1-1-1928

The Gladwin Forest Nursery

J. A. Gibbs
Iowa State College

Follow this and additional works at: https://lib.dr.iastate.edu/amesforester

Part of the Forest Sciences Commons

Recommended Citation
Available at: https://lib.dr.iastate.edu/amesforester/vol16/iss1/12

This Article is brought to you for free and open access by the Journals at Iowa State University Digital Repository. It has been accepted for inclusion in Ames Forester by an authorized editor of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
The Gladwin Forest Nursery

By J. A. Gibbs

The Gladwin Forest Service Nursery is located at Gladwin, West Virginia, on the Monongahela National Forest. It was established some seven years ago primarily to supply planting stock for the southern Appalachian forests, where the need for reforestation of the high spruce flats has been recognized for some time past. On the Monongahela forest in particular there are thousands of acres of this high spruce flat type where reproduction of any kind is almost totally lacking. Most of these areas are the result of destructive logging operations followed by repeated fires. Artificial reforestation is the only hope for such areas.

The nursery occupies a narrow flood plain of a small mountain stream and is surrounded on all sides by quite steep to precipitous mountain sides. The area now within the nursery fences embraces about five acres although there are several additional acres farther up stream that can be developed and made a part of the nursery. The gradual north-east slope is hardly perceptible but affords ample drainage when heavy rains occur. The soil, which has been classified as a Moshannon Loam by a soil survey of West Virginia, is quite sandy with hardly a trace of organic matter or litter of any sort. This is due to the fact, so the neighboring farmers claim, that the ground was cropped continuously for over sixty years prior to becoming a forest nursery. The subsoil is sand which stimulates rapid percolation of surface water. Thus the nursery has a soil while lacking in fertility, is very easily worked and maintained in good tilth, warms up rapidly, and in case of dry weather loses its supply of moisture rapidly. For the purpose of improving and maintaining the fertility of the soil a system of rotation of crops with trees has been established. Oats, red clover, rye, cow peas, and buckwheat are being used. No fertilizers of animal origin are available except sheep manure in limited amounts. Of the commercial fertilizers bone meal has been used but not long enough to justify definite conclusions as to the advantages of its use. It is the aim to maintain a slightly acid reaction in the soil since only conifers are to be produced. The results thus far attained at the nursery indicate that the site is very well adapted to the production of coniferous planting stock.
The transportation facilities at the Gladwin Nursery are very poor. The only available outlet is a decrepit ex-logging railroad which was built up the valley at the time of the logging boom. Since the death of that boom it has been running more on its reputation than upon tonnage, and that reputation is now showing its age. According to their time tables two trains are operated daily each way, but the Central West Virginia and Southern Railroad trainmen just can’t be bothered with such details as times tables and schedules. No automobile highway has as yet penetrated the Gladwin community and due to the inaccessibility of the valley it will no doubt be a long time before one is constructed. Local labor is plentiful—in fact over abundant, for since the big mills finished their job of timber devastation in this region and made their getaway, local industries are practically nil. Therefore the inhabitants are anxious to work, and at a reasonable wage.

The stock produced at the Gladwin Nursery is all coniferous. Of these red spruce (Picea rubra) is to be raised in the largest numbers for it is native in this region and makes a very satisfactory growth when planted in the field. Furthermore there is no question as to its ability to reproduce itself. The cost of production in the nursery is, however, quite high, due to a low per cent germination and quite heavy loss of the first year seedlings from root rot followed by practically no recovery of the affected seedlings. Norway spruce (Picea excelsa) is being used considerably at present but there is a question as to the advisability of planting it in the field on too large a scale until it is known definitely
just what it will do and how it will succeed in reproducing itself. However, it is quite apparent that it can be produced at this nursery at a very low cost per thousand transplants. The germination per cent of the seed has been high, the seedlings are very vigorous, and thus far it has shown marked ability to recover from root rot attacks. Of the pines, the eastern white pine (Pinus strobus) does very well in the plantations in this region and as yet has suffered no loss from blister rust nor attacks by the weevil. In producing the white pine stock the results thus far have been very gratifying and at a nominal cost. The plans for the future call for the production of red pine (Pinus resinosa) also which will probably be planted in the field with the white pine. Several beds of Frazier fir (Abies fraseri) were sown last spring and are making quite satisfactory development. European larch is being produced in limited numbers. It makes a good growth in the nursery and in the field but thus far the survival has been very low. The planting of eastern hemlock (Tsuga canadensis) is very desirable in this region but the production of the stock has been very discouraging due chiefly to poor germination and resultant thin stands in the seedbeds. For the present the above species are being raised in the Gladwin Nursery but it is planned to sow several others on an experimental basis. Such species as white spruce (Picea canadensis), Scotch pine (Pinus sylvestris), Austrian pine (Pinus austriaca) and Japanese larch (Larix leptolepis) will be tried.

