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Proceedings of the Fifth Meeting
OF THE
COMMITTEE on FOREST TREE BREEDING
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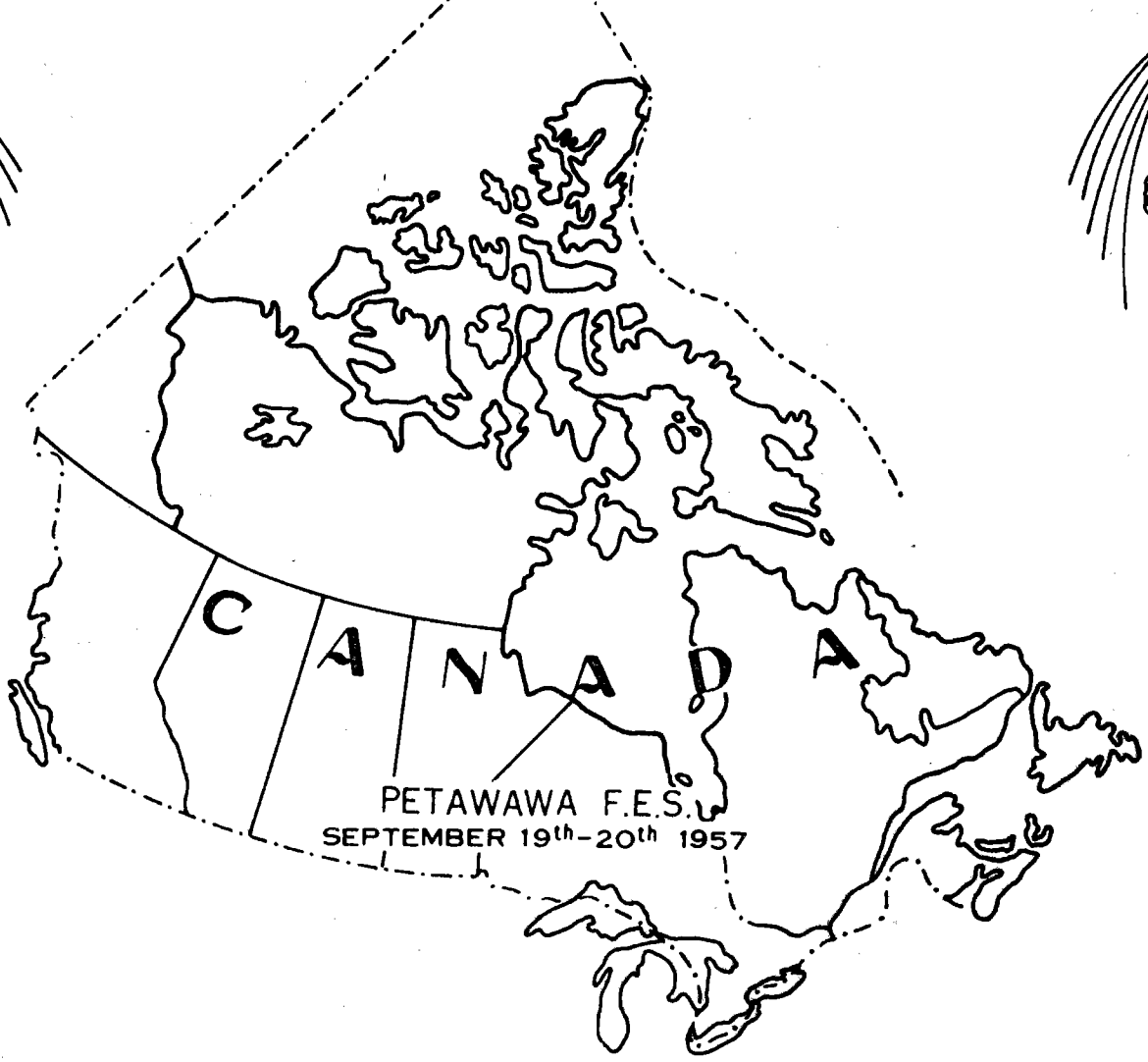

Part II
Reports and Papers

PROCEEDINGS OF THE FIFTH MEETING OF THE COMMITTEE ON FOREST TREE BREEDING IN CANADA

Held at Petawawa Forest Experiment Station, Forestry Branch, Department of Northern Affairs and National Resources, Chalk River, Ontario

on

September 19th and 20th

1957

Part I of the Proceedings, which includes the Minutes of the Meeting and Discussion of Reports, received restricted distribution to Committee members only.

