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NATIONAL RESEARCH COUNCIL OF CANADA

PROCEEDINGS

OF THE

TENTH MEETING

OF THE

SUBCOMMITTEE ON FOREST TREE BREEDING

OTTAWA

8 APRIL, 1943

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Held at the National Research Council, Ottawa, 8 April, 1943

Members present:

Dr. J.G.Malloch, Chairman
Dr. C.E.Atwood
Dr. N.H.Grace
Dr. C.Heimburger
Mr. W.M.Robertson
Dr. A.J.Skolko
Dr. L.P.V.Johnson, Secretary

103. Minutes — The minutes of the Ninth Meeting were read and approved with the provision that the following be added as a preamble to Appendix A:

1. The primary objective must be to organize the work so that the most effective results may be obtained.

2. Any decision as to the location of projects must be based on the best judgment in relation to No. 1 above.

3. Tree species of economic importance should be given major consideration in tree breeding work. For this reason, the following are considered essential projects.

104. Dr. Johnson's report — Dr. Johnson reported on the progress in the breeding work and indicated the main points in the proposed program for 1943. This report is attached hereto as Appendix A.

Mention in Dr. Johnson's report of experiments on hybridization technique led to considerable discussion. It was agreed that both Dr. Johnson and Dr. Heimburger should be encouraged to continue such experiments, especially in connection with designing a better protective flower covering than the glossine and canvas bags

now in use, both of which have serious disadvantages. Dr. Johnson agreed to go further into the matter after discussing with Dr. Woodcock the properties of the various protective wrappings used in the latter's experiments in food storage.

105. Dr. Heimburger's report

Dr. Heimburger gave a report on the progress and plans relating to his work, the details of which are given in Appendix B.

106. Dr. Grace's report

Dr. Grace stated that his part in the advancement of vegetative propagation during the year had been a small one, and would probably continue to be so for the duration of the war. He expressed great satisfaction with the progress Dr. Heimburger had made.

107. Dr. Skolko's report

Dr. Skolko reported on the inspection of poplar breeding materials for rust infection, details of which are given in Appendix C. He indicated that the pathological work during 1943 would likely be restricted to inspection of natural infection of breeding materials.

108. Dr. Atwood's report

Dr. Atwood gave no formal report, since the entomological work relating to tree breeding is co-operative and results are reflected by the reports of co-operators. He placed his services at the disposal of the subcommittee insofar as his established program of other work would permit.

109. Transfer of materials

Dr. Heimburger indicated the nature and amount of pine material to be transferred from Petawawa to the Disease Garden, in order that Dr. Johnson might make the necessary preparations for handling it. It was agreed that the transfer of materials from the Annex to Petawawa would be greatly facilitated if Dr. Heimburger would call at the Annex and pick up the material just before leaving for Petawawa.

110. New Members

The chairman brought attention to the necessity of replacing two retiring members, Mr. C.G. Riley, pathologist, and Mr. D.E.Gray, entomologist, both of whom have joined the armed forces. The meeting unanimously agreed to recommend Dr. A.J.Skolko as the pathologist member and Dr. C.E.Atwood as the entomologist member. The appointments will be made by the Associate Committee on Forestry.

Dr. Johnson had on display at the meeting, a number of colchicine-treated and check plants of fir, maple and ash, together with two microscopes for observing chromosomes of a "giant amphidiploid" and a check grand fir.

APPENDIX A

Report for 1942-43

by

L.P.V.Johnson

Experiments Previously in Progress

I-B-1. Interspecific hybridization in forest-tree genera. Greenhouse hybridization in Populus resulted in the production of the following hybrids: P. alba-36 x P.grandidentata, P. berolinensis x Lombardy, P. alba-36 x P. deltoides, and P. berolinensis x P. deltoides. Only seedlings of the first two named survived to the end of the growing season.

The only other hybridization on a large scale was in Pinus, where the species P. Strobus, P. peuce and P. koraiensis were cross pollinated in all combinations. Results will not be known until the fall of 1943.

Hybridization on a small scale was undertaken in white, Norway and black spruces; and in red, Austrian and pitch pines.

I-B-2. The development of crossing technique for forest-tree genera.

There is nothing new to report. It is planned to publish results in the near future.

I-B-3. Studies on the storage and artificial germination of forest tree pollen.

A manuscript reporting results has been prepared for publication.

I-C-1. Production of polyploid forms of forest trees by the colchicine method.

Colchicine treatments as outlined in the 1941-42 report (pp. A-1 and A-2, Proc. 8th Meeting) have been continued. A new method of applying colchicine to sprouted seeds has also been used which permits treatment of the seed leaves, without treatment of rootlet (sprout). This overcomes the difficulty of overdose in the rootlet. The advantage of treating very young seedlings lies in the fact that the very early divisions in stem development are subjected to treatment, which gives a more deeply-seated effect.

Results are in many cases very promising, but the great amount of material and the status of the cytological observations does not permit a report at this time.

I-E-1. Studies on reaction to blister rust of natural selections and new forms of white pines of potential resistance.

The disease garden has been enlarged, and lines of several of Dr. Heimburger's selections transplanted in it. New cuttings of the Pointe Platon material were obtained and placed in beds at Petawawa and the Annex. Propagation results of similar cuttings collected in 1941 were very poor at the Annex and fair at Petawawa. Samples of seed from the Pointe Platon trees were obtained in 1941 and again in 1942. Germination was poor in the first collection. A considerable amount of material is ready for transplanting to the disease garden this year. This includes white pine x Pinus peuce hybrids, the material from Dr. Riker and miscellaneous selections.

I-Z-1. Studies on self-sterility in forest trees. No further results to report.

I-Z-3. Studies on true and obligatory dormancy in forest trees.

This experiment is completed and a formal report will be made in the near future. To indicate some of the more important results, it may be said that true dormancy was shown to exist in all species, particularly in evergreen conifers, and that all genera produced flowers on detached branches except Tilia - which flowers normally in July. (p. A-5, Proc. 8th Meeting).

II-A-1. Studies on genetic variability for sugar production in the sugar maple.

This work is being continued as in 1942 (see p. A-2, Proc. 8th Meeting).

IV-Z-1. Studies on the effect of heeling-in temperatures on periodic collections of hardwood cuttings.

This experiment is completed. Results are briefly as follows: No rooting occurred in maple or birch. Rooting was obtained in basswood from midwinter collections heeled-in at 35°F. In the Populus material, 35°F. was most favourable for the earlier collections; but 13°F., while injurious to earlier collections (long heeling-in), gave best results in later collections. The spring collection planted directly into the bed gave negative results except in the case of Strathglass poplar.

V-Z-1. Studies on the control of damping-off of forest tree seedlings in greenhouse and nursery.

Experiment completed. Results published in Canadian Journal of Research, C, 20:559-571. 1942.

New Experiments

Classification Number: I-Z-4.

Classification Subject: Breeding, general.

Title of Experiment: Chemical stimulation of seed germination.

Schedule: Commenced Nov. 1942.

Conducted by: L.P.V.Johnson.

Objective: To obtain data on the effectiveness of a number of stimulatory chemicals in overcoming seed dormancy in a wide range of forest tree species.

