AN UPDATE ON TREE IMPROVEMENT AT THE WOODLAND DIVISION OF THE GEORGIA-PACIFIC CORPORATION

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ABSTRACT.--Selection of tamarack, developing a tamarack clonal seed orchard and larch species trials have been the primary thrust since the last NEFTIC meeting. A brief review of other tree improvement activities is also made.

THE WOODLAND DIVISION OF GEORGIA-PACIFIC CORPORATION is located in eastern Maine and southwestern New Brunswick. The total forest land base amounts to over 800,000 acres, with approximately 450,000 acres located in Maine and 350,000 acres located in New Brunswick. Timber on these lands are used to supply our pulp mill and building products mills. Two greenhouse complexes located in Old Ridge, St. Stephen, N.B. and Grand Falls, Woodland, Maine have produced over 14 million containerized seedlings since 1975 for our reforestation program.

In the last two years we have significantly shifted our seedling production to exotic larches. The reason in part for this shift is the need for a fast growing tree which is budworm resistant and compatable with land and the mills. These exotic larches are being tried in an essentially production level species trial with the known good performers, Japanese larch (Larix leptolepis (Sib. and Zucc.) Gord.) and Dunkeld larch hybrid Fx (L. eurolepis Henry) being planted in the greatest numbers. The other exotic larches being planted are Siberian larch (L. sibirica Ledeb.), Sudeten larch (L. sudetica), a strain of Siberian larch (L. sukaczwii), Duhurian larch (L. gmelini dahurica) and western larch (L. occidentalis Nutt.). These exotic larches have also been planted in two replicated species trials in 1981. Due to the very poor seed years for local tamarack (L. laricina (Du Roi) K Koch) this will be the first year that we have been able to grow a very small test. This material will be incorporated into future species trials.

CLONAL TAMARACK SEED ORCHARD DEVELOPMENT

Selection.--The point system selection method that was reported in the last NEFTIC meeting is still being used in Maine and the comparison tree selection system developed by the New Brunswick Tree Improvement Council (NBTIC) is being used on our lands in New Brunswick. Basically we are looking for young, fast growing, straight trees with small crowns and fine branches. Straightness is the single most sought after trait followed by volume growth and form.

This year in Maine we located and searched a number of young stands primarly on private ownerships. The company helicopter enabled us to locate potential stands from the air and then they were searched. If a potential plus tree was located we contacted the landowner to obtain permission to collect scion. Most of the stands found apparently originated from farm land abandoned in the 1940's and they indicated the potential for tamarack to produce high volumes in 30 to 40 years.

Some of our better plus trees include tree #EL-15-206 in the town of Pembroke on old farm land 37 years at DBH, 11.7 inches DBH, 70 feet tall and very good straightness. In Crawford tree #EL-15-202 growing on old pasture or clear-cut 33 years DBH, 11.8 inches DBH, 75 feet tall with good straightness. Though most of the trees were found on drained sites, a few fast growing stands were located growing on very wet sites. One of these found in Pembroke #EL-15-212, 33 years at DBH, 10.6 inches DBH and 62 feet tall with good straightness was found growing on a standing bog that had been clear-cut for tamarack fuel wood in the 1940's. Several very young trees were selected from stands 15 to 25 year. Tree #EL-15-203 growing on old pasture land in Pembroke 19 years at DBH, 5.1 inches DBH and 35 feet tall and very straight and good form. In 1982 we selected 19 plus trees and have included 17 into our program.

Scion collection.--As reported at the 1980 meeting we are using a 44 magnum rifle with a high eye relief 4 power scope to shoot 2 to 6 feet of the treetop down. However, sometimes the top hangs up in the lower branches or in the adjacent trees resulting in much gun powder being burned in shooting down the branches holding up the top. A new method of retrieval developed by Peter Carron, the University of Maine tree improvement technician, was used very successfully this year. A bow fishing outfit, minus the barb head, was used to shoot a line over the hung up top and to shake it loo3e. If

necessary this line was used to pull up a light rope so the tree could be more vigorously shaken to dislodge the hung up top. Limbs holding the top could also be broken with the rope. We found this system of retrieval very effective.