Part II is distributed for information to persons and organizations outside of Canada who are actively engaged in forest tree breeding and forest tree improvement.

The Proceedings are prepared and distributed by the

Forest Research Division

Forestry Branch

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Department of Northern Affairs and National Resources

Ottawa

PART II

PROGRESS REPORTS AND PAPERS SUBMITTED

TO THE COMMITTEE

SEPTEMBER, 1957

BY: - -

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List of Active Members, September, 1957.

A.

REPORT TO THE COMMITTEE ON FOREST TREE BREEDING

by:

A.J. CARMICHAEL
and
G.B. WITHERS

Ontario Department of Lands and Forests

Ontario Tree Seed Plant

Angus

Ontario

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TEST PLANTING 1956

A. Planting Procedure

The use of a marker to maintain an accurate spacing between furrows has continued to improve the uniformity of hand planting. In order to extend this uniformity to the location of trees in the furrow, a method has been devised whereby the alignment of two pickets designates the location of each tree. A row of pickets is placed at six foot intervals along the edge of a furrow at one side of the planting area. Pickets with two contrasting colours (red and white, blue and yellow) are set alternately in the row. A similar row is placed beside a furrow approximately 240' from the first. A third row is placed between the two by alignment, from one side of the field. When planting, the alignment of two appropriate pickets (red and white, or blue and yellow), will designate the exact location for each tree. The method is simple, gives an accurate spacing and does not delay the planting.

The steel rods, referred to in the March 1956 report, for marking sample blocks, are unsatisfactory. Aluminum stakes are being used but are not sufficiently conspicuous. A 2" × 2" painted, wooden stake seems to be as satisfactory as any except for the replacement problem.

B. 1956 Planting Program

1. General

Each test planting was arranged in four replications with randomized blocks. A sample block of one source contained 100 trees, 10 rows of 10 trees, unless otherwise noted. Whenever possible, a 14" wide ploughed furrow was made and the trees planted by hand using the wedge method, at a spacing of 6' × 6'.

Replacements of each source were lined out in furrows adjacent to the planting sites, for refill planting in spring 1958.

2. White Pine Provenance Test

Cone collections were made in two sections of the Boreal Forest Region (Halliday, B7, B9), and four sections of the Great Lakes--St. Lawrence Forest Region (L1, L2, L4, L 10). Plantings were made, using 2-2 stock, in Hill's Site Regions 4, 5 and 6 as follows:

Seed Source			Planting Site			
Locality	Halliday's Section	Hills' Site Region	Site Region 4 Tp. 11C	Site Region 4 Morse Tp.	Site Region 5 Rose Tp.	Site Region 6 Hope Tp.
Timmins	B7	3	-	-	X	-
Port Arthur	B9	4	X	X	-	X
Angus	L1	6	X	X	X	X
Kemptville	L2	6	X	X	X	-
Massey	L4	5	X	X	X	X
Douglas	L4	5	X	X	X	X
Mattawa	L4	5	-	-	-	X
Blind River	L10	5	X	X	X	X

The planting in Site Region 6 varied from normal in that the block size was reduced to nine rows of nine trees in each row in order to fit the planting to the area available.

3. Red Pine Provenance Test

Cone collections were made in one section of the Boreal Forest Region (Halliday, B9) and six sections of the Great Lakes--St. Lawrence Forest Region (L1, L2, L4, L9, L10, L11), to provide twelve sources of red pine seed. Plantings were made, using 2-2 stock, in Hills' Site Regions 3, 4, 5 and 6 as follows:

Seed Source			Planting Site			
Locality	Halliday's Section	Hills' Site Region	Site Region 3 German Tp.	Site Region 4 Morse Tp.	Site Region 5 Rose Tp.	Site Region 6 Hope Tp.
Port Arthur	B9	4	X	X	X	X
Bruce	L1	5	X	X	X	X
Angus	L1	6	X	X	X	X
Kemptville	L2	6	X	X	X	X
Mattawa	L4	5	X	X	X	X
Douglas	L4	5	X	X	X	X
Golden Lake	L4	5	X	X	X	X
Pembroke	L4	5	X	X	X	X
Barry's Bay	L4	5	X	X	X	X
Temagami	L9	4	X	X	X	X
Thessalon	L10	5	X	X	X	X
Eagle River	L11	4S	X	X	X	X

The planting in Site Region 4 varied from normal in that the trees were planted by the T-Method without furrowing, and the sample block was reduced to five rows of five trees in each row.