Materials: Eighteen species involving the following genera: Acer, Betula, Fraxinus, Larix, Picea, Pinus and Thuja.

Method: Replicated tests of check, stratified and chemically treated seeds. Germination counts made at two stages during course of sprouting and at end of test. Various concentrations of potassium nitrate, thiourea, ethylene chlorhydrin, sodium nitrate and dusts of red copper oxide and zinc oxide used.

Results: Stratification for 60 days was, in general, more effective than any chemical treatment, but in the case of Picea rubra 2% potassium nitrate gave significantly better results. Potassium nitrate gave significantly better germination than the check in Picea rubra, P. glauca and Pinus resinosa; thiourea was effective in all Picea species, and ethylene chlorhydrin in Betula lenta and B. papyrifera. Zinc oxide accelerated seedling growth rate in Larix, Picea, Pinus and Thuja species, while red copper oxide had a similar effect on Pinus species.

Classification Number II-B-1.

Classification Subject: Genetics and Cytology: cytology of induced polyploids.

Title of Experiment: Cytology of colchicine-treated materials.

Schedule: Commenced Dec. 1942.

Conducted by: L.P.V.Johnson.

Objective: To identify amphidiploid individuals in the colchicine-treated population by chromosomal counts or stomatal dimensions.

Methods: An original permanent squash technique has been developed for root and stem tips, involving leuco basic fuchsin stain. The number of cell divisions observable in stem tip material is very low, and the devising of a method for stimulating cell division in the growing points reremains a problem to be solved. Stomatal observations are made on fresh, unstained epidermal strips.

Materials: Thirty species of forest trees, including all common economic forms, are involved.

Results: The work to date (10 April, 1943) has been largely concerned with development of methods and has been done almost exclusively on check materials, hence there is not enough data on treated plants to warrant a report of results.

Proposed Breeding Program, Spring and Summer 1943

1. Further hybridization of spruce and pine, if season is favourable.
2. Transplanting of selected white pine materials to blister rust disease garden.
3. Cytological observations on numerous colchicine-treated plants, and on Populus hybrids originating from crosses involving a triploid parent.
4. Extension of breeding arboretum.
5. General elimination of low-grade breeding materials in nursery on basis of form, growth, rate, rooting capacity, etc.
6. As far as possible, further tests of material selected as superior in (5).
7. Preparation of reports, in some cases for publication, on the more important experiments which have been completed or have been terminated because of war conditions.
8. General observations on breeding materials throughout the growing season.

Owing to travel restrictions and reduction in staff, it will be necessary to carry out this program very largely in the Ottawa district.

APPENDIX B

Report for 1942-43

by

C. Heimburger

PROGRESS REPORT

Project 50, Vegetative Propagation

Active experiments, April 1943.

54:2, 1937	Development of plants from stem cuttings of Norway Spruce and Colorado Spruce
50:23, 1941	White Pine cuttings of rust free trees from Wisconsin, tests for rooting and further developments.
50:1-41, 1941	Cuttings of various conifers collected at various times and planted in various media, all in one type of bed and one type of screens.
50:4-41, 1941	Development of plants from stem cuttings of white pine.
50:5-41, 1941	Development of plants from stem cuttings of white spruce.
50:7-41, 1941	Rooting of layered basswood stem bases in nursery.
50:8-41, 1941	Rooting of layered Chinese Elm stem bases in nursery.
50:1-42, 1942	Rooting of semi-lignified cuttings of some hardwoods and conifers in hot bed and cold frame with cellophane screen and cloth-lath screen and hormone treatments.
50:2-42, 1942	Response of basswood, Chinese Elm and yellow birch to layering of young nursery stock.
50:3-42, 1942	Untreated cuttings of various conifers planted in media enriched with organic fertilizers, covered with cellophane and cloth-lath screens and placed on top of fresh sawdust in excavated beds.
50:4-42, 1942	Physical and biological properties of various propagation media.
50:5-42, 1942	De-budding of various pines for the formation of juvenile growth to be used as stem cuttings.
50:6-42, 1942	Grafting of pines.
50:1-43, 1943	Vernalization of tamarack cuttings in the laboratory.
50:2-43, 1943	Vernalization of basswood cuttings in the laboratory.
50:3-43, 1943	Vernalization of cuttings of populus canescens in the laboratory.

Project 52, Strain Testing of Spruce

(a) Sowings - Fall 1942

Seed Lot	
327	Picea rubra, Monongahela, National Forest, elevation 3600'.
328	" " " " " " 4700'.
329	" " Unaka " " " 5500'.
330	" " Pisgah " " " 5000'.
331	" excelsa, Petawawa FES, from selected trees in plantation 8.
332	" " " " bulk collection in plantation 8.
336	" mariana, " " swamps.
337	" Breweriana, from Herbst Bros., New York.
338	" jezoensis hondoensis, from Schumacher, Boston.
339	" Breweriana, from Schumacher, Boston.
340	" orientalis, " " "
341	" Smithiana " " "
342	" glauca, Petawawa FES.
350	" rubra, Petawawa FES, plantation 8.

(b) Vegetative Propagation - Spring 1942

Picea Omorika, Arboretum of Central Experimental Farm, 180 cuttings planted.

- Fall 1942

Picea	excelsa	SN-15	all available	cuttings	planted.	
"	"	SN-16	"	"	"	"
"	"	SN-17	"	"	"	"
"	"	SN-18	"	"	"	"
"	"	SN-19	"	"	"	"
"	"	SN-20	"	"	"	"
"	"	SN-21	"	"	"	"
"	"	SN-22	"	"	"	"

(c) Test Plantations - Spring 1940

Seed Lot	
8	Picea glauca, Petawawa FES - about 1000 to plantation 42.

Spring 1942

109	Picea	mariana,	Notakim, P.Q.,	245	to	plantation	53
	"	"	Sb. 1, Petawawa FES.	90	to	plantation	57.
	"	"	Sb. 2, " "	108	"	"	57
	"	"	Sb. 3, " "	144	"	"	57

Project 53, Strain Testing of Hard Pines

(a) Sowings - Fall 1942

Seed Lot	
358	Pinus rigida, from Schumacher, Boston.
360	" silvestris, Petawawa FES, Plantation at Thistle Siding.
361	" ponderosa, Salmon River Valley, B.C.
363	" contorta latifolia, China Valley, B.C.

(c) Test Plantation - Spring 1938

1	Pinus silvestris, Karelian Isthmus -about 1300 to plantation 39.

Spring 1940

18	Pinus silvestris, Heddal, Norway - 226 to plantation 43.
19	" " Mo., Norway - 110 to plantation 43.
20	" " Riga, Latvia - 906 to plantation 43.
21	" banksiana, Fort William, Ont. - 385 to plantation 43.
22	" silvestris, Rakkestad, Norway,- 804 to " 43.
23	" " Vinstra, " 820 " " 43.

Spring 1941

49	" contorta latifolia, Terrace, B.C. - 209 to plantation 43.
51	" silvestris, Czechoslovakia - 573 to plantation 43.