Grafting.--In the last two years 76 new tamarack plus trees were grafted on over 1400 Japanese larch root stock. Twenty-four of the trees were selected by G.P., 34 were obtained through NBTIC and 18 were selected in Maine by Nancy Strauch for her graduate work at the University of Maine at Orono. The same grafting method was used as reported at the 1980 meeting. With the expected 80 to 90 percent success rate there will be over 1200 ramets ready for field planting in the seed orchard in the near future.

Seed orchard planting.-- In the spring of 1981 a total of 518 ramets representing 33 tamarack ortets were planted in the seed orchard at Grand Falls. A 950 John Deer tractor with a 14 inch post hole auger proved to be invaluable in that 20 to 30 holes/hour could be done versus the 4 to 5 holes/man/hour that we previously dug by hand.

Tamarack clonal orchard summary.--Presently we have 49 ortets planted represented over 600 ramets. This amounts to more than 3 1/2 acres of clonal orchard in the ground. With the addition of the 76 ortets grafted at the greenhouse in the near future we will have 125 ortets represented over 1700 ramets. This will increase the tamarack clonal orchard to about ten acres. To maintain a wide genetic base, our goal for the first generation seed orchard is to have 200 to 400 ortets.

OTHER SEED ORCHARDS

Clonal orchards.--A one-half acre hybrid larch clonal orchard has been established representing 10 ortets over 54 ramets. Scion for this orchard was obtained through NBTIC and was grafted on Japanese root stock. This seed orchard will be added to when more material becomes available.

The white spruce (Picea glauca (Moench) Voss.) clonal orchard initially started in 1975 has 60 ortets represented over 385 ramets. One ramet produced a few cones last year and a few more are expected to produce a few cones this year barring insect damage. Since 1980 scion from 17 plus trees primarily obtained through NBTIC and a few selections made on our New Brunswick land have

been grafted. When these are added in the near future to the seed orchard it will bring the total ortets to 77 represented by over 500 ramets. Due to its susceptibility to the spruce budworm we have dropped white spruce priority to a maintenance level and are presently only selecting trees through the NBTIC program on our New Brunswick lands.

Seedling seed orchards .--Two black spruce (Picea mariana (Miller) Britton, Sterns and Poggenberg) obtained through NBTIC and grown in the G.P. greenhouses have been outplanted in New Brunswick and in Maine. These are made up of over 200 families represented over more than 25,000 trees planted in 1980 and 1981. These seedling seed orchards are tied to family tests initiated throughout New Brunswick, one of which is located on our land in New Brunswick.

A Jack pine (Pinus banksiana Lamb.) seedling seed orchard of 89 families also obtained through NBTIC were planted in 1981 in both Maine and New Brunswick. A second Jack pine seedling seed orchard representing more than 60 families are presently being grown in our greenhouses and will be ready for outplanting later this summer or early next year. These are also tied to family tests planted throughout New Brunswick, two of which are on G.P. lands.

Hybrid larch breeding orchard .--A small hybrid larch breeding orchard has been planted using Japanese and sudeten larch planted in adjacent rows on 10 foot centers. We hope to establish a few more breeding orchards in the near future. Until they come on line we will continue to use the fx hybrid larch seed from our Dunkeld larch stands.

OTHER TREE IMPROVEMENT ACTIVITIES

Provenances tests.--The 23 source Douglas fir (Pseudotsuga menziessii var glauca (Beissn) Franco) provenance test field planted in Talmadge and Orient, Maine in 1979 were tallied last year. Due to the poor survival in Orient this test was abandoned. This poor survival can probably be attributed in part to a very difficult site to reforest and two unusual snowless winters in 1979 and 1980 which caused a lot of frost heaving and winter burning. The initial results are in Table 1.