4. Scotch Pine Christmas Tree Test

Eight sources of Scotch pine seed were used, seven were obtained from commercial dealers and one was collected in Norfolk County. Plantings were made, using 2-1 stock, in Hills' Site Regions 3, 4, 5 and 6, as follows:

Seed Source		Planting Site			
Place	Dealer	Site Region 3 German Tp.	Site Region 4 Morse Tp.	Site Region 5 Rose Tp.	Site Region 6 Hope Tp.
Norfolk	Ont. L. & F.	X	X	X	X
Cevennes	Est.Versepuy	X	X	X	X
Adirondacks	F. Herbst	X	X	X	X
L.Austria	F.W.Schumacher	X	X	X	X
Denmark	Anton Mielsen	X	X	X	X
Campigne	Est.Versepuy	-	-	X	X
Belgium	R. Firmin	X	-	-	-
Auvergne	Est. Versepuy	-	X	-	-

The planting in Site Region 4 varied from normal in that the trees were planted by the T-method, without furrowing, and the sample block was reduced to five rows of five trees in each row.

C. 1955 Test Plantings

1. Jack Pine Provenance Test

The plantings in Maria Tp., Site Region 5 and Cane Tp., Site Region 4 could not be maintained at full stocking with a sample block size of 400 trees. These were reduced in size from 400 to 100 trees by re-marking a smaller block in the centre.

Replacement plantings were made in both townships, by the Reforestation Supervisors of Pembroke and Swastika Districts, in spring 1957. The large size of the replacement stock (12" - 30"), and the irregularity of spacing due to machine planting complicated the work. In future, hand planting at a uniform spacing will be used.

D. 1954 Test Plantings

1. Red Pine Provenance Test

Replacement plantings could not be arranged as planned for this test, in 1957.

2. Scotch Pine Christmas Tree Test

In the fall of 1956 (late October, early November) observations were made in the Site Region 3, 5 and 6 plantings, of foliage colour change and counts taken of the number of lateral buds surrounding the terminal bud. Most trees are still too small to make comments as to their form.

The varieties received from France have the best coloured foliage in Site Regions 3, 5 and 6, and attain their best colour in Site Region 6 at Cambridge Tp. near Ottawa (the most southerly planting). This source also has the highest numbers of lateral buds in all three Site Regions with the exception of a West Baltic and Adirondacks (Herbst) sources.

All sources produce darker foliage in the Southern plantings than in the Northern Plantings and each produces more lateral buds in the South than in the North. An increase in the number of lateral buds should increase the density of branches and improve the appearance of the trees.

Source	No. Lateral Buds		
	Site Region 3 German Tp.	Site Region 5 Rose Tp.	Site Region 6 Cambridge Tp.
France	3.6	3.9	7.4
W. Baltic	2.9	5.5	7.2
Finland	0.9	1.2	3.3

Rather extensive variation was found in all counts and there would seem to be some relationship between the soil type, the foliage colour and the number of lateral buds.

A small test is being made of the effect of pruning on the formation of buds, to determine which variety will produce an optimum of about 15 lateral buds after pruning.

3. Mugho Pine Christmas Tree Test

An inspection of the sources planted indicates that all are bush types and no single-stemmed habit has been produced.

4. Pine Shoot Moth Test

A comparison of Pinus nigra cebennensis from Cevennes, France, and red pine from Douglas in Site Region 5 is being made on two areas, to determine if there is any difference in the attack of shoot moth on these species. The following information was obtained by the Forest Biology Ranger Staff:

No. Trees Attacked by Shoot Moth

Species	1954		1955		1956	
	S.R.6	S.R.7	S.R.6	S.R.7	S.R.6	S.R.7
Red Pine	16	7	110	245	121	277
P. nigra cebennensis	30	11	21	82	20	45

N.B. Sample Size - Site Region 6 - 400 trees X 4 replications.
Site Region 7 - 200 trees X 4 replications.

