to permit all excess water to drain away.

Press the surface level and then cover it with a 1/2 inch layer of sphagnum on
that has been scrubbed through a sieve mesh of 1/8 inch squares. This must
stand until it is uniformly moist. The seed is then sown on the surface,
the receptacle covered with a pane of glass and a sheet of newspaper. No
more attention will be needed until long after germination has taken place.

Temperatures ranging between 60-70° F. bring on germination within two weeks for most azaleas. Lower temperatures produce slower results. One may watch the seed absorbing moisture and fattening before the tip of the radicle begins to show. It is interesting to watch the seeds through germination as occ asionally one finds a lot that are not uniform in time.

If the moss is fresh, there will be no losses from any of the dampingoff fungi common in this area. The writer learned by experience that an old flat, even if completely resurfaced with a deeper layer of sifted sphagnum no longer protects the germinating seedlings.

<u>Pricking off.</u> This again is a matter of convenience, related to facilities. For the worker in the greenhouse where atmospheric hunidity can be maintained, it is perfectly safe to transplant the seedlings before any true leaf has formed. With conditions similar to those of the writer, it is much better to wait until 2 or 3 true leaves have formed.

The soil mixture for the transplant flat should be the usual azalea soil mixture with about one third by bulk of coarse sand to insure rapid draining. The flats should need little drainage material as such if the soil mixture is correct. They can be prepared, watered copiously and drained before using or they may be used at once, and then stood in water until moisture shows on the surface, when they will be removed to their place on greenhouse bench or frame. Shade must be given. No additional water will be needed for several weeks, by which time there should be active signs of Digitized growth. Creenhouse temperatures of Brianical Documentation

Each worker handled the seedling according to his own manual skill.

The seedlings, though small, even tiny, are remarkably tough. They can be pulled out of the sphagnum and dibbled into the prepared transplant flat.

Should the root or hypocotyl be damaged, plant as if sound and whole, but a little deeper than normal. New roots will be thrown out from the hypocotyl. If by accident a seedling falls over on the seed flat, roots can be observed all along the hypocotyl, as well as from the growing radical end. The one requirement is that soil moisture and atmospheric humidity are kept about constant. Their degree does not appear to be as important as their uniformity.

Any seedlings not needed can be left in the original seed pam almost indefinitely now without feeding. To prevent too rapid growth, the degree of moisture should be much less than that given to seedlings in active growth.

Where space is not at a premium, their broadcast sowing is desirable. The writer works under limited space conditions and sows his seed in broad rows that are spaced about one inch apart. Germination is excellent but seriously crowded. If it were possible to prick out the seedlings quickly. no harm could follow. It is not and the result is that many seedlings become seriously elongated before they are handled. No damage has resulted if they are planted more deeply than they had been growing. These data are included not as advisable or to outline a desirable practice but to show again that the azalea is not as difficult as certain older texts would suggest.

Space between seedlings in the transparent flat must be determined by the space at one's command and the speed with which they can be rehandled for the next shift. At the Plant Introduction Garden they are usually spaced about two inches apart each way; in the writer's home garden, never over one inch apart and a few extras for good meaure. The widely spaced Digitized plants are ready for permanent nursery beds the same season the writer sion the following spring.

> Nursery transplant. The well grown seedlings described above are ready for planting out of doors in nursery condition by late summer or early autumn. The decision must be made by the grower and will depend upon the severity of his climate and the amount of hard wood present at the base of the plant. Frequently there is almost none. When it is possible, the first winter should pass in a cold frame. Lacking frames, a light mulch of leaves and a cover of brush will suffice. The crowded, smaller seedlings must go through the winter in a frame, but need no special protection. They can be set out as early in the spring as desired and if they are assiduously cared for will almost catch up with the better plants after the summer's growth is finished.

In this climate, and so presumably in others, the young plants should be set out at a distance so that they will touch one another by the end of summer and provide mutual protection the following winter.

Transplanting is the easiest of operations. One merely cuts between the rows and between the plants in the row and lifts out the individual plant

with its square prism of roots. Occasionally in the crowded system, a plant will have made a crooked main root that is cut off too close to the plant. In that case the top should be cut back two thirds. In general practice, one may plant out the young seedlings at any time of day in any temperature, provided about one-half pint of water is poured into the hole as the plant is set and the hole closed as the water disappears. A light shelter to provide broken shade for a week will hasten the adjustment, but the writer has moved small seedlings successfully in mid-July with no shading whatever.

Rarely is there any wilting and when it does occur, it disappears after the first night. The more quickly the plant is established, the more quickly it can resume the summer's full measure of growth. Subsequent nursery care is the same as for any other small plant, with regular attention to moisture and food.

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The well grown plants will give almost 100% bloom the third year whereas the plants produced under the writer's more casual system give only an indication reading the third year.

First Flowering. In all cases observed by the writer, the flowers that are poor in size or form can be immediately discarded. Color sometimes improves a little and large flowers sometimes appear larger, but the small bloom with pinch corolla leaves, usually stays just that way.