

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

August 17th - 19th, 1958

PART I
MINUTES AND DISCUSSIONS

Prepared and Distributed by
Research Division
Forestry Branch
Dept. of Northern Affairs and National Resources

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

Held at Macdonald College, Ste. Anne de Bellevue, Que.,
on August 17th, 18th and 19th, 1958.

PART I

MINUTES AND DISCUSSIONS

Attendance

P. Aird	Canadian International Paper Co., Grenville, Que.
M. G. Boyer	Dept. of Agriculture, Forest Biology Laboratory, Quebec, Que.
A. J. Carmichael*	Dept. of Lands and Forests, Tree Seed Plant, Angus, Ontario
W. H. Gram*	Dept. of Agriculture, Forest Nursery Station, Indian Head, Sask.
L. P. Chiasson	Dept. of Biology, St. Francis Xavier University, Antigonish, N. S.
B. W. Dance*	Dept. of Agriculture, Forest Biology Laboratory, Maple, Ontario.
K. W. Dorman	U.S. Forest Service, Southeastern F.E.S., Asheville, N.C., U.S.A.
J. L. Farrar*	Faculty of Forestry, University of Toronto, Toronto, Ontario.
D. P. Fowler*	Dept. of Lands and Forests, Southern Research Station, Maple, Ontario.
C. Gagnon	Dept. of Agriculture, Forest Biology Laboratory, Quebec, Que.
C. Heimbürger*	Dept. of Lands and Forests, Southern Research Station, Maple, Ontario.
M. J. Holst*	Forestry Branch, Petawawa F.E.S., Chalk River, Ontario

A. H. Hutchinson*	Dept. of Biology and Botany, University of B.C., Vancouver, B.C.
A. de Jamblinne	Centre de Biologie, Bokrijk-Genk, Belgium.
A. R. C. Jones	Macdonald College, St. Anne de Bellevue, Que.
H. B. Kriebel	Ohio Agricultural Experiment Station, Wooster, Ohio, U.S.A.
C. H. Lane*	Dept. of Lands and Forests, Div. of Timber and Reforestation, Toronto, Ontario.
C. Syrach Larsen	Arboretum Hørsholm, Denmark.
H. G. MacGillivray*	Forestry Branch, Fredericton, N. B.
Francois Mergen	School of Forestry, Yale University, New Haven, Conn., U.S.A.
R.J. Moore	Dept. of Agriculture, Science Service, Ottawa, Ontario.
Hans Nienstaedt	U.S. Dept. of Agriculture, Northern Institute of Forest Genetics, Rhinelander, Wis., U.S.A.
A. L. Orr Ewing* (Chairman)	Research Division, B.C. Forest Service, Victoria, B.C.
Scott S. Pauley	University of Minnesota, St. Paul 1, Minn., U.S.A.
T. O. Perry	University of Florida, Gainesville, Fla., U.S.A.
R. Pomerleau	Dept. of Agriculture, Forest Biology Laboratory, Quebec, P. Q.
J. Salm	Canadian International Paper Co., Harrington Forest Farm, Calumet, Que.
H.S.D. Swan*	Pulp and Paper Research Institute of Canada, Montreal, Que.
C. W. Yeatman* (Secretary)	Forestry Branch, Petawawa F.E.S., Chalk River, Ont.

BUSINESS MEETING, 17th AUGUST

Thirteen members, denoted by * in the list above, attended the business meeting in the afternoon of 17th August.

70. Welcome

Dr. Orr Ewing called the meeting to order and welcomed the members to the 6th Meeting of the Committee. The agenda had been distributed prior to the meeting.

71. Minutes of the Last Meeting

The minutes of the last meeting had been prepared and distributed to members by the Forestry Branch. Omissions or corrections were called for. The minutes were adopted on a motion by Holst, seconded by Fowler.

72. Business Arising from the Minutes

(a) Distribution List, Part II, Proceedings

Approval was requested for a distribution list of names of persons and organizations outside of Canada to whom Part II of the Proceedings, Reports and Papers, should be sent. Approval was granted on a motion by Holst, seconded by MacGillivray. (See Appendix 2 for list).

