

Forestry Branch  
Department of Northern Affairs and National Resources

PROCEEDINGS OF THE THIRD MEETING OF  
THE COMMITTEE ON FOREST TREE BREEDING

Held in the Lecture Room, Forest Products Laboratory,  
Metcalf and Isabella Streets, Ottawa, on March 8 and  
9, 1955.

Attendance

Mr. A. Bickerstaff, Chairman  
Dr. R. M. Belyea,  
Dr. J. E. Bier,  
Mr. A. J. Carmichael,  
Dr. L. Chouinard,  
Dr. W. H. Cram,  
Dr. B. W. Dance,  
Mr. A. R. Fenwick,  
Mr. J. A. C. Grant,  
Mr. J. M. Halpenny,  
Mr. J. D. B. Harrison,  
Mr. R. R. Hartig,  
Dr. R. G. Hitt,  
Mr. J. M. Holst,  
Dr. A. W. S. Hunter,  
Dr. R. J. Moore,  
Mr. H. G. MacGillivray,  
Dr. R. Pomerleau,  
Mr. W. A. Porter,  
Mr. J. W. B. Sisam,  
Dr. E. C. Smith  
Mr. C. R. Sullivan,  
Mr. H. S. D. Swan,  
Mr. C. W. Yeatman,  
Dr. C. C. Heimbürger, Secretary

40. Welcome

Mr. Bickerstaff welcomed the following guests and new members: Dr. R.G. Hitt and Mr. R.R. Hartig of the Lake States Forest Tree Improvement Committee, Dr. R.M. Belyea and Mr. C.R. Sullivan of the Forest Insects Laboratory at Sault Ste. Marie, and Mr. A.R. Fenwick of the Ontario Department of Lands and Forests, and new members: Dr. B.W. Dance, Mr. W.A. Porter, and Dr. R. Pomerleau of the Division of Forest Biology, Department of Agriculture, Mr. J.M. Halpenny of the Division of Reformation, Ontario Department of Lands and Forests, Mr. H.S.D. Swan of the Pulp and Paper Research Institute of Canada, and Mr. C.W. Yeatman of the Forestry Branch, Department of Northern Affairs and National Resources.

41. Minutes of last meeting

Mr. Bickerstaff distributed copies of the minutes of the last meeting which had been mimeographed by the Forestry Branch and suggested the following corrections:

In Minute 38, Mr. A.L. Orr-Ewing was proposed as an active member. Since Mr. Orr-Ewing is an officer of the B.C. Forest Service, Dr. R.H. Spilsbury has been asked to become a sponsoring member. In the first copies of the minutes circulated "Adjournment" should be minute 39, not 38. Dr. Heimburger introduced a suggestion by Mr. McCallum to change "Division of Forest Biology" to "Division of Botany and Plant Pathology" in minute 28, page 5. Dr. Heimburger then made some comments on changes in the minutes of the last meeting made by the editor of the Forestry Branch, in deleting several paragraphs. These deletions are as follows: Minute 22, in the middle, "The C.P.P.A. has a Woodlands Section which has developed into a large body. It had a Silvicultural Research Committee which is now a Committee on Forestry. This Committee organized the present plantation survey. The Pulp and Paper Research Institute of Canada (P.P.R.I.C.) was established in 1950 and took over the Pulp and Paper Research Laboratory in Montreal. This is supported by McGill University and the Forestry Branch. Dr. L.L. Thiesmeyer, its president, is also a member of the directorate of Woodlands Research. Mr. A. Koroleff is Director of Woodlands Research, dealing with logging methods, hauling roads, wood transportation and similar studies." Minute 22, last paragraph: "Some of the latter are more interested in planting than others and are willing --etc."

In minute 23, in the middle: "In Canada, the governments are contributing about this share of the total cost if a comparison is made on a per capita basis and the cost reduced to about 1/3 of that in Sweden. Therefore, it is important to invite the participation of the industry in sponsoring forest tree breeding and allied activities." None of the members present voiced any objections to the wording or contents of these deletions and to their reinstatement.

Mr. Swan stated that the P.P.R.I.C. was reorganized, not established, in 1950. Dr. Cram moved a vote of thanks to the Forestry Branch for mimeographing the minutes of the last meeting.

42. Business arising from the minutes

Mr. Bickerstaff distributed copies of the Chairman's Report covering action taken on the items arising out of the 1953 and 1954 meetings of the Committee (see Appendix "A").