Spring 1942

73	" contorta, Lower Fraser River Valley, B.C. - ca. 156 to plantation 43.
74	" silvestris x montana F3 - all available to plantation 56.
77	" " Griva, Latvia - all available to plantation 43.
144B	" ponderosa, Salmon Arm, B.C. - all available to plantation 56.
172	" silvestris, Scotland - all available to plantation 43.
174	" " Smaland, Sweden - all available to plantation 43.
175	" " France - all available to plantation 43.
178	" " Pyrennees - all " " " 43.
179	" " SW Germany - " " " " 43.
180	" " Svanøy, Norway " " " " 43.
181	" " Hedmark, " " " " " 43.
182a	" " Troms Coast, Norway, all available to plantation 43.

Project 53 (cont'd.)

Seed Lot	
184	Pinus resinosa, Petawawa FES - all available to plantation 43.
186	" banksiana, Orange Rd., Petawawa FES - all available to plantation 43.
201	" densiflora, Harbin, Manchoukuo - all available to plantation 43.
202	" leucosperma, Harbin, Manchoukuo - all available to plantation 56.
215	" contorta latifolia, Salmon Arm, B.C. - all available to plantation 43.
218	" " " Prince George, B.C. - all available to plantation 43

Project 54, Strain Testing of Soft Pines

(a) Sowings - Spring 1942

Seed Lot	
303	Pinus edulis, from Schumacher, Boston
304	" monophylla, from " "
305	" Parryana, " " "

Fall 1942

314	Ribes Cynosbati, Mountain Road, Hull, Que.
364	Pinus Strobus, Pointe Platon #1.
365	" " " " #2
366	" " " " #3
367	" " " " #4
368	" " " " #5
369	" " " " #6
370	" " " " #53
371	" " " " #58
372	" " " " #61
373	" " " " #63
374	" " " " bulk collection.
362	" aristata from Schumacher, Boston.

(b) Vegetative Propagation - Spring 1942

Pinus Holfordiana (ayacahuite x excelsa F1) 11 grafted plants obtained from England and planted.

Fall 1942 (populations and clones)

Pinus koraiensis (seed lot 142) - all available cuttings from side branches.

Project 54 (Cont'd.) - Fall 1942

Pinus parviflora (seedlot 64), all available cuttings from side-branches.
" Armandi (" 26) " " " "
" Peuce (" 68) " " " "
" excelsa (" 55) " " " "
" Strobus, Pointe Platon #1 - about 500 cuttings planted.
" " " " 2 " " " "
" " " " 3 " " " "
" " " " 4 " " " "
" " " " 5 " " " "
" " " " 6 " " " "
" " " " 53 " " " "
" " " " 58 " " " "
" " " " 61 " " " "
" " " " 63 " " " "
" " Green Timbers, B.C. #1-28 cuttings planted
" " " " 2-20 " "
" " Petawawa FES, S.L. 8 - about 50 cuttings planted.
" " " " 38 " " " "
" " " " 44 " " " "
" " " " 47 " " " "
" " " " 57 " " " "
" " " " 63 " " " "
" " " " 64 " " " "
" " " " 67 " " " "
" " " " 105 " " " "
" " " " 111 " " " "
" " " " 116 " " " "
" " " " 117 " " " "
" " " " 126 " " " "
" " " " 133 " " " "
" " " " 160 " " " "
" " " " 164 " " " "
" " " " 169 " " " "
" " " " 200 " " " "
" " " " 207 " " " "

(c) Test Plantations - Spring 1942

Seed Lot			
6	Pinus Peuce, Macedonia - 13 to plantation 56.		
63	" koraiensis, Japan - 49 to plantation 56.		
72	" Strobus, Petawawa FES, Racehorse & Centre Lake Roads, 150 to plantation 53.		
75	" " " FES, Corry Lake - 42 to plantation 53		
89	" " C.E.F. - 150 to plantation 53		
90	" " K25-20 to plantation 53		
91	" " K17-6 " " 53		
92	" " K7-14 " " 53		

Project 54 (cont'd.) - Spring 1942

Seed Lot			
117	Pinus Strobus,	Pl 3 - 150 to plantation 53.	
118	" "	Pl 8 - 114 " "	53.
119	" "	H 18 - 150 " "	53.
120	" "	H 19 - 450 " "	53.
121	" "	H20 - 450 " "	53.
122	" "	H 21 - 750 " "	53
123	" "	H 396 - 150 " "	53
124	" "	W1 - 24 to plantation 53	
125	" "	W2 - 100 to plantation 53	
126	" "	W3 - 72 " "	53
127	" "	W4 - 150 " "	53
128	" "	Pe SCI - 150 "	53
129	" "	W5 - 74 to plantation 53	
130	" "	W6 - 52 " "	53
131	" "	W7 - 46 " "	53
132	" "	Pe 404 - 60 "	53
133	" "	Pe 405 - 50 "	53
134	" "	D 800 - 34 to "	53
135	" "	D 801 - 6 " "	53
136	" "	D 802 - 60 " "	53
137	" "	D 803 - 150 " "	53
138	" "	D 808 - 42 " "	53
139	" "	Maskinonge - 150 to plantation 53.	
140	" "	PeCLAN - 140 to plantation 53	
141	" "	PeCLAS - 150 to plantation 53	

Project 55, Strain Testing of Douglas Fir

(a) Sowings - Fall 1942

Seed Lot

325 Pseudotsuga taxifolia, Salmon Arm, B.C.

(b) Vegetative Propagation - Spring 1942

Pseudotsuga taxifolia caesia #696 - 180 cuttings planted.

Project 56, Strain Testing of Larch

(a) Sowings - Fall 1942

Seed Lot

326 Larix europaea, from Schumacher, Boston.
354 " eurolepis F2, Petawawa FES, plantation 34, collected largely from L. leptolepis

Project 56 (Cont'd.)

(b) Vegetative Propagation - Spring 1942

Larix eurolepis F2 - 180 cuttings planted.

Fall 1942

Larix eurolepis F2 - 490 cuttings planted.

Project 57, Strain Testing of Birch

(a) Sowings - Fall 1942

Seed Lot	
316	Betula populifolia, Acadia FES
317	" alba pendula, from Schumacher, Boston
318	" japonica mandshurica, " "
319	" papyrifera kenaica, from " "
320	" alba, from Herbst Bros., New York.
321	" Ermani, from Schumacher, Boston.
322	" Jackii, from " "
323	" lutea, Great Smoky Mts., National Park
324	" papyrifera kenaica, from Schumacher, Boston.
335	" alba pendula, from Schumacher, Boston
343	" " from Herbst Bros., New York
351	" japonica mandshurica, from Schumacher, Boston.
352	" Jackii, from Schumacher, Boston.
353	" Ermani, from " "
355	" " #2004, C.E.F.
356	" macrophylla, #5633, C.E.F.
357	" populifolia, Acadia FES.

Project 58, Strain Testing of Poplar

(a) Sowings - Spring 1942

Seed Lot	
312	Populus tristis, C.E.F.
315	" Rasumowskyana x tacamahacca, Petawawa FES

(b) Vegetative Propagation - Spring 1942

berolinensis x Northwest 2, being propagated
" " 4, " "
" " 6, " "
" " 8, " "
" " 9, " "
" " 11, " "
" " 15, " "

Project 58 (Cont'd.)