The stock at the Gladwin Nursery at present consists of about 125,000 2-1 transplants, about 80,000 2-0 seedlings, and about 550,000 1-0 seedlings. Thus, since the nursery is still small, all the nursery practice is done on a small and intensive scale. No power machinery is used except for plowing and harrowing. The closed type of seedbed is used but it is believed that there is a possibility of eliminating the frames since rodents and birds have not been a serious menace to seed or young stock. The beds are four feet wide and sixteen feet long. Broadcast seeding is practiced and in the past has all been done in the spring of the year. The seedlings are kept in the beds for two years with the lath shades in place both years, and in the transplant beds one year after which they are distributed for planting in the field.

The most desirable density for the various species raised at the Gladwin Nursery has not as yet been established, for there is still a question as to the class of stock that should be put out for field planting. It is thought that the 2-0
stock of most of the species will do as well and perhaps better in the field than the 2-1. In case the policy to plant the 2-1 stock is definitely established it would mean that the density in the beds would be reduced sufficiently to stimulate a vigorous lateral development of roots and a comparatively short stem development. The sowing thus far has been done to secure about 140 seedlings per square foot in case of white pine beds and as many as 200 seedlings per square foot in case of the spruces. These densities will undoubtedly be materially reduced.

In connection with seeding at the Gladwin Nursery the method of covering the seed should be mentioned. It has been the practice in the past to press the seed into the soil and then sift the cover on without the use of a covering or so called planting board. In so doing it has been a difficult and slow undertaking to give the beds a crown and uniform surface and what is still more important, it has been almost impossible to give the seed the proper depth of cover uniformly over the entire surface of the bed. Undoubtedly the low centers in some of the beds have been the cause of considerable damping off and root rot. Furthermore, im-

1-0 white pine stock about 5 inches high.
proper depth of cover has caused delayed germination of seed to be quite common. It is planned to use the planing boards in the future with which beds can be quickly crowned and the seed efficiently given the depth of cover desired.

Watering the beds is accomplished by pumping water out of a nearby creek and applying it with a garden hose. With an annual rainfall of about 50 inches watering at the Gladwin Nursery is not a serious problem. The policy thus far has been to water frequently but in moderate amounts rather than heavy watering at longer intervals of time. It is believed that light applications of water frequently keep the soil moist near the surface which has a tendency to stimulate the development of lateral roots.

In sterilizing the beds the sulphuric acid treatment is used. This solution is prepared by adding 1 ounce of the commercial acid to each gallon of water and is applied at the rate of about two gallons per bed. This practice has apparently been successful in controlling damping off but not so much so in the prevention of root rot. During the past summer quite a large number of seedlings were affected with the root rot disease but it was noted that a goodly per cent of them were able to recover.

Rodent damage has been very slight. It is believed that the use of the open type of seedbed can be justified at this nursery in case the damage from birds can be controlled by other means than the enclosed seedbed. Sparrows caused quite a little damage during the past season by working on the white pine beds while the seeds were germinating.

Delayed germination has always been quite a common difficulty at the Gladwin Nursery. During the summer of 1927 it was especially noticeable in the white pine beds where the bird damage was consequently greatly prolonged. In one hemlock bed considerable germination was noted as late as in October. Various causes of this trouble have been suggested. The prevalent low temperatures in May and June no doubt had their bad effect. Low viability of some of the seed probably caused some of the trouble. Improper depth of cover, however, is believed to be the chief cause of the failure of the seed in many of the beds to germinate promptly.