(a) Membership

Dr. L.P.V. Johnson (University of Alberta) did not reply to invitation for membership. Dr. H. Hills, the new chief of the Horticultural Division, was suggested as a sponsoring member. Mr. W.J. Le Clair, Secretary of the Canadian Lumbermen's Association, promised to appoint a member representing his organization "in the near future". Mr. W.A.E. Pepler wrote that he would be unable to attend the present meeting and suggested Mr. E.T. Owens as an alternate. He also suggested to invite

Dr. L.L. Thiesmeyer of the P.P.R.I.C. to become a sponsoring member. Dr. G.S. Allen (U.B.C.) has suggested that Dr. A.H. Hutchinson, formerly of the U.B.C., be invited to become an active member of this Committee. It was moved by Mr. Sisam and seconded by Mr. Porter that this suggestion be followed. This was accepted.

Mr. Bickerstaff read a letter received from Dr. N.H. Grace, Research Council of Alberta, extending greetings and good wishes to the Committee.

(b) Financial position

Mr. Bickerstaff read and distributed copies of a memorandum from the Director, Forestry Branch, covering among other questions, the functions of this Committee, its membership and availability of funds. (See Appendix "B").

Mr. Harrison outlined the functions of the National Research Council in initiating and sponsoring the Associate Committee on Forestry and its Sub-Committee on Forest Tree Breeding, and the subsequent development of the present Committee. The outline is similar to that given in minute 3 (1953). He stated that the Canada Forestry Act was promulgated in December, 1949. At present funds are available for agreements with the Provinces for the support of 2 kinds of activities of the Provinces: (1) forest inventories, and (2) reforestation of vacant Crown Lands.

Dr. Heimburger inquired about the kind of sponsorship carried out by the Forestry Branch. Mr. Harrison replied that the sponsorship at present consists of a certain amount of clerical work, arrangement for a place of meeting and the other activities outlined in the memorandum (Appendix "B").

(c) Lectures on tree breeding

Dr. Chouinard (Laval U.) stated that a few special lectures on this subject will be welcome at Laval University.

Mr. Sisam (U. of T.) wrote the following about this to Mr. Bickerstaff: "The matter of lectures on tree breeding has been discussed at some length with members of the Faculty. While the importance of forest tree breeding, and the need to have our forestry graduates well informed on this subject are fully realized, it is felt that the giving of three or four lectures on the subject by a visiting lecturer would not be particularly desirable. Such lectures would presumably not be a required part of the curriculum, might not fit in easily with the courses being given in related subjects, and would not be subject to examinations. Furthermore, if the subject Forest Genetics is treated in this way, how many more aspects of the biological, economic, operational, mensurational and so on, branches of forestry should also be given such special attention? As I mentioned to you in a previous letter, I am in favour of doing something more in this Faculty with regard to Forest Genetics, but it seems to me it will probably have to be developed within the framework of Silvics or Silviculture." Mr. Sisam stated further at the meeting that funds are available in the Graduate School of the University of Toronto for traveling lecturers. The lectures are given in the evenings and are also available to undergraduate students.

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Mr. Bickerstaff mentioned that Dr. D.A. Macdonald met Dr. C. Syrach Larsen in India during the recent World Forestry Congress. Dr. Syrach Larsen is preparing a set of lectures on forest tree breeding. These lectures are to be translated into English by Dr. M.L. Anderson of Edinburgh.

Dr. G.S. Allen (U.B.C.) wrote as follows to Mr. Bickerstaff: "Although we require a course in Second Year which we call Principles of Forest Genetics, we would welcome visiting lecturers who might deal specifically with some phase of the work or who might outline the work of the organization represented. If we have sufficient advance notice we might be able to find funds to help defray expenses of a lecturer coming from another part of the country. At the same time, we would be pleased to contribute in some way to the program elsewhere, provided that we are qualified to deal with the subject desired."

Mr. J.M. Gibson (U.N.B.) wrote as follows: "We will be particularly interested in this and will be very glad to pay any necessary travelling expenses for a visiting lecturer to visit our University and talk to our students concerning forest genetics and tree breeding. At the present time, however, we have no funds available as an honorarium for such work. I have talked this over with our staff members and they feel it would be a most useful opportunity for our students to become acquainted with the present developments in this field and would definitely broaden the work already given by our regular staff members."