Spring 1942 (cont'd.)

berolinensis x Northwest 16, being propagated.
" " 17, " "
" " 18, " "
" " 19, " "
" " 20, " "
" " 23, " "
" " 25, " "
" " 1, " "
deltoides 481, Masson, P.Q. - being tested
" 482, " " "
" 483, " " "
" 484, " " "
canescens 15, South Africa - " "
alba 40, Farrelton, P.Q., " "
deltoides x tremuloides - 120 clones from Skinner, Dropmore, Man. being tested
acuminata x Eugenei 1, being propagated
" " 4, " "
" " 8, " "
" " 11, " "
Big Brooks, Brooks, Alta. - being tested
alba 39, Port Stanley, Ont. " "
trichocarpa 11, Lake Tahoe, Calif.- being propagated for testing.
canescens x alba 1-being propagated for testing.

Fall 1942

Maximowiczii 1, Harbin, Manchoukuo - being tested
" 2, " " " "
" 3, " " " "
" 4, " " " "
" 5, " " " "
canescens x tremuloides aurea - 18 clones being propagated.
Rasumowskyana x tacamahacca - 52 clones being tested.

(c) Test Plantations - Spring 1935

Carolina - about 1000 to plantation 49
" - " 500 to " 46

Spring 1936

Carolina - about 500 to plantation 46.

Spring 1939

Geneva - about 100 to plantation 50.
Maine - " " " 50.
Raverdeau - " " " 50.
Strathglass " 500 " 50.

Project 58 (Cont'd.)

Spring 1940

Jackii 1	- 160	to plantation	42.
Raverdequ	- 47	"	42.
Northwest	- 33	"	42.
Maine	- 20	"	42.
Masson	- 143	"	42.
Geneva	- 52	"	42.
Rochester	- 19	"	42.
Roxbury	- 26	"	42.
Strathglass	290	"	42.
OP-5	10	"	42.
OP-6	10	"	42.
OP-7	10	"	42.
OP-10	10	"	42.
OP-14	10	"	42.
OP-16	10	"	42.
OP-23	10	"	42.
OP-26	10	"	42.
OP-27	10	"	42.
OP-30	10	"	42.
OP-41	10	"	42.
OP-42	10	"	42.
OP-44	10	"	42.
OP-46	10	"	42.
OP-47	10	"	42.
OP-48	10	"	42.
OP-50	10	"	42.
OP-51	10	"	42.
OP-52	10	"	42.
OP-53	10	"	42.
OP-55	10	"	42.

Spring 1941

Northwest	- 117	to plantation	51
Masson	- 10	"	51
vernirubens	- 11	"	51
Carolina	- 12	"	51
Maine	- 10	"	51
Brooks 4	- 10	"	51
" 10	- 10	"	51
Jackii 1	-10	"	51
Geneva	- 10	"	51
Calgary 23	- 10	"	51
Rochester	- 10	"	51, 2 to plantation 55.
Roxbury	- 10	"	51, 2 " 55.
cathayana	- 31	"	51,
Strathglass	- 10	"	51
22-11	- 10	"	51
candicans	- 10	"	51
OP-38	- 10	"	51

Project 58 (Cont'd.)

Spring 1941 (Cont'd.)

OP-54 - 10 to plantation 51
OP-45 - 10 " 51
OP-49 - 10 " 51
tristis 1 -10 " 51
Raverdeau - 10 " 51
generosa - 9 " 51
Calgary 16 - 10 " 55
acuminata 1 - 1 " 55
Calgary 6 - 2 " 55
Calgary 17 - 3 " 55
Calgary 4 - 3 " 55
Calgary 1 - 7 " 55
laurifolia 2 - 9 " 55
tremoides x grandidentata 3 - 1 to plantation 55
" " 4 - 2 " 55
" " 2 - 1 " 55
Tremula 1 - 2 to plantation 55.

Spring 1942

Maine - 400 to plantation 52; 5 to plantation 55.
Strathglass - 640 to plantation 52; 5 to plantation 55.
Geneva - 80 to plantation 52; 5 to plantation 55.
Rasumowskyana x tacamahacca F1 - 76 to plantation 51.
OP-51 - 5 to plantation 55.
OP-41 - 4 to plantation 55.
Northwest - 4 to plantation 55.
OP-47 - 4 to plantation 55.
OP-46 - 4 " 55.
OP-10 - 5 " 55.
OP-14 - 4 " 55.
OP-5 - 4 " 55.
OP-42 - 3 " 55.
Masson - 3 " 55.
OP-50 - 3 " 55.
OP-23 - 5 " 55.
OP-27 - 5 " 55.
OP-26 - 5 " 55.
deltoides 1 - 5 " 55.
acuminata 1 - 5 " 55.
OP-16 - 5 " 55.
canescens 1 - 1 " 55.
Raverdeau - 5 " 55.
OP-7 - 5 " 55.
OP-6 - 5 " 55.
Jackii 1 - 5 " 55.
OP-48 - 5 " 55.
OP-30 - 5 " 55.
OP-44 - 5 " 55.
OP-53 - 5 " 55.

Project 58 (Cont'd.)

Spring 1942 (Cont'd.)

deltoides 4 - 5 to plantation 55.
" 2 - 5 " 55.
OP-52 - 3 " 55.
OP-55 - 5 " 55.
alba 10 - 1 to " 55.
canescens x alba 1 - 1 to plantation 55.

Project 59, Strain Testing of Miscellaneous Species

(a) Sowings - Spring 1942

Seed Lot	
306	Acer glabrum, Salmon Arm, B.C.
307	Ulmus hollandica, from Schumacher, Boston.
308	Tilia cordata cordifolia, " "
309	" amurensis, " "
310	" tomentosa " "
311	Ulmus racemosa, Rockcliffe, Ont.

Fall 1942

323	Caragana sophoraefolia, from Schumacher, Boston.
324	" arborescens, Petawawa FES.
344	Abies lasiocarpa, from Schumacher, Boston.
345	" holophylla, " " "
346	" Fraseri, from " "
347	" lasiocarpa, from Herbst Bros., New York.
348	Libocedrus decurrens, Eldorado County, Calif., elevation 3950'
349	" " " " " elev. 5560'
359	Alnus glutinosa, from Schumacher, Boston.

(c) Vegetative Propagation - Spring 1942

Chosenia splendida, Keijo, Chosen-layered plants from male and female parent stock transplanted.

(c) Test Plantations - Spring 1942

158	Phellodendron amurense,	Harbin, Manchoukuo - 447 to plantation 54.
159	" "	USSR - 18 plantation 54.

Project 85, Work in the Breeding Arboretum

The thinning of the plantation of Norway Spruce (plantation 8) was completed. The part with Red Spruce was also thinned. A site was prepared for poplar planting in the spring

Project 85 (Cont'd.)

of 1943. Two new plantations (57 and 56), of spruce and pine, respectively, were established. The poplar plantation (55) was enlarged considerably. A clump of balsam poplars growing near the site of an abandoned cellar was girdled, to kill the trees without producing too many suckers and to prepare the site for other plantations in the near future.

