SELECTION OF JACK PINE IN WESTERN MAINE

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ABSTRACT--There are 2,000 acres of natural jack pine (Pinus banksiana Lamb.) in western Maine which are unique to this State because of its size and composition. This area originated from a fire in 1888 and a smaller burn in 1911. The stands of jack pine are well stocked and range in age from 46 years (DBH) to 70 years (DBH). In 1981, 24 selections were made in this area. The trees were chosen on an individual basis for height superiority, diameter growth, stem straightness, small branch size, and small crown size. Each tree was felled and about 1,000 cones, starting with the youngest, were taken. The number of cones collected per tree ranged from 298 to 7,500 cones from an exceptionally prolific tree. A cross-section was cut at DBH from each stem and radial increment measurements were taken. This basic technique will be used in the summer of 1982 to collect an additional 50-75 trees. The collected seed will be used to establish a three-acre seedling see orchard.

Scott Paper Company is in the initial stages of an ambitious tree improvement program. Our main objective is to provide genetically improved seedlings for our planting program which is scheduled to expand to 3,000 acres a year by 1990. We are primarily interested in providing softwood pulpwood to our kraft mill in Skowhegan which produces 900 tons/day of bleached pulp.

We have singled out three species to concentrate our tree improvement efforts; white spruce (Picea glauca Moench.), European (Larix decidua Mill.) and Japanese (Larix leotolipis Sieb. and Zucc.) larch, and jack pine (Pinus banksiana Lamb.). Our white spruce and larch programs revolve around grafted seed orchards of 30-40 clones per species. With jack pine we will be making more extensive selections for a seedling seed orchard.

SELECTION OF TREES

Jack pine occurs sporadically in disjunct stands throughout the State of Maine. One of the largest stands of jack pine is located in Western Maine in Bradstreet Township. This 2,000 acre area originated from a fire in 1888 and a smaller burn in 1911.

Much of this area is owned by Scott Paper Company, and as part of our on-going tree improvement program we decided to select 100 trees to provide seed for a seedling seed orchard. Our interest in jack pine stems from its rapid juvenile growth and its ability to grow well in the harsh climate of our northernmost landholdings. We feel fortunate to be able to establish a seed orchard from local sources when they are so uncommon. Also as custodians of such a unique area, we want to save the genotypes of the best trees we can find.

Our selection started in the summer of 1981. Trees were selected by making ocular estimates of height superiority, diameter growth, stem straightness, small branch size and small crown size. All trees were free of disease. Following the recommendations of other researchers (Jeffers, 1976), we did not use a "Comparison tree" method of evaluation, but merely picked out the best trees in each stand. Selected trees were at least ten chains apart. We selected at least one tree from each stand that we searched and in those stands that had better than average trees we selected several. We selected a total of 24 trees last summer from approximately 270 acres. (See Table 1)

Summer employees, who were forestry students, did the majority of the selecting after two days of on-the-job training. We had four employees for one week and two employees for an additional two weeks. They were given type maps with the location of the stands to search. They would walk through a stand approximately two chains apart until one person found what appeared to be a good tree. After closer scrutiny by the discoverer, the person would call the others to join in a group evaluation of the tree. A unanimous decision was needed for selection as a plus tree. The tree was flagged and referenced to some point along a base line that had been established earlier. Every two or three days I would go out and judge the trees that were selected. One of the problems that we ran into was not being able to relocate some of the trees. By keeping the time between selecting and making the final judgement to three days at most it was easier for the searchers to relocate the trees.