(b) 9th International Botanical Congress.

Dr. Heimburger reported to the Committee on progress being made on the organization of the section on Forest Botany at the 9th International Botanical Congress, which is to be held in Montreal, 19th-29th August, 1959. The programme is to begin on August 20th, and will include seven days of meetings and lectures. A symposium with the theme 'Forest Tree Breeding' is being organized, at which invited papers will be presented. In addition, papers reporting research in tree breeding may be submitted for inclusion in the Forest Botany Section. Summaries of these papers must be submitted by 15th March, 1959.

The Congress is divided into seventeen Sections, 122 papers have been announced to date, and some 900 are expected. It is probable that papers will be limited to 15 minutes.

A number of forest geneticists from abroad have already announced their intention of attending the congress.

73. Membership

Resignations: Mr. A. Bickerstaff, Forestry Branch, Ottawa, wished to resign from the Committee. Dr. Cram gave notice of the resignation of Mr. J. Walker, formerly Superintendent of the Forest Nursery Station, Indian Head, Saskatchewan.

New Members: The following men were elected:

Dr. R. Glen	Associate Director, Science Service, Dept. of Agriculture, Ottawa, Ontario	Sponsoring Member
Mr. C. H. Lane	Dept. of Lands and Forests, Div. of Timber and Reforestation, Toronto, Ontario	Sponsoring Member
Dr. P. Aird	Canadian International Paper Co., Grenville, Que.	Corresponding Member
Mr. R. N. Johnston	Chief, Division of Research, Dept. of Lands and Forests of Ontario, Parliament Buildings, Toronto, Ontario	Corresponding Member
Dr. C. Syrach Larsen	Arboretum Hørsholm, Denmark	Corresponding Member
Dr. M. G. Boyer	Dept. of Agriculture, Forest Biology Division, Quebec City, Que.	Active Member
Dr. L. P. Chiasson	St. Francis Xavier University, Antigonish, N. S.	Active Member
Dr. L. Ebell	Forestry Branch, c/o Forest Biology Laboratory, Victoria, B. C.	Active Member
Mr. C. Gagnon	Dept. of Agriculture, Forest Biology Division, Quebec City, Que.	Active Member
Mr. J. Salm	Canadian International Paper Co., Harrington Forest Farm, Calumet, Que.	Active Member

74. Review for Forestry Chronicle

On a motion proposed by Cram, seconded by Farrar, the Chairman was instructed to prepare a review of the meeting for submission for publication in the Forestry Chronicle.

75. Location and Date of Next Meeting

The proposal was made that the committee meet biennially rather than annually. It was pointed out that the meetings entailed a lot of work, and that a fresher outlook can be presented in the longer interval. In particular, tree breeders will be busy in 1959 with the Botanical Congress. On a motion, proposed by Holst, seconded by Farrar, it was decided that future meetings of the Committee on Forest Tree Breeding be held biennially.

On a motion, proposed by Farrar, seconded by Holst, it was decided that the next meeting be held in British Columbia in 1960, either immediately before or after the World Forestry Conference, which is to be held in Seattle in the autumn.

76. Election of Officers

Nominations were called for the positions of chairman and secretary. On a motion, proposed by Holst, seconded by Cram, the present office holders were retained.

77. New Business

(a) Seed exchange - B. C. Forest Service Policy

Dr. Orr Ewing outlined the policy of the B.C. Forest Service with respect to requests for seed collections and other plant material. Every consideration was given to requests from university and forest research organizations for specific seed collections but the number of requests received made this difficult. Persons and organizations requesting seed for private use, or large collections for commercial use, were advised to contact the commercial seed dealers in the province.

A list of approved requests for seed from the current year's crop was closed on May 30th each year. Requests received after this date were deferred for one year unless they could be fulfilled from routine collections. The collection of special lots of seed could not be allowed to interfere seriously with the research programme of the Forest Service so that it was not usually possible to collect seed from special trees, or to provide photographs of the trees or stands from which seed was collected. Requests for pollen or scions could not usually be granted at the present time.