Project 86, Hybridization

Spring 1942

The following crosses were made in early spring in Ottawa:

Populus grandidentata x Salix daphnoides - unsuccessful.
P. alba #9 x tremuloides, Calgary - successful.
P. berolinensis #1 x nigra italica - successful.
P. tristis #2 x nigra italica - unsuccessful.
P. angulata x Simonii - successful.
P. canescens #8 x (alba x grandidentata)# 37 - successful.
P. (alba x grandidentata)#33 x canescens #13 - successful.
P. berolinensis #1 x Simonii #1 - successful.
P. " #1 x (alba x grandidentata)#37 - unsuccessful

Some 15 flowers of red pine were pollinated with Scotch pine, collected at Petawawa FES. The resulting conelets have so far shown normal development.

Program of Work for 1943 Season

Project 50, Vegetative Propagation

(a) continuation of experiment with time of collection and various media for conifer cuttings; new media, sawdust and manure bottoms, cellophane and lath-cloth screens-especially early spring and early and late fall collections;
(b) continuation of experiments in layering of basswood and ash;
(c) continued experiments with greenwood cuttings of birch and elm in hot-beds, also preliminary experiments with conifers, especially larch;
(d) grafting of conifers in early spring growing material for grafting;
(e) continuation of de-budding of pines for juvenile growth production;
(f) vernalization of hardwood cuttings with hormone treatments, also preliminary work with conifers;
(g) experiments with 2 new growth hormones, additional new hormones obtained in co-operation with Dr. Grace and other biochemists, if possible. Preliminary work with Wilde's humus extracts.

Project 52, Strain Testing of Spruce

(a) current selection of growing material and vegetative propagation of promising biotypes;
(b) rooting tests of available white spruce material, especially geographic strains in juvenile condition;
(c) selection of weevil-free white spruce in co-operation with entomologists in existing plantations at Petawawa FES;
(d) establishment of new test plantation for spruce.

Project 53, Strain Testing of Hard Pines

(a) propagation of selected Scotch pine from plantation 39 by stem cuttings;
(b) seed collection from promising Scotch pine in plantation at Thistle Siding;
(c) acquisition of additional strains of Lodgepole pine;
(d) setting out more material in test plantation.

Project 54, Strain Testing of Soft Pines

(a) current selection and propagation of promising biotypes while in juvenile condition;
(b) setting out of additional material in test plantation;
(c) rooting capacity test with white pine strains to determine range of variation in this respect;
(d) cutting collection of additional selected weevil-free trees;
(e) acquisition of Appalachian strains of white pine for testing.

Project 55, Strain Testing of Douglas Fir

(a) vegetative propagation of promising biotypes observed in nursery;
(b) observation of infected material in co-operation with pathologists and selection of apparently resistant types.

Project 56, Strain Testing of Larch

(a) testing F2 Dunkeld hybrid seedlings for rooting capacity from stem cuttings;
(b) setting out material in test plantation.

Project 57, Strain Testing of Birch

(a) vegetative propagation of rare and exotic species, especially B costata;
(b) cytology of species with unknown chromosome numbers and of some hybrids;
(c) growing material for grafting.

Project 58, Strain Testing of Poplar

(a) setting out more material in test plantations, disease garden and arboretum;
(b) propagation of P. alba x aspen hybrids in spring by vernalized stem cuttings;
(c) further raising of hybrid poplar seedlings in especially prepared beds;
(d) further distribution and exchange of material.

Project 59, Strain Testing of Miscellaneous Species

(a) rooting capacity tests of Chinese Elm material available in nurseries;
(b) acquisition of Caragana material in form of plants and seeds;
(c) acquisition of elm material.

Project 85, Work in Breeding Arboretum

(a) maintenance of established material;
(b) setting out poplar, larch and 5-needled pines;
(c) preparation of area for further planting (especially spruce).

Project 86, Hybridization

(a) effecting a number of birch crosses using stored and fresh pollen of several species on the two native birches;
(b) effecting a number of poplar crosses using stored and fresh pollen on a number of native and exotic aspens and cottonwoods and their hybrids;
(c) development of technique in crossing Caragana;
(d) crossing native jack pine with lodgepole pine using pollen from the Kananaskis FES and the arboretum of the CEF.

APPENDIX C

Report for 1942-43

by

A.J.Skolko

V-A-1 Resistance to disease in poplar breeding materials

Previous work on this project has been fully summarized in Proceedings of the Eighth Meeting of the Subcommittee on Forest Tree Breeding, April 15, 1942.

Since no artificial inoculations were made during 1942, the results of the two inspections of August and September indicate resistance or susceptibility under conditions of natural infection only. The following is a summary of the 1942 inspections:

Clone	Rust Infection# Aug.	Sept.
Upper Nursery: Comp. 1.		
Acuminata 1	4	4
N-7	1	1
N-2	0	1
BNW-16	0	3
BNW-22(19)(?)	2	3
BNW-9	4	4
Masson	4	4
N-3	0	1
D-481	2	2
D-4	2	3
AG-81	0	0
AG (fall)	0	0
C-15	0	0
T-8	0	0
Raverdeau	3	3
Berolinensis 1 -		0
AG April	0	0
A-4 "	0	0
C-13 "	0	0
A-20 "	0	0
A-3 "	0	0
A-12 "	0	0
A-36 "	0	0
A-34 "	0	0
C-5 "	0	0
A-21 "	0	0
A-38 "	0	0

Clone	Rust Infection# Aug.	Sept.
N-9	0	1
BNW-25	0	3
Oxford	0	0
Rumford	0	1
Frye	0	1
Androscoggin	0	0
Andover	0	2
Trichocarpa 2	0	2
A-20 Oliver	0	0
A-40	0	0
DT-Skinner	4	4
A-36 outside	0	0
A-20 "	0	0
C-13 "	0	-
A-36 Oliver	0	0
A-13 Oliver	0	-
A-37 April	0	0
A-17 April	0	0
A-18 "	0	0
Comp. 6		
Trichocarpa 5	0	0
Vernirubens	0	3
Generosa	1	3
Jackii 2	0	2
Calgary 23	0	0
Cathayana 1	0	1
" 13	0	1
" 20	0	0

#Classification of rust infection according to Schreiner:
0 - no rust; 1 - slight infection; 2 - medium; 3 - heavy; 4 - very heavy.