Mr. Harrison suggested the establishment of a regular program of lectures in forest genetics and forest tree breeding at the forestry schools having shown an interest in this. Dr. Heimburger mentioned a film, in sound and colour, on some phases of forest tree breeding prepared by the Mississippi State Forestry Commission which could be made available in this connection. Mr. Halpenny suggested that active members of this Committee could serve as lecturers. Mr. Harrison suggested that any university who sees fit to ask, should be considered in this respect. Dr. E.C. Smith expressed the view that such lectures should not be restricted to forestry schools and may be extended to other universities. Dr. Cram pointed out that forest tree breeding in North America is just as advanced as it is in Europe, and perhaps even more advanced along certain lines. Mr. Sisam stressed the point that a lecturer should be an outstanding geneticist. Mr. Bickerstaff emphasized the necessity of having definite funds allocated for such lectures. Dr. Cram would like the lectures to be an introduction to forest tree breeding rather than to cover special phases of this field. Mr. Carmichael recommended that the Mississippi film be rented or purchased as a first step in this direction. Dr. Heimburger promised to look into the matter of renting or acquisition of this film.

(d) Preservation of superior stands

Mr. Holst recommended an informal basis for arrangements with wood using industries for the preservation of superior stands. Mr. Carmichael believed that holding stands is a very difficult undertaking. A seed orchard program is preferable. Seed orchards of superior white pine are being planned in Ontario. Red pine seed orchards are being developed for northern seed production. The utilization of Holst's results

with spruce in seed orchards was recommended. Dr. Bier was impressed with Corsican pine in England -- there was excellent growth and it seeded in naturally in openings. Mycorrhiza was established in natural regeneration and in temporary nurseries. Dr. Heimburger explained that our work in the preservation of superior stands can only be an attempt at present because of the large forested areas involved, in relation to available personnel for this task. Mr. Holst suggested two steps in this procedure: (1) increasing seed production in stands, and (2) mapping seed collection zones, and within the zones the collection of seeds from "good" stands.

Dr. Hitt said that in the Lake States there is a committee looking after the selection of desirable stands and trees, the subdivision of the forested area into seed zones and the selection of stands within such zones. Mr. Harrison drew attention to W.E.D. Halliday's forest classification for Canada as a suitable basis for the selection of areas deserving attention in this respect. Dr. Heimburger pointed out that the preservation of superior stands and trees is part of forest conservation and that the Canadian Forestry Association ought to be interested in this and support such activities. He drew attention to the statements of the late Dr. E.S. Babcock at the Lake States Forest Genetics Conference in 1953. These are as follows:

- "1. The preservation of the better and elimination of the poorer hereditary stocks in each important timber tree species must be recognized as a basic principle in forest conservation.
2. The utilization of the best available hereditary traits or features of each important species, i.e. conservation of superior genes, in the creation of ideal types of timber trees by means of applied genetics must be recognized as a basic principle of forest conservation.
3. Since the utilization of superior genetic stocks of timber trees in growing our future forests can be accomplished only by qualified scientists, working intensively, continuously, and cooperatively for many years, the adequate financial support of research in forest genetics and allied disciplines is of basic importance in forest conservation."

Mr. Swan asked Mr. Holst about the cooperation of the wood using industries in this. Mr. Holst mentioned his questionnaire to the industries and his report on suitable stands of seed sources and outstanding single trees of white spruce. Most replies came from the boreal forest. Quebec is too far away from the Petawawa Forest Experiment Station for this. Twenty odd trees were selected that are suitable; a report on this to the C.P.P.A. has been prepared. Mr. Holst would like to extend this work and concentrate it to an area close to the Petawawa Forest Experiment Station. Mr. Swan believed that professional men were the most suitable for this kind of work. Mr. Bickerstaff mentioned that a revised edition of Halliday's forest classification for Canada will be put out next year as part of an Atlas of Canada in connection with this problem.

Mr. W.G.E. Brown has made a breakdown of Halliday's classification into physiographic divisions, based on comparable climate, land forms, etc. These are similar to the site districts of G.A. Hills. Mr. Harrison

believed it would be of help for the selection of superior stands to reduce the country into more manageable areas. Mr. Holst said that this statement was included in his report and referred to areas of highest productivity. The map of Mr. Brown's is in support of his case. Mr. Bickerstaff recommended the extension of tree breeding activities into the north, starting with the selection of superior stands and trees.