A change in the method of examination was made in 1957 to indicate the reaction of the two species to attack by shoot moth. Four rows were selected in a random manner in each sample block and a total count of the number dead and the number attacked by shoot moth was taken for these rows. Three trees were randomly selected in each of these rows and a count made of the number of shoots attacked in each whorl, and the form of the tree described. The average for the four sample blocks of each species is as follows:

Species	Av. per Row of 20 Trees No. Dead	No. Trees Attacked by Shoot Moth	Total Ht. to 1956 inches	1956 Increment	*Form S-D-M	No. Shoots Attacked by Whorls **0	1	2	3	4
Site Region 6										
Red Pine	10.2	5.4	13.0	2.5	7-2-3	0.9	0.8	0.7	0.8	0.1
P. nigra	2.5	2.3	11.2	3.4	9-1-2	0.2	0.2	0.2	0.0	0.0
Site Region 7										
Red Pine	1.0	3.2	13.2	3.7	2-2-5	0.1	0.1	0.0	0.1	0.0
P. nigra	0.9	0.6	13.7	4.8	6-1-2	0.0	0.0	0.0	0.0	0.0

* S-D-M = single, double or multiple stem. The form of twelve trees is given, which is the average of four samples of twelve trees each.

** 0 whorl = This is the terminal shoot of the plant. In the case of double stemmed trees there are two of these and three or more for multiple stemmed trees.

N.B. The high mortality of red pine in Site Region 6 was due to grasshopper damage in the very dry summer of 1955.

The 1957 examination indicates that red pine continue to be attacked more frequently than Austrian pine. The Austrian pine are beginning to show a greater annual height increment and tend to have a single stemmed growth habit even after shoot moth attack. The general infestation, as indicated by this test, in Site Region 6 is four times as heavy, while in Site Region 7 it is the same for red pine and only half as great on Austrian pine as it was in 1956.

SEED PRODUCTION

A. Seed Production Areas

1. Nairn Township

This area will not be treated until the red pine trees recover from a severe attack by a midge insect which resulted in the loss of considerable foliage for several years.

2. Lynn Tract, Drury Forest

The fruit induction tests which were to be planned for this area of red pine, have been delayed until more information can be obtained on the effects of site on flower production. Mr. R.D. Carman carried out a preliminary soil survey of the area and selected 15 sites on the basis of topographic position and growth of the red pine. On each site selected, two replications of eight trees were established with four trees chosen for female flower counts within each replication, and four trees left for later treatment. The eight trees on each site chosen for female flower counts were further marked with zinc tags lettered A to O between sites and numbered 1 to 8 within sites. The eight trees on each site left for later treatment have yet to be numbered 9 to 16 and have flower counts made.

Description of Broad Sites Chosen by Topographic Position and Growth of the Red Pine

Site A - Steep south slope, middle position; fair growth.
B - Gentle west slope, middle position; good growth.
C - Moderate north slope, middle position; good growth.
D - Steep north slope, upper position; poor growth.
E - Ridge; poor growth.
F - Depressed flat; good growth.
G - Flat; good growth.
H - Gentle east slope, middle position; good growth.
I - Steep south slope, middle position; good growth.
J - Steep northeast slope, middle position; poor growth.
K - Steep west slope, upper position; poor growth.
L - Moderate west slope, lower position; fair growth.
M - Moderate west slope, lower position; good growth.
N - Steep south slope, upper position; fair growth.
O - Steep south slope, middle position; good growth.

Counts were made in June 1957 and the number of 1 year old and 2 year old cones per whorl recorded. There were no 1 year old cones on any site. The number of 2 year old cones is as follows:

Site	Number of 2 year old cones per tree								
	Replication 1				Replication 2				
	Tree 1	Tree 2	Tree 3	Tree 4	Tree 5	Tree 6	Tree 7	Tree 8	Avg.
A	54	27	0	54	50	32	45	55	39.6
B	40	7	63	58	13	19	23	55	34.7
C	0	27	10	14	-	-	-	-	12.7
D	28	34	81	36	11	6	13	33	30.2
E	30	6	48	64	170	14	6	29	45.9
F	112	131	0	96	4	0	3	0	43.2
G	0	0	0	0	0	0	2	8	1.2
H	7	0	6	0	0	4	1	0	2.5
I	65	93	114	65	35	26	102	23	65.4
J	0	32	2	1	18	35	7	0	11.9
K	7	16	11	-	0	0	2	0	5.1
L	5	51	55	44	0	1	0	11	21.0
M	0	3	2	1	0	2	0	3	1.4
N	78	3	25	12	27	9	59	32	30.6
O	4	9	2	3	0	1	3	0	2.7

The trees selected will be re-examined to try and determine the cause of variation between trees on the same site. Mr. K. Armson of the University of Toronto plans to carry out foliar analysis tests to correlate cone production with the nutrient uptake of the tree. When fertilizer treatments are applied to individual trees, further foliar analyses would be carried out.