Weeding is a big item of cost at the Gladwin Nursery. Weeding the first year seedlings is necessary on an average of about three times per month in order to get the weeds before they develop to the extent that their removal would damage the small seedlings. Furthermore, it is essential that weeds be destroyed before seed is matured. The second year
seedlings in beds with good stands require very little weeding.

It is the policy in handling this nursery to open the seedbeds by removing the lath shades at every opportunity. On cloudy and partly cloudy days, in the evening, in the early morning, and at other times when the rays of the sun are moderate, the beds are opened to give the seedlings additional light and aeration.

The seedbeds are mulched in the fall with burlap. It is easily and quickly applied and removed and has given good results thus far. It is planned, however, to try other methods of mulching this fall. A few beds will be mulched with leaves and a few with oat straw and a comparison made next spring with those beds mulched with burlap.

The transplants (2-1 stock) are lifted as early in the spring as weather and soil conditions will permit. They are healed in in a shady and protected place. In preparing them for shipment, the trees are counted and tied into bundles of 100 each and packed into bales with the tree baler. The bales are then shipped by express to the planting sites. Mr. Perkins, the supervisor, investigated the express rates on planting stock and learned that the rate could be materially reduced by enclosing the ends of the bales. This was accomplished by merely bringing the wrapping together at the ends, which satisfied the express company and greatly reduced the cost of transportation.

After the planting stock has been shipped the 2-0 seedlings are lifted from the seedbeds with the garden fork and transplanted immediately. The transplanting board is used in placing the seedlings in the transplant beds. The trees are placed 2 inches apart in the rows and a space of 12 inches is left between the rows. They are set at a depth slightly greater than they stood in the seed beds to allow for the settling of the soil. Cultivation is done by hand with the Planet Jr. cultivators at quite frequent intervals to eliminate weeds and keep the soil in good tilth. Weeding by hand in the rows is done occasionally to remove the weeds which cannot be destroyed by the cultivator blades. It has been found to be advisable to follow the weeder with a wheelbarrow and haul out the weeds, many of which readily take root again if allowed to lie.

Despite the fact that the Supervisor has been handicapped in developing the nursery, due chiefly to insufficient funds to keep a nurseryman on the project, a very creditable start has been made in experimental work. Although the work is new, the progress thus far deserves mention.
In fertilizing the seed beds various fertilizers and methods of application are being tried. Of these the 2-0 beds of white pine and Norway spruce fertilized with sheep manure show very satisfactory results. The experimental fertilizing of the transplant beds has thus far failed to show any decided advantage of the use of the various fertilizers. The transplanting of 1-0 stock thus far shows negative results. Removing the lath shades after the first year is apparently inadvisable in the case of white pine and Norway spruce. Quite a little work has been done on the proper amount of seed to sow per bed. The results thus far would indicate the necessity of a reduction in order to decrease the density of seedlings. Observations have been made on the damage to first year seedlings from damping off and root rot. The loss from damping off has not been serious—the greatest loss occurring in the white pine beds. Root-rot, however, has caused quite heavy loss especially in the red spruce beds. During the past summer quite a large number of affected seedlings were staked and observations made of their behavior. In the case of Norway spruce, from 70 to 80 per cent of the seedlings produced new roots and apparently fully recovered. In the case of white pine the recovery was not so good—on about 50 per cent of the affected seedlings produced new roots, and after making additional observations it was concluded that the per cent of recovery was still lower. Frazier fir showed only fair ability to recover. In the red spruce and larch beds the recovery was almost nil. Thus one of the major problems at the nursery will apparently be to prevent the loss of red spruce from root rot since that species is to be the most important for planting in this region.

The stock produced at the Gladwin Nursery thus far has been very satisfactory. The growth of the seedlings has been remarkable in both root and stem development. In the field the planting stock has shown a high per cent of survival in practically all the plantations. The success of the nursery in producing good planting stock is largely due to the efforts of the Supervisor of the Monongahela National Forest, Mr. C. L. Perkins, and Ranger W. P. Dale. A nurseryman has been in charge of the nursery for only a few months time during the seven years of existence of the project. This has meant that Mr. Perkins and Mr. Dale have been obliged to handle the work in addition to their regular administrative duties. Consequently there have been difficulties and discouragements, but the results attained have been very creditable and encouraging.