(e) Participation of plant physiologists in flowering studies

Dr. Senn was asked for suggestions as to available plant physiologists (see Appendix "A"). There has so far been no reply from Dr. Senn. Dr. Moore stated that Dr. Senn had nothing further to say about this.

Mr. Sisam cited the work of Dr. G.H. Duff of the Department of Botany, U. of T., in flower induction in red pine. Dr. Heimbürger also cited Dr. Duff's work in thinning, studies of flower bud initiation in red pine and treatment with growth hormones to induce flowering. Mr. Holst stated the problem consisted in forcing young trees to flower, especially seedlings of pine and spruce. Promising results have been obtained by long-day treatments. Dr. Hunter believed that such investigations also were important to fruit growers and cited the work of Dr. K. Sax at the Arnold Arboretum. Mr. Holst described his finding of young cones on seedlings of Scotch pine in the nursery and the preservation of such materials for further studies. Mr. Carmichael also found some potted red pine with flower buds. The pines had been potted during last spring and probably initiated flower buds as a result of heavy root damage during potting. They began to flower when forced in the greenhouse this year.

(f) Tree breeding sub-stations

Mr. Carmichael recommended that areas for this purpose be adjacent to research areas and should include black spruce swamps. Mr. Harrison recommended that a report on the requirements for tree breeding areas be submitted to the forthcoming meeting in April of the joint advisory committee on silvicultural research of the Forestry Branch and the Ontario Department of Lands and Forests. Dr. Cram moved that such a report be prepared before adjournment of the meeting of this Committee, Dr. Heimbürger and Mr. Holst to submit a final report to the Committee in the afternoon. (Appendix M)

(g) Wood density studies

Mr. Bickerstaff cited an excerpt of a letter by Mr. Holst on this, stating that wood density varies with site, age of tree, with climatic cycles. He mentioned the work under way in Texas with loblolly pine. Some studies on slow-grown wood have also been undertaken at McGill University. Mr. Swan cited the studies of Mitchell on wood density in the southern States. Mr. Carmichael suggested that this may be a problem for graduate students. Dr. Heimbürger stated that in his experience with pulp companies, the woods end and the mill end often did not have the same requirements as regards wood density and that we still know very little about the variation of this factor in the forest. Mr. Harrison suggested obtaining all available information about this from the Forest Products Laboratories and the Pulp and Paper Research Institute of Canada. Mr. Carmichael suggested that a member to this Committee be invited from the Forest Products

Laboratories, to study wood density, fiber length, and cellulose content of selected tree materials. Mr. Bickerstaff recommended that this matter be looked further into during next year.

(h) Abstract of meeting for the Forestry Chronicle

Dr. Heimbürger reported that arrangements have been made for a short article to appear in the March issue of the Forestry Chronicle. Mr. Harrison moved that this article be prepared immediately after this meeting. This was seconded by Mr. Swan.

(i) Consolidation of records

Mr. Bickerstaff outlined the present situation in this respect. A complete file of the minutes of the old Sub-committee is in the Forestry Branch library. Forestry Branch file 14-5-3 covers the activities from the first meeting of this Committee. Dr. Heimbürger stated that he had some new data on file.

(j) Invitation to outstanding geneticists

Mr. Holst recommended that we invite visitors to attend the meeting of this Committee and give lectures on their current work in this connection.

(k) Exchange of observers with the Lake States  
Forest Tree Improvement Committee

Dr. Hitt and Mr. Hartig were attending this meeting as representatives of the above organization, following an invitation to attend by Mr. Bickerstaff.

(l) Seed exchange

In response to a letter of appreciation from Mr. Bickerstaff, Mr. Bayly wrote as follows: "I would suggest that you address any requests for seed for this purpose to this Division, stating species and quantities required. I believe that we can supply the small quantities of seed required for this work free of charge if we have it available." Dr. Heimbürger stated that he had received a letter from Mr. R.W. Marquis, Director, Northeastern Forest Experiment Station, with a request for seedlings of white pine of known origin and believed this Committee should reciprocate.

43. New Business

Mr. Bickerstaff suggested that the Committee deal with administrative matters first.