B. Seed Orchard Production

1. White Pine

In the winter of 1956, approximately 2700 grafts of white pine were made for Dr. Heimburger, to preserve various clones at Connaught Ranges. A series of greenhouse difficulties weakened many of the grafts and reduced the normal survival for the species. About 2200 or 80% were delivered to Maple in spring 1956. Another 4% have survived at Angus, although they were originally thought to be dead.

In order to increase the white pine cone production for Site Region 3, 1100 white pine, 2-2 stock, were planted at Maria Township in spring 1957 for later field grafting and 1000 white pine 2-2 stock, were potted for greenhouse grafting in winter 1957-58.

2. Red Pine

Site Region 3

The accumulation of scion materials from northern Ontario has continued. In February 1956 scions were collected by the Reforestation Supervisor at Swastika and shipped to Angus. Two hundred and ninety-six grafts were made in the greenhouse mainly on Scotch Pine. The survival on June 20, 1956 was 65% and on July 26, 1957 was 44%.

In February 1957, scions were collected by the Reforestation Supervisor at Cochrane and shipped to Angus. Eleven hundred grafts were made in the greenhouse mainly on Scotch pine. The growth of these scions has been very irregular and generally slow, so that no survival figure is available. When sufficient scions become available from grafted materials, they will be sent to the Ontario Division of Research, Maple, for clonal testing. While these are being tested, seed orchards will be established to increase the bulk production of seed for Site Region 3.

Site Region 5

Nine hundred and five red pine scions were grafted in Head Township, using materials supplied by the Petawawa Forest Expt. Station, in order to determine the procedure of orchard establishment by field grafting.

Scotch pine established in 1953 as stock plants, were in an area surrounded by native and planted red pines. For this reason Site Region 5 scions were used, although additional cone producing stands are not required for this region. Survival of the grafts seven weeks after grafting shows that 76% of the scions have new growth. The pattern of the failures would seem to indicate that a portion of the loss is due to the poor grafting qualities of one of the clones.

3. Scotch Pine

Timber Types

The propagation of 10 new selections from the Nellie Lake group of trees, in Cochrane District, was carried out in 1957. A two acre field has been prepared for field planting of an orchard in 1958 utilizing the original selections.

Arrangements are to be made to test the timber strengths and pulping properties of some of the parent trees and to compare these with jack pine from the same region. When sufficient seed is available from orchard stock, test plantations will be established to compare the growth of this Scotch pine with jack pine.