In reply to a question by Dr. Heimburger, Dr. Orr Ewing said that winter collections of poplar could be made, within the limits of co-operation provided by districts and rangers.

Mr. Holst commented on some of the problems involved in the exchange of plant material. Requests had been made that were both too involved and too expensive to fulfill. If such collections were considered to be necessary, then special collection teams should be sent by the interested party.

In the Forestry Branch, a limited amount of money is provided at Petawawa and in the districts for special collections. Mr. Holst concluded by saying that every effort to co-operate with others must be made so that one can feel free to make requests.

(b) Co-operation in Tree Breeding

Dr. Heimbürger discussed three examples of possible co-operation between the Dept. of Lands and Forests and other agencies.

1. Breeding of hard pines for resistance to European shoot moth.

Dr. Heimbürger had hoped that representatives of the Forest Insect Laboratory, Sault Ste. Marie, would be present to discuss the possibility of co-ordinating present co-operative efforts. Mr. Holst commented that such co-operative efforts must be worked out between the people involved.

Dr. Heimbürger suggested that red pine from northern sources should be tested in southern Ontario for resistance to shoot moth, for shoot moth may eventually be an important factor in the north.

2. White pine weevil resistance.

Dr. Heimbürger hoped that a meeting with Dr. Belyea might be arranged in the fall.

3. Resistance of white pine to blister rust - co-operation with Dept. of Agriculture, B. C.

Dr. Heimbürger noted that some western white pine seed had been sown at Maple and that the seedlings had been rigorously tested and screened for resistance to blister rust. Some half a dozen plants remained which could be propagated, and this material was available for further testing and possible use in the west. Dr. Orr Ewing promised to inform Mr. Porter about these plants on his return to Victoria.

(c) Discussion of plans for 7th Meeting, 1960.

Dr. Farrar suggested that a tree breeding section be organized at the World Forestry Conference rather than hold a separate meeting. Alternatively, the committee meeting could be confined to a field meeting. Mr. Holst noted that a business meeting should be held separately in one afternoon.

In conclusion, Dr. Orr ~~Bring~~ outlined the following program which summarised the points brought out in discussion:

- 1/2 day business meeting
- 1/2 day discussion of biennial reports
- 2 days field meeting.

Voluntary papers may be presented at the World Forestry Conference.

(d) Following a motion, proposed by Heimbürger, seconded by Holst, it was decided that members attending other tree breeding meetings of which proceedings will be published should not be required to present reports to this committee.

(e) List of Workers in Canadian Botanical Sciences

Dr. Moore requested that he be notified of any additions or corrections to the above list, which is to be brought up to date for the Botanical Congress. In answer to a question, Dr. Moore said that private companies had been sent copies of the list and some names had been submitted.

(f) Dr. Farrar drew attention to a correction to the published membership list; it should read G.S. Allen, not C.S. Allen.

(g) Dr. Heimbürger requested that a newsletter be prepared and sent to members in the fall of 1959. Notes for the newsletter should be requested of members beforehand.

(h) Dr. Cram affirmed that the chairman and secretary have executive powers between meetings.

TECHNICAL MEETING, 18th, 19th AUGUST

Twenty members and eight guests from the United States and Europe attended the Technical Meeting, which included discussions of members' progress reports, reviews of programmes by the guests, voluntary papers, a seminar, "Timber Quality and Genetics", and a tour of the Morgan Arboretum.

A banquet was held in the evening, 18th August, at which Dr. C. Syrach Larsen was guest speaker. His informal talk on the development of forest tree breeding throughout the world was greatly appreciated by the members and guests present.

Dr. Syrach Larsen has been elected a corresponding member of the Committee on Forest Tree Breeding in Canada.

78. The chairman introduced Dr. Common, who, in the absence of the Dean, welcomed the Committee to Macdonald College, and outlined the history and functions of the College.

79. The chairman introduced each of the guests, and members of the committee introduced themselves in turn.

80. Discussion Arising from Members' Progress Reports, Programme Reviews and Papers

Active members had distributed their annual reports in advance of the meeting. The following are notes from the discussions arising from the reports, reviews and papers.