An Ottawa Valley white spruce provenance test is

Table 1.

DOUGLAS FIR PROVENANCE TEST PLANTED SPRING 1979

TALLIED SPRING 1981 - % SURVIVAL

Source	Location	Talmadge[1]	Orient[2]
Pike N.F.	Colo.	98.75	41.67
Herbst Brothers	Unknown	92.50	36.67
Obrich Creek	Wash.	91.25	41.67
Listle Creek	Mont.	91.25	41.67
San Jaun N.F.	Colo.	86.25	28.33
Covert Creek N.F.	Idaho	86.25	23.33
Liver Gulch	Mont.	83.75	16.67
Middle Mountain	Colo.	83.75	36.67
Shuswad Lake	Unknown	83.75	33.33
Smith Creek	Mont.	78.75	28.33
Kaibab	N.M.	78.75	35.00
Clear Water River	Mont	77.50	48.003
McMurphy	B.C.	77.50	33.33
Johnson Lake	B.C.	75.00	41.67
Shaddock Butte	Idaho	73.75	28.33
Trapper Creek	Idaho	70.00	48.33
Bonner Creek	Idaho	68.75	11.67
Silver Creek	Wash.	66.25	16.67
Lincoln N.F.	N.M.	63.75	11.67
Brenton Creek	Idaho	61.25	28.33
Lincoln	N.M.	55.00	20.00
Apache N.F.	Unknown	47.50	13.33
Cocono N.F.	Unknown	36.50	13.33

[1] Talmadge - 10 reps - 10 tree rows

[2] Orient - 6 reps - 10 tree rows

[3] Orient - Clear Water River 4 reps - 10 tree rows

being maintained and will be reported through NBTIC. In Maine the UMO Tree Improvement Program has a Scotch pine (Pinus sylvestris L.) provenance test and a jack pine provenance test on G.P. land. A white pine (Pinus strobus L.) provenance test obtained through Clyde Hunt, USFS, which was planted in Talmadge in 1979, has been released with an early spring application of Simazine in 1981. A survival tally made in August 1981 indicates an overall good survival. We hope to have 5 year results to report at the next meeting in 1984.

Progeny tests.--A small progeny test of Japanese larch obtained from Jack Winieski, Dept. of Environmental Resources, Pennsylvania, containing eight seed sources and one bulk seed orchard lot, was planted in Talmadge in 1979. Last year's survival tally looked good, though there are no obvious differences between seed lots yet.

Related tree improvement activities.--Georgia-Pacific has been a working member of the New Brunswick Tree Improvement Council since its inception in the 1970's. One of our New Brunswick Foresters, Bruce Frazer, has been responsible for our work with the Council; selecting trees, grafting, growing seedling seed orchards in our greenhouses and outplanting them, outplanting family tests, maintaining all these field plantings and record keeping. With the other members of NBTIC we have jointly sponsored research at the University of New Brunswick on cone and seed production in young black spruce and a relative wood density study of the plus trees in the NBTIC program. NBTIC is a very vital part of Georgia-Pacific's improvement effort.

At the University of New Brunswick a new tree improvement chair has been initiated through the joint support of a number of companies in New Brunswick and the Maritimes. As a supporter of this chair, which has been filled by Dr. Morgenstern, we are looking forward to working closely with him.

In Maine G.P. has been an active supporting member of the tree improvement program at the University of Maine in Orono since it started in 1975. In 1981 a Georgia-Pacific graduate assistantship for tree improvement work on tamarack was set up under the direction of Dr. K. Carter. It is presently being filled by Nancy Strauch. This study has also been assisted through the use of our helicopter to spot stands, the use of the 44 magnum rifle for scion collection and the exchange

of information and material.

SUMMARY

This update is to help keep you informed of our tree improvement activities at the Woodland Division of the Georgia-Pacific Corporation, so that we may exchange needed information, ideas and material to help further tree improvement in the Northeast.