TABLE 1

JACK PINE SELECTIONS

Tree No.	Metric	Cone Size & Shape	Ten Year Radial Increments (Inches) (Average) 1981-72	1971-62	1961-52	1951-42	1941-32	1931-22	1921-12
1	Tot. Ht. - 85 (25.9)m Age - 70 DBH - 14.4 (36.6)cm No. of Cones = 550	Lumpy, straight, medium Seed Yield = 23.0 grams	.63	.69	.55	.93	1.34	1.51	1.37
2	Tot. Ht. - 77 (23.5)m Age - 65 DBH - 10.4 (26.4)cm No. of Cones = 298	Small, curved Seed Yield = 5.9 grams	.37	.41	.47	.78	.73	1.42	-
3	Tot. Ht. - 73 (22.3)m Age - 60 DBH - 9.3 (23.6)cm No. of Cones = 498	Small, curved Seed Yield = 5.0 grams	.58	.49	.49	.60	.99	1.40	-
4	Tot. Ht. - 78 (23.8)m Age - 62 DBH - 10.3 (26.2)cm NNo. of Cones = 448	Small, curved Seed Yield = 37.9 grams	.26	.42	.57	.58	.75	1.46	-
5	Tot. Ht. - 75 (22.9)m Age - 63 DBH - 11.4 (29.0)cm No. of Cones= 750	Lumpy, curved, medium Seed Yield = 4.1 grams	.60	.60	.76	.82	.83	1.31	-
6	Tot. Ht. - 73 (22.3)m Age - 55 DBH - 10.2 (25.9)cm No. of Cones = 569	Small straight Seed Yield = 21.4 grams	.61	.67	.77	.96	.79	-	-
7	Tot. Ht. - 83 (25.3)m Age - 59 DBH - 12.1 (30.7)cm No. of Cones = 785	Small, curved Seed Yield = 25.8 grams	.79	.81	1.06	.75	.80	-	-
8	Tot. Ht. - 70 (21.4)m Age - 59 DBH - 12.7 (32.2)cm No. of Cones = 970	Medium, slight curve Seed Yield =123.1 grams	.47	.61	.87	1.21	1.52	-	-

CONE COLLECTION

Once a tree was chosen for collection it was cut down and the cones were collected starting with the youngest. At first we collected all the cones on a tree. On the first twelve trees that ranged from 280 cones to 1,860 cones. When we cut down one tree and finished picking all the cones, we had 7,500 cones. The time spent picking all these cones and carrying them in burlap bags back to the road, up to a mile away, made us reevaluate our procedures. We decided to pick 1,000 cones per tree as a maximum. I would like to have picked all the cones because it is a one-time chance to do so, but it takes too much time.

With the tree on the ground we measured the total height and a cross section of the stem was cut out at DBH. These "cookies" were taken back to the office and the ten-year radial growth increments were measured.

Not only did we keep count of the numbers of cones picked, but also their shape and size. About half of the trees we selected had good, straight cones. The seeds were extracted at the Maine State Forest Nursery and then cleaned by hand. The cones yielded a high of 36 seeds per cone to a low of one seed per cone, with an average yield of 12 seeds per cone. Our selections as a whole yielded seed averaging 99,000 cleaned seeds per pound which is lower than the average given in the USDA Woody Plant Seed Manual (1974).

FUTURE SELECTIONS

This summer we will be using this basic technique to collect seed from an additional 50 - 75 trees. Most of the area we will be selecting in is accessible only by canoe. Because of the remote location, we will probably collect only 500 cones from each tree to save time. This should give us about 6,000 seeds per selection. I feel that summer employees with adequate training and sufficient motivation make excellent tree selectors. By having everyone, as a group, evaluate each candidate tree it was rare that I had to veto a selection.

The seed we are collecting will be used to establish a three-acre seedling seed orchard at our seed orchard site in Central Maine. This will be one of the few orchards established in the State to provide a source of local jack pine seed. Additionally, we plan to establish progeny tests at various locations using extra seed from these collections.

SUMMARY

Scott Paper Company's tree improvement efforts in jack pine revolve around collecting cones from superior trees in the Bradstreet Township area. These selections were begun last summer and will continue this summer. The seed will be used to establish a seedling seed orchard which will provide us with a local source of seed.

LITERATURE CITED

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