The Reports, Reviews, and Papers were tabled as listed below, and are to be published as Part II of the Proceedings.

1. Member Progress Reports:

A/ A. J. Carmichael	J/ H. G. MacGillivray
B/ W. H. Cram	K/ R. J. Moore
C/ B. W. Dance	L/ A. L. Orr Ewing
E/ D. A. Fraser	M/ R. Pomerleau
(in absentia)	N/ W. A. Porter
F/ C. C. Heimbürger	(in absentia)
G/ M. J. Holst	P/ L. P. Chaisson (new member)
I/ A. H. Hutchinson	

2. Programme Reviews:

K. W. Dorman
H. B. Kriebel
Francois Mergen
A. de Jamblinne
Hans Nienstaedt
Scott S. Pauley
T. O. Perry

Southeastern Forest Experiment Station.
Ohio Agricultural Experiment Station.
Yale University.
Campine, Belgium.
Northern Institute of Forest Genetics.
University of Minnesota.
University of Florida.

3. Papers:

Francois Mergen
H. B. Kriebel

M. J. Holst
B. W. Dance

C. W. Yeatman
C. C. Heimburger

Natural polyploidy in pine.
Early differentiation between sugar
maples.
Interspecific grafting in hard pine.
The taxonomy of fungi causing leaf
and twig blights of north american
poplars.
A tree crown isolation tent.
The role of "Rhubarb" in forest tree
breeding.

4. Seminar: Timber Quality and Genetics

K. W. Dorman

T. O. Perry and Wang,
Chi-Wu

M. J. Holst

The status of work on wood quality in
southern forest tree improvement
research.
Investigations of variation in wood
quality of southern pines and its
genetic significance.
Thoughts on wood density.

1. MEMBER PROGRESS REPORTS

A/ A. J. Carmichael

In answer to a question by Dr. Heimburger on the validity of the Ontario seed collection zones, Mr. Carmichael replied that the zones were based on Dr. Hill's system of site classification, with modifications by Dr. Heimburger. There had as yet been no chance to verify the validity of these zones. It was intended to compare the Ontario zones with zones based on climatic data as had been done in the Lake States. Provenance tests would also be established based on the defined seed zones.

Mr. Carmichael explained a recent administrative re-organization within the Dept. of Lands and Forests, in which the Divisions of Timber and Reforestation had been combined into one division.

Mr. Carmichael added that a new project had been set up for the production of seed through the development of seed orchards. These are being established specifically for seed production, but relevant research findings will be made use of for their establishment.

It was questioned whether seed production was the concern of the Committee, as opposed to the research aspects of seed testing. After some discussion, the majority considered that a broad outlook should be adopted for the mutual benefit of research and practice.

Mr. Holst drew attention to the foliar analyses referred to on page A-2 of the progress report, pointing out that they were made in the year of the cone crop rather than two years previously when the flower primordia had been laid down. Mr. Carmichael conceded that these foliar analyses will refer directly to cone counts yet to be made. He also suggested that the foliage for analysis should be collected in July when the primordia are laid down.

Replying to a question from Dr. Cram, Mr. Carmichael said the designing of the provincial provenance tests included four replications, plots consisting of 10 rows of 10 trees planted 6 ft. x 6 ft.

Dr. Cram drew attention to the degree and nature of variation of cone counts within and between sites in Table 1. Mr. Carmichael emphasized that since the cone crop varies from tree to tree, and from year to year, a number of annual counts will be required to provide basic data before the fertilizer treatments can be applied.

B/ W. A. Cram

In a discussion of the necessity for storing poplar cuttings over winter, Dr. Cram pointed out that it was too dry in the fall for planting out poplar.

C/ B. W. Dance

Dr. Cram asked how Cytospora ranked with other pathogens of poplar. (Ref. Page C-6.) Mr. Dance replied that it is frequently isolated from wood in an advanced state of decay, but it is not an aggressive fungus. Innoculations had not been successful. Dr. Heimbürger suggested the inoculum might be introduced to the host by hitting the tree with a hammer. Mr. Dance noted that Cytospora is a secondary pathogen and not a parasite.