Clone	Rust Infection# Aug.	Rust Infection# Sept.
Comp. 2		
C-16	0	0
C-17	0	0
A-42	0	0
A-43	0	0
A-41	0	0
Jackii 9	4	4 def#
Maxomowiczii 1	-	0
Andrewsii 1	4	4 def#
N-11	0	1
Sp.3442-37	0	1
Sp.6712-39	0	2
Szechuanica 1	0	0
Sp.6709-39	0	0
Koreana 9	0	0
Trichocarpa 6	0	0
" 5	0	0
Koreana 6	0	4 def#
N-12	4	4 "
DT-3	4	- "
Bassano	4	4 "
Sp.6710-39	0	3
Kanjitaliana 1	0	2
Simonii 2	0	3
Epirotica 1	0	0
Koreana 5	0	0
CxW long cuttings	0	3
Comp. 3		
P. alba x G F1	0	0

Clone	Rust Infection# Aug.	Rust Infection# Sept.
Comp. 6 (cont'd.)		
Cathayana 16	0	0
" 18	0	0
" 17	0	0
" 15	0	0
22-11	0	3
Trichocarpa 6	0	1
OP-38	0	1
OP-45	0	0
N-8	0	1
D-3	0	2
N-2	0	1
Candicans	0	1
D-7	2	3
Tristis 2	3	4
D-5	0	3
N-9	0	1
Trichocarpa 11	4	4
N-10	0	1
N-5	0	1
N-7	0	1
Cathayana 18	0	1
OP-38	0	2
OP-45	0	0
Berolinensis 1	0	1
N-3	0	0
Simonii 1	0	0
N-1	0	1
N-4	0	0
Eugenii 2	0	3
AcE-8	3	4
BNW-6	2	4
AcE-11	2	4
BNW-22	3	4
BNW-25	0	4

Clone	Rust Infection # Aug.	Sept.
Comp. 6 (cont'd.)		
Bassano	4	4 def.
Gelrica	0	0
Angulata erecta	0	1
Brooks 10	0	4
Brooks 4	3	4 def.
Koreana 6	0	0
Angulata erecta	0	2
Cathayana 20	0	0
" 16	0	0
" 17	0	0
22-11	0	3
OP-49	0	0
OP-54	0	1
Generosa	1	3
Cathayana 15	0	2
" 13	0	2
Rochester	0	0
Roxbury	0	1
Vernirubens	0	1
Jackii 2	0	2
Calgary 23	0	0
Brooks 4	0	3
Trichocarpa 6	0	1
Brooks 10	0	4
Trichocarpa 5	0	0
Koreana 9	0	3(?)
Saskatchewan	4	def.
Tristis 1	0	3
BNW-1	2	4
BNW-18	0	2
BNW-16	0	3
AcE-1	0	3
BNW-4	0	4
" -19	2	4
" -8	0	4
" -9	4	4
" -17	3	4
" -23	0	2
" -11	2	3
" -4	0	3
" -8	0	3
AG-27	-	-
D-5	2	3
Acuminata 2	4	4 def.
A-39	0	0
N-8	0	2
D-483	0	3

Clone	Rust Infection# Aug.	Sept.
Comp. 6 (cont'd.)		
AcE-4	3	4
A-36	0	0
A-29	0	0
A-22	0	0
C-2	0	0
A-26	0	0
C-3	0	1
A-35	0	0
BNW-15	3	4
BNW-2	3	4
Northwest	4	4 def.
N-13	4	4
Northwest	4	4 def.
Rasoumowskyana	0	2
N-10	0	1
N-1	0	1
C-1	0	0
BNW-17	0	4
AcE-8	4	4
BNW-2	2	4 def.
D-2	2	4
A-36	0	0
BNW-19	0	2
D-484	0	2
BNW-15	2	3
AcE-1	2	3
BNW-18	0	2
BNW-23	0	3
AcE-4	4	4
D-1	3	4
Koreana 6	0	3
D-482	0	3
BNW-1	2	3
Koreana 9	0	2
AG-28	-	-
A-10	0	0
BNW-6	3	4 def.
BNW-25	3	4
Big Brooks	0	3
AG-60	0	2
AG-107	0	2
CG-28	0	1
AG-15	0	1
CG-6	0	0
AG-32	0	1
AG-59	0	0
AG-47	0	1

Clone	Rust Infection# Aug.	Sept.
Comp. 6 (cont'd.)		
Trichocarpa 11	4	4
BNW-11	0	3
CA-1	-	-
D-7	2	3
AcE-11	2	3
Lower Nursery		
OP-45	0	1
Angulata erecta	3	3
OP-49	0	1
22-11	3	3
Generosa	4	3
Cathayana 15	0	2
" 17	0	2
Gelrica	0	1
Vernirubens	3	3
Jackii 2	4	4
OP-38	2	3
Masson	4	4 def.
Raverdeau	4	3
Jackii 1	4	4 def.
Tremula 5	0	1
AG-2	1	1
AG-21	1	1
CG-12	2	0
TG-3	4	3 Nap4
CG-27	2	0
Ta-2	2	2
CG-16	0	0
AG-22	0	2

Clone	Rust Infection# Aug.	Sept.
AG-24	0	1
AG33-16	0	1
CG-17	0	1
TS-4	0	1
AG-7	2	1
CG-30	0	1
TS-5	0	1
CT-6	3	2
AG33-13	6	1
CG-8	0	1
TS-7	0	1
AG33-17	0	1
AT-2	2	1
CG-1	0	1
AG33-19	0	1
AG-10	0	1
Ta-4	0	1
CG-18	0	2
AG33-14	0	1
AG33-5	-	-
Eastern Comp.		
CxW-208	0	3
CW-102	0	3
CW-372	0	3
AGW-53	0	3
AGW-20	0	3
AG-10	0	0
TG-7	0	0
AGW-1	0	3
" -26	0	3
" -3	0	3
" -29	0	2
" -5	0	3

Clone	Rust Infection# Aug.	Rust Infection# Sept.
Eastern Comp. (cont'd.)		
CG-17		0
CW-691		4
CW-727		3
CW-1083		4
CW-1093		3
CW-1348		3
CW-1447		3
AGW-7		3
" -8		3
" -9		3
" -10		3
" - 13		3
" -14		3
" -16		3
" -18		3
" -32		3
" -34		3
" -35		3
" -37		3
" -38		3
" -41		3
" -43		3
" -44		3
" -46		3
CG-8		0
CG-12		0
CG-27		0
AG-73		0
Ta-2		1
AG-112		0
AG-10		0
TS-7		0
CG-17		0
CG-30		0
CG-16		0
AG-112		0
AG-73		1
AG-92		0
CG-12		0
Ta-2		3
CG-8		0
CG-27		0
AGW-56		3
" -53		3
" -55		def.
" -46		3
" -47		def.
" -52		3
AGW-43		def.
" -41		4 def.
" -29		4
" -44		3
" -37	4	def.
" -38	3	3
" -34		3
" -35		3
" -31		3
" -32		3
" -26	3	3
" -20		3
" -25	4	3
" -23	4	def.
" -24	3	3
" -14		3
" -17	3	def.
" -16	3	4
" -13	3	3
" -8	2-3	3
" -10		3
" -9	2-3	3
" -7	2-3	3
" -4	2-3	3
" -5	2-3	3
" -3	2-3	3
" -1	2-3	3
CW-1325	2-3	def.
AGE-2	2-3	3
" -3	2-3	def.
CW-1447	2-3	def.
CW-1446	2-3	3
CW-1509	2-3	3
CW-1389	2-3	3
CW-1330	2-3	def.
CW etc.	2-3	3,4, or def.
A-38	0	0
Jackii 3	3	4
" 5	3	4
" 6	3	4
" 4	3	4
" 7	3	4
BNW 4	3	4
" 25		3
Calgary 23	0	1
OP-45	0	0
Vernirubens	2-3	3
OP-38		2
Brooks 10		2
OP-45		0