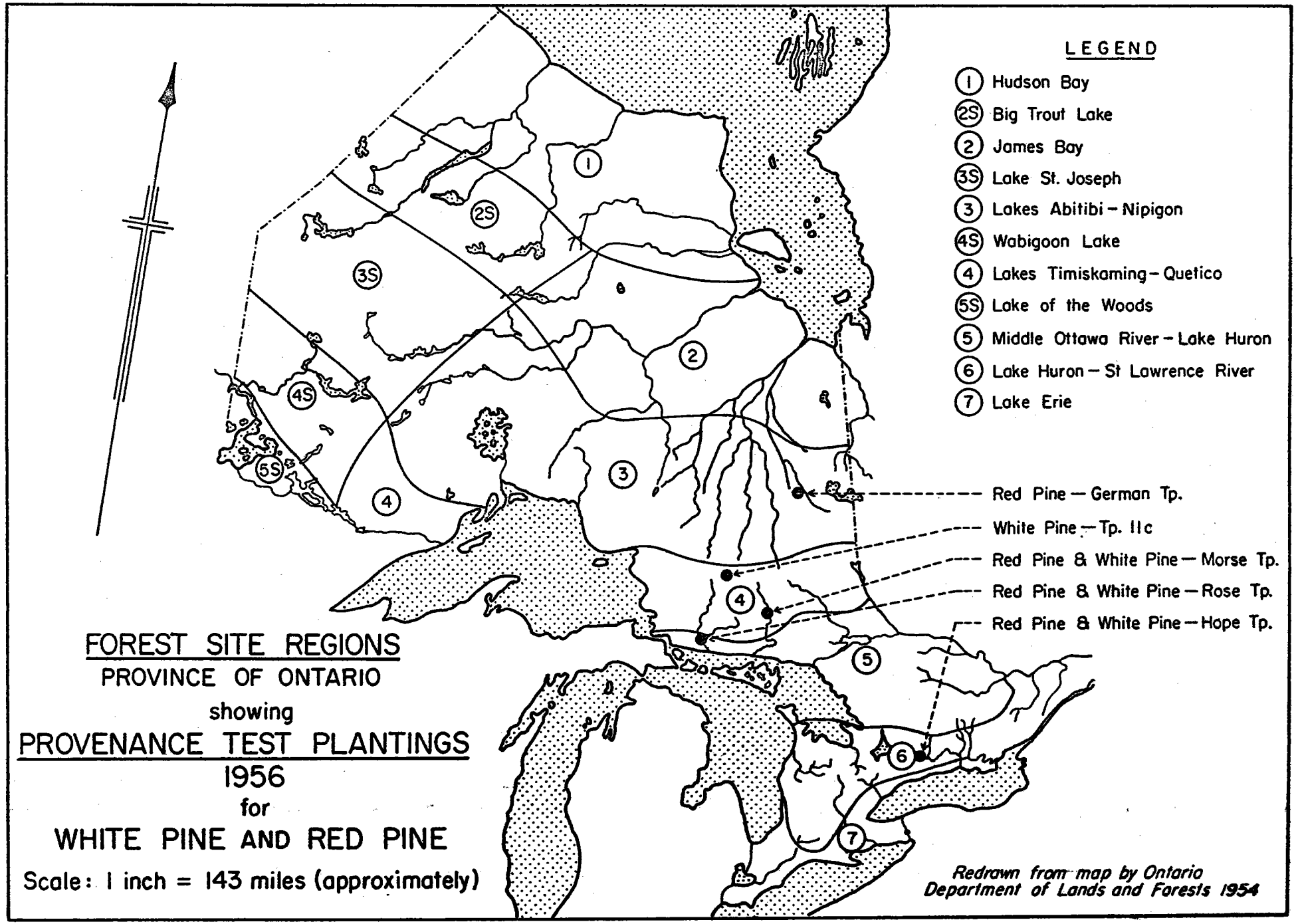
4. Yellow Birch

The grafting of selected veneer quality birch from the Algonquin Highlands has continued. In 1956, 134 grafts were made with a success of only 10%. In 1957, 444 grafts were made, with what appeared to be a high survival. Fungus attacks on the foliage reduced this to 34% by July 20. Bordeau mixture applied weekly is the best treatment available at present.

A survey, by means of aerial photographs, was made by R. D. Carman to locate potential birch seed orchard sites. It covered about 2700 square miles in the Muskoka and Haliburton area. Mr. Carman's report states:

"The specific location had to have a minimum of 2 acres clear with a 20 chain radius which was free or could be freed from yellow birch. A moulded till appears to offer the most advantages as it is a rich material, is usually moderately deep to deep, and has a smooth topography. The dumped till is less rich, is usually shallower and has a rougher topography. The fine sand appears to be the least advantageous as it is poorer in nutrients."

With this basis of suitability, Lots and Concessions were marked on Topographic maps for field checking. When field checking is completed there will be a sound basis for land purchase.


LEGEND
1 Hudson Bay
2S Big Trout Lake
2 James Bay
3S Lake St. Joseph
3 Lakes Abitibi – Nipigon
4S Wabigoon Lake
4 Lakes Timiskaming – Quetico
5S Lake of the Woods
5 Middle Ottawa River – Lake Huron
6 Lake Huron – St Lawrence River
7 Lake Erie
Red Pine – German Tp.
White Pine – Tp. IIc
Red Pine & White Pine – Morse Tp.
Red Pine & White Pine – Rose Tp.
Red Pine & White Pine – Hope Tp.
FOREST SITE REGIONS
PROVINCE OF ONTARIO
showing
PROVENANCE TEST PLANTINGS
1956
for
WHITE PINE AND RED PINE
Scale: 1 inch = 143 miles (approximately)
Redrawn from map by Ontario Department of Lands and Forests 1954

B.

SUMMARY REPORT FOR 1956

SHELTERBELT TREE BREEDING & NURSERY PROBLEMS

by:

W.H. CRAM

Forest Nursery Station

Experimental Farms Service

Canada Department of Agriculture

Indian Head

Saskatchewan

SHELTERBELT TREE BREEDING & NURSERY PROBLEMS

In 1956 the research program was expanded to include:1) Nursery and 2) Seed Viability Problems, in addition to existing breeding and improvement projects for Caragana, Spruce, Pine and Poplar. Services of a third technician and one laborer were made available for the two new phases of work after July. A new headerhouse with office-laboratory space and a new greenhouse are scheduled for construction in 1957. Encouraging progress is reported for 1956, despite increased administrative duties and a serious infestation of spruce seed insects.