E/ D. A. Fraser

No discussion was held in the absence of the author.

F/ C. C. Heimbürger

In reply to a question by Dr. Cram, Dr. Heimbürger agreed that seed viability studies were a legitimate part of tree breeding. Dr. Cram noted that a germination of 60 per cent after 60 days stratification implied that 40 per cent of the progeny was rejected. Dr. Heimbürger agreed, but noted that it was difficult to overcome in practice. Every germinable seed must be raised for very detailed studies but normal nursery procedures

should be followed for large scale provenance tests. Dr. Heimburger, in further discussion, said that provenance testing is a silvicultural tool employed to determine the economic value of the material on particular sites and as such it should not be considered to be a part of either tree breeding, or forest genetics. Mr. Holst added that a provenance experiment also tests the adaption of a species to nursery culture and plantation practices. Dr. Hutchinson commented on losses due to embryonic failure before germination. Dr. Heimburger considered that, in spite of these losses, the random assortment of genes in a polygenic population assured a fair representation of the population in the survivors.

Dr. Syrach Larsen emphasized the importance of raising every viable seed from special lots, so that no material of potential interest might be lost. As an example, he cited Antirrhinum, in which gardeners usually thin out the small plants. Dr. Larsen had found that by planting all the seedlings, some fine and unusual flowers had developed from seedlings normally discarded.

G/ M. J. Holst

A discussion developed concerning the size of plot to be used in field experiments. Mr. Holst said that in practice, plot size was limited to between 50 and 100 plants for experiments with a number of seed lots and with multiple replications. If the object of the planting was for selection and as a source of breeding material, 'observation' experiments were established where no limit was placed on the size of the plots.

In reply to a question from Dr. Orr Ewing, Mr. Holst said that a Douglas fir provenance exhibiting a marked blue colour was probably from a high elevation, and was not suited to Petawawa conditions. Low elevation Douglas fir was frost-tender. Douglas fir of mid elevation may be of some value.

A discussion arose concerning the forcing of hybrid seedlings in the greenhouse at Petawawa Forest Experiment Station. A combination of mercury vapour and incandescent lamps is used to extend the photoperiod. Illumination at plant level is less than 500 foot candles. Mr. Holst said that from experience at Petawawa and from references in the literature, it appeared that diurnal and maximum day temperatures were important factors. It was pointed out that interesting genetic comparisons might be made with very young material grown under controlled conditions in the greenhouse.

I/ A. H. Hutchinson

Dr. Hutchinson's summaries of the work at the University of B.C. were received after the meeting and are to be found in Part II, Proceedings.

J/ H. G. MacGillivray

Dr. Heimburger questioned the use of a plant spacing of 4 x 4 feet in provenance experiments on the grounds that it is normal silvicultural practice to use wider spacing.

Mr. Holst replied that they were interested in early assessments of these experiments which may be followed for only 20 to 30 years. On the basis of this information, seed collection zones may be established. These experiments, however, were not intended to be silvicultural plantations.

K/ R. J. Moore

In reply to a question concerning the practical value of the Caragana tetraploid, Dr. Cram agreed that the tetraploid itself was of no value, but that when it flowers, it may be crossed with a diploid to produce triploids which may be of real value. Dr. Cram expressed his appreciation for the close collaboration that he had received from Dr. Moore.

L/ A. L. Orr Ewing

Dr. Farrar noted that Dr. Orr Ewing preferred to make plus tree selections in the younger age classes in Douglas fir, while others, working with other species, preferred to select in older stands. Dr. Orr Ewing commented that in mature stands of Douglas fir very many trees look plus trees and that selection of the best phenotypes was very difficult. In the future trees will not be grown on a rotation of from 300 to 500 years and older and, therefore, selection is concentrated in the 50 to 100 year age classes. Some material, however, will be collected from the old stands before they are cut out.

Dr. Cram asked whether inbred and crossbred seedlings were being grown together and compared individually. Dr. Orr Ewing replied that this had not been done, as the lots had been planted out in plots. If there were only one or two inbreds from a tree, grafts were taken in order to maintain the genotypes.