Clone	Rust Infection# Aug.	Sept.
Eastern comp. (cont'd.)		
22-11		3
Brooks 4		2
Trichocarpa 5		0
Generosa		3
Carolina		1
Trichocarpa 6		0
Generosa		1
Jackii 2		2
Tremulla 5	0	0
AcE-11		3
BNW-8		3
" -11		3
" -22		3 def.
" -1		4
AcE-4		4

Distribution List

Copy No.	Name
1	Dr. J.G.Malloch, Chairman
2	Dr. C.E.Atwood
3	Mr. D.Roy Cameron
4	Dr. N.H.Grace
5	Dr. C.Heimburger
6	Dr. L.P.V.Johnson, Secretary
7	Mr. M.B.Morison
8	Mr. W.M.Robertson
9	Dr. H.A.Senn
10	Dr. A.J.Skolko
11	Dean C.J.Mackenzie
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NATIONAL RESEARCH COUNCIL OF CANADA

PROCEEDINGS

OF THE

ELEVENTH MEETING

OF THE

SUBCOMMITTEE ON FOREST TREE BREEDING

OTTAWA

2 DECEMBER, 1943

NATIONAL RESEARCH COUNCIL

PROCEEDINGS

of the

ELEVENTH MEETING

of the

SUBCOMMITTEE ON FOREST TREE BREEDING

Held at the National Research Council, Ottawa, 2 December, 1943.

Members present:

Dr. J.G. Malloch, Chairman
Mr. D. Roy Cameron
Dr. C.E. Atwood
Dr. N.H. Grace
Dr. C. Heimburger
Mr. M.B. Morison
Mr. W.M. Robertson
Dr. A.J. Skolko
Dr. L.P.V. Johnson, Secretary

111. Minutes — The minutes of the Tenth Meeting were approved without amendment.

112. Bags for crossing — Dr. Johnson reported on his discussions with Dr. Woodcock regarding possible improvements upon the protective coverings now in use in hybridization work. (see Minute 104). He recommended a practical trial of a specially designed parchment bag which, from preliminary tests, appeared to provide the necessary requirements of moisture and light-transmission and to have, in addition, greater toughness than the commonly used glossine bag and a much greater "wet strength" than any of the paper bags previously used. The meeting agreed that the new bag should be tested in actual crossing work and recommended the purchase of a few hundred bags in two sizes for this purpose by the Research Council, a supply of the bags to be made available to Dr. Heimburger.

113. Test plots on the prairies — The subject of testing on the prairies all the breeding materials designed for the prairies received considerably discussion. It was agreed that the final test of all such material should be made on the prairies, but that every effort should be made to utilize facilities at Ottawa and Petawawa in eliminating materials on such bases as: poor rooting, lack of winter hardness and susceptibility to diseases (such as Septoria Canker) for which Eastern test

results may be considered to indicate directly the reaction under prairie conditions.

With this agreement the subject resolved itself into a question of the policy to be followed in making the necessary arrangements for suitable tests of our materials on the prairies. It was agreed that Dr. Malloch and Mr. Cameron should discuss with Dr. Archibald the prospects of having Mr. Kerr, of the Sutherland Nursery Station, undertake a number of tests both at his station and on certain farms selected at his discretion. It was understood that such an arrangement would not preclude trials on farms selected by Dr. Johnson.

114. Report on white pine and spruce work

At Mr. Cameron's request, Doctors Heimburger and Johnson outlined the progress being made in breeding for blister-rust resistant white pines (Major Project No. 1) and for spruce improvement (M.P. No. 2).

It was shown that the white pine work is progressing very well with over a thousand plants from selected stands already in the disease garden, and with several additional stocks ready for transplanting in the Spring. A serious difficulty in this work has been introduced by the failure to obtain rooting of cuttings taken from the Pointe Platon pines. The possibility of rejuvenation of mature tissue is being investigated as a possible solution to this problem.

The spruce work is receiving attention in its season, but lack of suitable flowering has prevented any extensive hybridization during the last two years. A number of seedlings from earlier cross pollinations appear to be hybrids. Colchine treatment of spruce, as well as all other important forest tree genera, has been continued.

115. Report on pathological work

Dr. Skolko presented a report on the work undertaken in the interests of the Subcommittee during 1943, which is attached hereto as Appendix A.

The matter of artificial inoculation of poplar with the Septoria Canker organism came up for discussion. Dr. Skolko agreed to provide inoculum to interested members in the Spring, said members to do their own inoculations from directions provided.

116. Dr. Heimburger's report

Dr. Heimburger reported on his very diverse undertakings. It was quite clear from his report that he has managed to keep work on vegetative propagation, nursery and plantation tests, hybridization, cytology, etc. progressing exceedingly well. His report, with certain additions, will be attached as an appendix to the proceedings of the forthcoming Spring meeting.

117. Cultural practice in shelterbelts

Dr. Johnson introduced the subject of cultural practices in the shelterbelt as the concern of the forest tree breeder. Recent observations on the prairies had led him to conclude that cultural practices in the shelterbelt have such pronounced beneficial effects on the environment that they warrent similar attention as that being paid to the breeding aspect of shelterbelt improvement. The cultural aspect is apparently not receiving that attention and, as one whose activities is directed toward improved shelterbelts, the breeder would appear to have some responsibilities on the matter. Dr. Johnson agreed to prepare a memorandum on the subject for the Spring meeting.

118. Deer fences

Dr. Heimburger indicated some of the difficulties arising out of deer browsing in young poplar plantations set out in the bush. There were no constructive ideas on the subject of deer fences, and the matter was left to Dr. Heimburger's own ingenuity.

APPENDIX A

V-A-1 Resistance to disease in poplar breeding materials

The annual (1943) inspection of the tree breeding material in the nurseries and plantations at the Petawawa Forest Experiment Station was made from September 14 to September 17. The cool, moist weather during the summer months has apparently been very favourable for poplar rust development, the susceptible clones being extremely heavily infected. The results of this year's examination, presented below, should give, therefore, a fairly reliable indication of poplar rust resistance or susceptibility. The degree of rust infection is stated as in previous reports according to Schriner's classification of rust incidence. In some cases more than one observation is recorded. This was done where the same clone was planted in different nurseries or in widely separated parts of the same nursery.