Breeding work was confined to plants in the open, while existing greenhouse facilities were utilized for seed studies. An early spring with cold and wet weather prevailed until May 15, but was followed by a clear and dry period favorable to field breeding. A frost-free period of 118 days from April 10 to September 6 was experienced in 1956.

A brief summary of the 1956 results for active research projects follows.

CARAGANA

Cross-and self-compatibility studies in 1955 and 1956 with Caragana arborescens demonstrated that seven self-incompatible selections were cross-incompatible. However, three were highly cross-compatible with pollen of 12 vigorous and self-compatible selections. Hybrid seed from the 1955 determinations was sown in the greenhouse in January 1956 and the resulting hybrid progenies planted May 1956 in field vigor tests. The most vigorous progenies should identify the superior cross combinations. Mass production of hybrid seed of these combinations will be possible from Natural Crossing blocks of the two selections forming each superior combination.

Rooting of Softwood Cuttings was found to decrease with maturity of the wood. Results of a 1956 rooting test for two trees have been summarized in Table 1. It was evident that caragana was readily propagated by cuttings, if collected from June 14 to June 28. However, as moisture content of the cuttings at harvest decreased from 77 to 66%, rooting capacity decreased from 74 to 2%. Rooting of basal cuttings was materially increased by the hormones, until moisture content of the cuttings fell below 70%. Maximum rooting of basal cuttings was obtained when the moisture content at harvest was 75% Rooting of tip (or terminal) cuttings was inferior to that of basal cuttings until moisture content of the cuttings had fallen below 68%.

Table 1. Rooting and Moisture Content of Terminal and Basal Cuttings of Caragana at Six weekly Intervals.

(Averages for Two Trees)

date of collection	Moisture Content[1] Tip	Base	Ave.	Tip Cuttings[2] +	-	Basal Cuttings[2] +	-	Mean Rooting
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
June 14	79	75	77	70	50	95	80	74
June 21	79	73	76	50	60	85	50	61
June 28	74	70	72	55	40	55	40	47
July 5	69	68	69	5	5	0	15	6
July 12	68	67	67	0	10	0	10	5
July 26	66	66	66	0	10	0	0	2

[1]Moisture content (wet weight) of cuttings when collected
[2]Rooting with (+) and without (-) Rootone Hormone

SPRUCE

A small Seedcrop of spruce was further reduced by severe insect infestations in 1956. Large numbers of the male flowers were destroyed by larvae of the Owlet moth (Epizeuxis sp.) in late May. Twenty-five percent of the female buds on Colorado spruce (Picea pungens) were destroyed by larvae of the spruce budworm (Choristoneura funferana) in early June. In addition, 70% of the cones, which were produced from the 1956 Colorado Spruce breeding program, were damaged or destroyed by insects. Larvae of the spruce cone worm (Dioryctria abietella) caused most of this damage and larvae of the spruce seedworm (Laspeyresia Youngana) a lesser amount. (Note:- the above insects were identified by courtesy of the Forest Biology Laboratory, Science Service, Winnipeg.)

Seven Insecticides were investigated for the control of insects which attack spruce cones and seed. Female cones on two trees of white spruce (Picea glauca) were isolated in the bud stage by sausage casing bags. The isolated flowers were cross-pollinated with a pollen mixture to ensure cone set. Five series of seven insecticides were applied a week later to the fertilized cones within 35 bags on the two trees. The mature cones were classified (after extraction of seed) as to insect infestation by Mr. L.O.T. Peterson, Entomologist, Forest Biology Laboratory, with the results listed in Table 2. Insect infestations were not materially reduced by any of the insecticidal treatments. It was evident that insecticides must be applied in the pre-bloom stage to be effective. Reliable techniques were evolved for applying the dust form of insecticides for subsequent studies.