Dr. Orr Ewing discussed the question of self fertility. Individual Douglas fir vary greatly in this respect, in one tree more seedlings were obtained from self-pollination than from cross-pollination. Mr. Fowler asked whether apomictic seedlings could be distinguished from selfed progeny. Dr. Orr Ewing said not, but that the apparent apomicts are very uniform in comparison with the inbred and crossbred progenies from the same tree. Originally, there were twelve apomictic seedlings, of which seven remain. Dr. Orr Ewing added that he would like to have cytological evidence of the occurrence of apomixis in the Douglas fir. Some hundreds of seedlings have been derived from self pollinations.

Dr. Orr Ewing pointed out that the growing demand for seed has meant that his work must now be mainly concentrated on selection and the establishment of seed orchards.

Dr. Cram suggested that self-incompatible clones should be used in seed orchards in preference to self-compatible clones.

Replying to Mr. Holst's question, Dr. Orr Ewing said that the breeding value of an individual tree possibly may be assessed from inbred progeny.

Mr. Holst commented that emphasis on inbreeding may advance a breeding program rapidly where such is possible. Dr. Cram pointed out that combinations of genotypes can also be important. Dr. Heimburger warned that by the use of selfing, selections may be made for self-compatibility which may thus lower the value of these genotypes for use in seed orchards. Dr. Nienstaedt agreed that more work needs to be done to determine the degree of selection by individual trees for self and foreign pollen. Dr. Syrach Larsen commented that in the case of European-Japanese larch seed orchards, inbreds could only be obtained by artificial pollination.

M/ R. Pomerleau

Dr. Pomerleau and Dr. Heimburger discussed the possible mechanisms in resistance of elm species to Dutch elm disease with respect to vessel size in the wood. Dr. Pomerleau noted that the indications are that the disease blocks the vessels of the host tree. Dr. Heimburger suggested that the relative carbohydrate content in the cambium may be an important factor in the attraction of the ambrosia beetle to elm.

N/ W. A. Porter

No discussion was held in the absence of the author.

P/ L. P. Chiasson

Dr. Chiasson explained that his activity in tree breeding was on a part time basis at present.

2. PROGRAMME REVIEWS

K. W. Dorman

Southeastern Forest Experiment Station,
U.S. Dept. of Agriculture, Forest Service.

Mr. Holst asked how much work had been done with Virginia pine. Dr. Dorman replied that the station had co-operated with a number of agencies in northern Alabama and Tennessee. He added that Virginia pine was an extremely variable species and that improvement could be expected in a relatively short time.

H. B. Kriebel

Ohio Agricultural Experiment Station,
Department of Forestry, Ohio.

Dr. Cram asked whether problems had been encountered in raising maple seedlings in pots. Dr. Kriebel said that serious nutritional problems had arisen, particularly with respect to iron deficiency. This had been overcome by the addition of iron chelate and powdered iron, both of which had proved effective.

In reply to Mr. Holst's question, Dr. Kriebel said that insufficient chilling of maple after bud formation resulted in abnormal bud burst and foliage development. In further discussion, Dr. Perry commented that one month of chilling was adequate for New York and Vermont provenances of maple, and that this appeared to hold true for other species. Temperatures between 38°F and 40°F appeared to be effective. Dr. Nienstaedt noted that if hemlock is transferred directly from the growth room to the freezer, it is killed, although two weeks in temperatures between 36°F and 40°F were enough to harden the plants to withstand subsequent freezing.

François Mergen

School of Forestry, Yale University

A discussion was held concerning the occurrence and causes of the yellowing of needles of spruce and pine species. It was agreed that coniferous species found in very cold climates, especially in the north, exhibited a natural yellowing of the foliage in the winter which was not related to mineral deficiencies.

In reply to a question, Dr. Mergen said that the needle fascicles used in the rooting study had been taken from slash pine seedlings, of which the oldest was eight years. The best rooting medium had been vermiculite and sand, a 16 hour photoperiod had been used, with a 70°F day 60°F night temperature.

A. de Jamblinne

Centre de Biologie Forestiere Bokrijk,
Campine, Belgium.