Poplar Tree Breeding Stock in Nurseries

A 3 - 0
A 4 - 0
A10 - 0
A12 - 0
A17 - 0
A18 - 0
A20 - 0
A21 - 0
A34 - 0
A37 - 0
A38 - 0,0
A39 - 0
A40 - 0

A36/G - 2

AcE 1 - 1,3
AcE 4 - 4
AcE 11 - 3,4,3

acuminata 1 - 4
" 2 - 4

AG 10 - 0,0
AG 33-5 - 0
AG 33-17 - 0
AG 33-19 - 0
AG 73 - 0,0
AG 81 - 0
AG 92 - 0
AG112 - 0

AG x AT (379) - 0

AGE 2 - 4,4
AGE 3 - 4,4

AGW 1 - 4,4
" 3 - 4,4
" 4 - 4
" 5 - 4,4
" 7 - 4,4
" 8 - 3,3,0
" 9 - 4,4
" 10 - 3,4
" 13 - 3,3
" 14 - 3,3
" 16 - 4,4 (Napa)
" 17 - 4
" 18 - 3
" 20 - 4,4
" 22 - 4
" 23 - 4
" 24 - 4
" 25 - 4
" 26 - 4,4
" 29 - 3,4
" 31 - 3
" 32 - 4,3
" 34 - 4,4
" 35 - 4,3
" 37 - 4,4
" 38 - 4,4

AGW 41 - 4,4
" 44 - 4,4
" 46 - 4,4
" 47 - 4
" 51 - 3
" 52 - 4,4
" 53 - 4,3
" 55 - 4
" 56 - 4

Andover - 2

Andrewsii 1 - 3

Androscogyin - 1

Angulata/Simonii - 2,3

Angulata erecta - 3,3

Bassano - 4,4

Berolinensis 1 - 0

Berolinensis/Lombardy - 0(Septoria)
Berolinensis/Simonii - 0

BNW 1 - 4,4,3
" 2 - 3,3
" 4 - 4,2-3, 4
" 6 - 4,3

Poplar Tree Breeding Stock in Nurseries
(Cont'd.)

BNW 8 - 4,3+,3
" 9 - 3+,4
" 11 - 0,4,2-3
" 15 - 3,3
" 16 - 4,2
" 17 - 4,3
" 18 - 3,3
" 19 - 4,0
" 22 - 3+,4,3
" 23 - 4,3
" 25 - 4,3,3

Brooks 4 - 4,3,2
" 10 - 4,3
Big Brooks - 2

C1 - 0
C5 - 0
C8/AG 37 - 0
C15 - 0

Calgary 23 - 0,2,2,0-1
" 91 - 2
92 - 2
94 - 3
95 - 2
96 - 3
98 - 3
106 - 3
108 - 2
109 - 2
120 - 3
121 - 1

Carolina - 3

Cathayana 1 - 1
" 15 - 1,2
" 17 - 0-1,2

CG1 - 0
CG6 - 0
CG8 - 0,0,0
CG12 - 0,0
CG16 - 0,0,3
CG17 - 0,0,0
CG27 - 0,0,0,0
CG28 - 0
CG30- 0,0
CT6 - 0

CW39 - 4,4
"101 - 4
"102 - 4,4
"122 - 4,3
"161 - 4
"175 - 4
"208 - 3,3
"218 - 4
"247 - 4,3
"260 - 4,3
"310 - 4
"316 - 4
"334 - 4
"354 - 4
"359 - 3
"372 - 4,3
"385 - 4
"407 - 4
"435 - 4
"440 - 4
"460 - 4
"526 - 4
"538 - 4
"591 - 3
"641 - 4,3
"647 - 4
"689 - 4
"691 - 4
"727 - 4,3
"733 - 4
"748 - 3
"756 - 4
"791 - 4
"920 - 4
"926 - 4
CW 1083 - 4,4
" 1093 - 4
" 1246 - 4
" 1261 - 4
" 1320 - 4
" 1325 - 4
" 1330 - 4
" 1339 - 4
" 1348 - 4,4
" 1389 - 4
" 1447 - 3-4
" 1476 - 4
" 1509 - 4,4

D 1 - 3,4
D 2 - 3,3
D 5 - 3,3
D 7 - 3,3

D 481 - 2+
D 482 - 3,3
D 483 - 3,3,3
D 484 - 3

DT - 4,4
DT3 - 4

Frye - 1

gelrica - 0-1,1
generosa - 4,4,4,3+

Jackii 2 - 3-4,3,2
" 3 - 4,4
" 4 - 4
" 5 - 4
" 6 - 4
" 7 - 4,4
" 9 - 4,4

kanjitaliana 3435-37 - 2

koreana 5 - 0
" 6 - 1,2,3
" 9 - 0,0,0,0

Maximowiczii 1 - 0
" 2 - 0,0
" 3 - 0
" 4 - 0,0,0
" 5 - 0,0

Masson - 3

N 1 - 1
N 2 - 1
N 3 - 1
N 7 - 1
N 8 - 1,1
N 10 - 2
N 11 - 1
N 13 - 3

Northwest - 4,4,4

Poplar Tree Breeding Stock in Nurseries
(Cont'd.)

OP-38 - 1,3,3-4,0-1
OP-45 - 0,0,0,0,0,0

Oxford - 0-1

Rasumowskyana - 2

Rasumowskyana/
tacamahacca(313)-0

Raverdeau - 3,3

Rochester - 1

Roxbury - 0-1

RT 1 - 1
" 2 - 1
" 4 - 4
" 5 - 3,3
" 8 - 3,3
"10 - 1
"13 - 1
"20 - 3
"21 - 3
"22 - 3
"24 - 1
"25 - 1
"31 - 3+
"33 - 3
"37 - 2
"38 - 2
"39 - 2,2
"40 - 2
"41 - 2+
"46 - 1
"47 - 3
"49 - 0
"51 - 2
"52 - 3

Rumford - 1

Simonii 2 - 2

Szeckuanica 1 - 1-2,2

T8 - 2

Ta2 - 1,2,2
TS7 - 0

trichocarpa 2 - 3
" 5 - 1,1,0,
0-1
" 6 - 1,0,
1-2
" 11 - 3,3

V 14 - 0
V 23 - 1
V 48 - 2
V 55 - 3
V 64 - 0
V 69 - 0,1
V 94 - 1

vernirubens - 3,3,
2-3

22-11 - 4,1,2-3

18P39-7CS - 3
69P38-5CS - 1
15P39-2CS - 3
38P38-CS - 2+

6710-39 - 2
6701-39 - 3(Septoria)

4P42-CS - 2-3
6710-39 - 1

5P42-CS - 2-3
11P42-CS - 2-3
1P42-CS - 1,2

Examination of Poplar Disease Gardens
(Wormke's Field)

row 1 - Northwest - 4
" 2 - Masson - 2-3
vernirubens - 1-2
Carolina - 2
" 3 - Maine - 0:Sept.1*
Brooks 10 - 2
" 4 - Northwest - 4
5 - Jackii 1 - 4
Genera - 0:Sept. 1
Calgary 23 - 0:Sept.2
" 6 - Rochester - 0:Sept.2
Roxbury - 0:Sept. 1
cathayana - 0
" 7 - Northwest - 4
8 - Strathglass - 0:Sept. 2
22-11 - 2:Sept.1
candicans - 0:Sept.2

row 9 - OP-38 - 1
OP-54 - 0:Sept.1
OP-45 - 0:Sept.2

" 10 - Northwest - 4
cathayana - 0:Sept.1
" 11 - cathayana - 0:Sept.1
Tristis 1 - 1-2
OP-49 - 0
" 12 - Raverdeau - 1
Generosa - 2-3
? - 0:Sept.2
cathayana - 0:Sept. 1

*Septoria 1 - Light

" 2 - Medium

" 3 - Heavy

Distribution List

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