Table 2. Percentage of Insect Infested Cones of White Spruce Following Seven Insecticidal Treatments[1]

Series	D.D.T.	Malathion	Starch	Lindane	Endrin	Benexane	Methoxychlor
(Ranked)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
1	29.3	40.0	29.6	30.4	33.3	29.4	26.1
2	27.6	28.3	28.1	21.4	22.7	23.8	16.7
3	23.1	24.5	25.0	20.0	15.4	17.9	16.1
4	22.6	7.0	16.0	15.0	12.0	12.1	14.3
5	20.0	0.0?	0.0?	0.0?	0.0?	11.1	11.8
Means							
General	24.5	20.0	19.7	17.4	16.7	18.9	17.0
Weighted	24.5	24.9	24.6	21.7	20.8	18.9	17.0

[1]Insecticides applied as 5% dust with starch (except 2% Endrin preparate) (Courtesy of L.O.T. Peterson, Forest Biology Laboratory, Indian Head.)

Self - and Cross - Compatibility investigations for Colorado spruce were seriously distorted in 1956 by the above mentioned insects. Only 20 trees with sufficient female flower buds were readily accessible for the 1956 breeding program. Three to six bags of bloom were utilized to determine effectiveness of isolation, self-and cross-compatibility of each tree. The results while incomplete suggest that eight trees were self-incompatible and five were cross-incompatible with two deep blue 'tester' selections. Average self and cross sets were reduced to one-ninth that of open-pollination apparently due to a combination of insect protection and high temperatures within isolation bags. Nevertheless, the 1956 investigations demonstrated the value of sausage casings as isolation bags for spruce breeding. The value of shading, by adding a paper bag during the pollination period, is being determined in 1957. Bagging of male flower buds on the tree hastened pollen dehiscence. Pollen from these bags was more bountiful and viable than that from detached branches.

Survival, Vigor and Coloration data for 8-year-old progenies of 25 Colorado spruce bore no relation to that for the same seedlings four years previously. However, marked differences existed between progenies for all three characteristics. For example, the proportion of blue seedlings ranged from 12 to 97% for the 25 progenies. Nevertheless, the age at which Colorado Spruce seedlings attain maturity of these characteristics has yet to be determined.

Provenance Trials to evaluate spruce species under prairie conditions were initiated in 1956.

Two-year-old seedlings of 15 white spruce provenances (from Quebec, Ont. & U.S.A.) were received from the Petawawa Forest Experimental Station (Courtesy of M. Holst) and planted in the transplant plots.

Seed accessions of nine white, two red and two black spruce (from Sask., Man., Ont. and N.B.) were sown in the seedbeds.

Methods for Grafting selections of Colorado spruce were investigated in 1956. Two-year-old seedlings, which were potted in April 1955, were brought into the greenhouse on April 6, 1956. Cleft, side and bottle grafts were made at four weekly intervals from April 12 to May 2. The average catch for the tree types of grafts was 45, 27 and 9%, respectively.

PINE

Progeny Tests, involving 88 seedtrees from plantations of seven Scotch pine races, were field planted in 1952 and 1953. Records for needle-burn, survival and vigor in 1956 revealed that vigorous progenies and outstanding seedlings were produced by seedtrees of each race. Eighty-five seedlings were selected for vigor and resistance to needle-burn. A slight relationship (r= .55) existed between the height of the 4- and 8- year-old seedlings.

POPLAR

Seventeen poplar clones were selected, from 80 hybrids and 40 species in test plantations on the station, on the basis of performance and rooting ability. A 1951 rooting test of these 17 clones was thinned to 4 x 4 foot spacings for a performance recheck. Records on survival, disease and vigor of these clones in 1956 have been summarized in Table 3. One poplar clone, FNS-52,

Table 3. Rooting in 1951 and subsequent Performance in 1956 of 17 Poplar Clones

Clone	Rooting 1951	Survival 1956	Disease[1] 1956	Height[2] 1956
	(%)	(%)	(rank)	(ft.)
P. X. FNS-#52	78	94	0	25.0
P. X. 38P38	67	75	2	20.6
P. tristis #1	84	87	2	20.0
P. gelrica	73	87	2	18.5
P. X Northwest	59	75	1	17.8
P. X Brooks #4	67	6	1	15.9
P. Sargentii	55	19	4*	15.6
P. X Brooks #7	74	25	4	15.3
P. incrassata	45	6	3*	13.6
P. X Dunlop	92	19	3	12.9
P. X Sask.	74	94	1	12.9
P. X BNW #4	61	100	0	12.2
P. X. Wheeler #4	76	6	5	11.1
P. X Volunteer	91	0	-	- -
P. X Brooks #10	77	0	-	- -
P. X PAS #2	68	0	-	- -
P. angustifolia	59	0	-	- -

[1]Ranking from 0 to 5 for incidence of cankers or die-back*
[2]Average height in feet