Dr. Orr Ewing asked what conifers were indigenous to Belgium. Baron de Jamblinne replied that the pines were introduced into Belgium during the 15th century when plantations were established. The origin of the seed was unknown, and thus provenance studies were important to-day.

In answer to Mr. Holst's question, Baron de Jamblinne said a type of P. nigra had been grown in Belgium for a long time and made good planting stock.

Hans Nienstaedt

Northern Institute of Forest Genetics
U.S. Dept. of Agriculture, Forest Service

Dr. Nienstaedt noted that the chilling requirements of rootstocks and scions changed with the age of the material; four-year-old seedlings required longer than two-year-old seedlings, and an old scion required a longer chilling period to break dormancy than the young root stock.

Scott S. Pauley

University of Minnesota,
School of Forestry.

Replying to Dr. Heimbürger's question, Dr. Pauley said that field budding of aspen was carried out in early August.

Dr. Dorman asked what clone stock had been used for budding. Dr. Pauley replied that two were of particular interest: one found at Harvard showed outstanding growth, it was disease resistant and grew with a whorled appearance of the branching because the small late season branchlets sloughed off. The second clone was chosen for outstanding growth.

T. O. Perry

University of Florida,
School of Forestry.

The following notes were taken from a brief review given by Dr. Perry of the work at the University of Florida. A written review is not included in the Proceedings but the 1957 Progress Report is available on request to Dr. Perry.

The tree breeding programme at the University of Florida was financed by a group of private companies, and the main emphasis was on plus tree selection in Pinus and the establishment of seed orchards. Much of this work was done by the companies under the guidance of the University staff.

Studies concerning photoperiod and the chilling requirements of a number of species have been completed.

A promising technique to obtain material for cytological studies had been developed whereby wound tissue emanating from medullary rays was protected from dessication by covering with a plastic sheet.

In pollen dispersal studies, it was found that the pollen density from an isolated slash pine dropped to five percent of the source frequency at 300-500 ft. over open land. In another instance, the pollen density midway between two plantations one quarter of a mile apart was thirty percent of the source frequency. These studies have indicated the distance necessary for the effective isolation of seed orchards.

A single tree progeny test for transplanting ability has given indications of real differences between progenies.

A discussion followed which dealt with the isolation of seed orchards from contamination by wild pollen. Dr. Perry considered that an isolation strip of one quarter of a mile was desirable, but often difficult to put into practice.

3. PAPERS

François Mergen

Natural Polyploidy in Pine

It is regretted that it is not possible to reproduce in Part II, Proceedings the excellent photographs Dr. Mergen used to illustrate this paper.

H. B. Kriebel

Early Differentiation between Sugar Maples

Dr. Farrar questioned whether the differences in germination behaviour might be related to differences in seed treatment prior to sowing. It was agreed that more light (empty) seed may have been taken out of some lots than others. Ripeness at collection and time of drying may also have had some effects. Seeds from the two northern sources were collected from the ground, while the Angus seed was collected from the trees.

The seed was stratified by mixing with moist spagnum, the mixture being placed in polyethylene bags, and kept in a refrigerator at 35-40°F for from sixty to one hundred days when sprouting could be seen through the bag.

Mr. Jones commented that he had collected red maple seed in the spring of 1958. An early collection was made from the tree, but the seed did not germinate. Collection from the ground made a week later, however, gave some germination.

M. J. Holst.

Interspecific Grafting in Hard Pine.

Dr. Perry commented that slash pine had been cleft grafted to slash pine on a large scale in Florida. It was noticed that when all lower branches were pruned off too quickly an apparent phloem block developed, with swelling of the scion above the graft, resulting in death. Dr. Perry asked whether this situation had been noticed at Petawawa. Mr. Holst replied that this had not been observed, but that, in any case, comparisons of mortality covered all combinations of scions and rootstocks.

B. W. Dance.

The Taxonomy of Fungi causing Leaf and Twig Blights of North American Poplars.

Replying to a question from Dr. Pomerleau, Mr. Dance said that the leaf and twig blights were not important diseases in high stands of poplar, but that severe damage was common in regeneration. It was not an important disease to hybrids, it was most destructive to P. tremulaeides and some damage was found on P. grandidentata.

C. W. Yeatman

A Tree Crown Isolation Tent

This paper was illustrated with photographs which cannot be included in Part II, Proceedings.

C. C. Heimbürger

The Role of "Rhubarb" in Forest Tree Breeding

Dr. Pauley commented that he agreed with Dr. Heimbürger's contention that only a small proportion of the phenotypically select plus trees used in a seed orchard can be expected to be elite trees. His impression, however, was that people who have established orchards intend to screen the material heavily and to establish further orchards with genotypically select clones.

In discussion, it was noted that the few valuable individual trees were most important to a breeding programme, although poor individuals from inbred lines may be valuable for their combining ability. Mr. Holst pointed out that in the provenance test one expects to determine the average losses or gains to be realized by moving seed from the area of collection. Most provenance experiments were not intended for the selection of individual trees for breeding, but the results were basic to a selection programme.

Mr. Carmichael pointed out that the seed producer and the geneticist were both interested in the establishment of seed orchards, but that their motives and methods were frequently different.

4. SEMINAR: TIMBER QUALITY AND GENETICS

The subject was introduced by the chairman, Dr. Orr Ewing. Dr. Dorman and Dr. Perry each gave papers, which are published in Part II, Proceedings. They discussed the research which has been carried out in the Southern States to determine 1) the nature and extent of variation in wood quality within the southern pines, and 2) the degree of genetic control over wood quality.

Mr. Holst outlined briefly the main points contained in his prepared paper "Thoughts on Wood Density". He referred specifically to the wood density determinations of white spruce provenances made by Mr. Jones at the University of New Brunswick which demonstrated a range of variation in wood density in young trees of this species. A good correlation was also shown between stem and adjacent branch wood density.

A general discussion followed of the relation of wood quality to the forests and forest industries in Canada. Mr. Swan pointed out that the requirements of wood in sixty years' time with respect to wood quality are unknown. Dr. Perry noted that the requirements of wood fibre for different types of paper can be specified for the guidance of the tree breeder.

Dr. Farrar commented that, although the individual tree can be selected and bred for a combination of fast growth and high wood density, the production per acre of a given site, as measured in volume or cellulose, has a limit.

81. Co-operation in Tree Breeding Between Industry and Government Research Organizations.

Dr. Aird introduced the subject of co-operation between government research organizations and industry for the further promotion of tree breeding and its practical application in Canada. Dr. Aird noted that his company was already working in co-operation with Mr. Holst. He felt, however, that this type of co-operation should be extended between other organizations, and that relevant information be more widely distributed. Particular reference was made to provenance studies and to trials of exotic tree species. He stressed the importance of selection of individual trees of outstanding characteristics by foresters in the course of their duties in the forests. These trees could be brought to the attention of the tree breeders for detailed study and use.

The committee agreed that a great deal of work has yet to be done. The discussion centred on ways and means to extend tree breeding activity. The organization of co-operative groups working in the Southern States, Lake States and Northwestern States was outlined to the committee. This included the setting up of a joint committee to co-ordinate tree breeding work in a region, and the conducting of short courses by tree breeders to train practicing foresters in the concepts and methods to be used.

Mr. Swan suggested that further co-operation could best be developed through the Forestry Committee of the Woodlands Section of the C.P.P.A. The secretary was accordingly instructed to write to Mr. Pepler, Manager, Woodlands Section, to inform him that this matter had been discussed, including the possibility that short courses for company foresters might be organized if required.

82. Dr. Orr Ewing expressed his appreciation to the members and guests for their attendance, and also, on behalf of the Committee, thanked Mr. Jones for allowing the Committee the use of his lecture room.

Dr. Syrach Larsen thanked the Committee for their hospitality.

The meeting was adjourned until 1960, when the Committee is due to meet in British Columbia.

83. In the afternoon of 19th August, Mr. Jones of Macdonald College conducted the members and guests of the Committee on an interesting and informative tour of the Morgan Arboretum. Examples of farm woodlot management were seen, together with a wide selection of native and exotic trees and shrubs.