(a) Type of future meeting

In the past there has been a business meeting followed by reports of the members. At present, a two-day meeting is indicated, consisting of a business meeting, as brief as possible, and a longer meeting open to a wider group. Mr. Fenwick extended an invitation from Mr. R.N. Johnston,



Chief, Division of Research, Ontario Department of Lands and Forests, to hold the next meeting at Maple, Ontario. Mr. Swan supported this move. Mr. Bickerstaff reported a suggestion received from Mr. A.L. Orr-Ewing, Forest Service, Victoria, B.C., that annual meetings should be held at different places, in order to give the most distant members a chance to attend from time to time. Mr. Holst suggested that progress reports by active members be submitted before the meetings, so that the members could have time to peruse and discuss them at the meetings. Dr. Heimbürger suggested that the meetings be held in different parts of Canada, perhaps in connection with the Canadian Institute of Forestry annual meetings. Dr. Hitt stated that the meetings of the Lake States Committee on Forest Tree Improvement are held at different places in Wisconsin and consist of annual meetings of the executive council followed by field meetings. Mr. Carmichael stated that the time of year of the present meeting is suitable, also for the sponsoring members. Mr. Harrison was not in favour of having meetings in connection with the C.I.F. annual meetings because the time of the sponsoring members is usually fully taken up with other matters then. He supported Mr. Holst's suggestion about the presentation of reports prior to the meetings. Mr. Bickerstaff suggested that the meeting next year be held at this time. Mr. Harrison stated that summer meetings would be difficult to attend by the sponsoring members. Dr. Cram suggested this type of meeting and a field day at the Southern Research Station. Mr. Fenwick forwarded the suggestion of Mr. R.N. Johnston that the meetings be rotated among the member organizations and the reports be distributed at the meetings.

(b) Procedure for election of officers

Mr. Fenwick favoured a rotation of officers. Mr. Harrison suggested that the Chairman be a sponsoring member. Dr. Cram suggested that either the Secretary or Chairman rotate in relation to the locality of the meeting. Dr. Heimbürger suggested that a moderator be elected for each specific meeting, who could act as chairman. Dr. Hitt mentioned that the meetings of the committee he represented were small and consisted of representatives from State, Federal and industrial organizations, and from universities. Mr. Holst favoured a rather flexible system in respect to appointment of both Chairman and Secretary. Dr. Bier suggested a relatively continuing Secretary and rotating Chairman. The Secretary should preferably be a member of the Forestry Branch and retain this office, and the rotating Chairman should be elected from another organization. Mr. Bickerstaff then appointed a nominating committee of three, consisting of Dr. Bier, Dr. Cram, and Mr. Carmichael, to nominate a new Chairman and Secretary for the next year.

(c) Other new business

Dr. Cram inquired about the availability of white spruce seeds and seedlings for testing under Prairie conditions. Eastern origins of white spruce were not suitable for the Prairies. Mr. Holst suggested white spruce from Yoho Canyon in British Columbia, and from Montana. Mr. Carmichael inquired about vegetative propagation of yellow birch. Dr. Heimbürger replied that he had been able to root greenwood cuttings of yellow birch, with hormone application, in open propagation frames at the Petawawa Forest Experiment Station during his earlier work there.

The question of restriction of publication of the Proceedings of the meetings of this Committee then came up for discussion. It was suggested

that the minutes be marked "Confidential" as were the minutes of the old Subcommittee. The Proceedings are not for publication. It was suggested that the incoming executive prepare a distribution list for the Proceedings of future meetings of this Committee.

Dr. Chouinard announced the recent formation of the Genetics Society of Canada, of which he is the Eastern Director at present. Meetings will be held in two parts of Canada and this information should be of interest to the new Secretary. The membership of this Society is open to all persons interested in any field of genetics. This would include many members of this Committee.

Dr. Cram suggested that progress reports be sent in advance of the meetings of this Committee. Mr. Fenwick stated that it should be the responsibility of the Secretary to get these out, and to advise members in advance accordingly. Dr. Heimbürger stated that he had difficulties during the past year in the identification of pathogens causing a certain kind of canker on white pine at Maple, Ont., and at the Connaught Ranges, of mites on white pine at the Connaught Ranges and of certain aphids attacking poplars in his tests. Dr. Bier stated that the Advisory Committee on Forest Entomology and Pathology had not received a request for this type of work. Dr. Belyea recommended that a definite proposal be made in this respect. Dr. Cram then described the functions of the Forest Pathology Laboratory in Saskatoon. Specific requests about identification of pathogens and other matters of cooperation are made well in advance to the Division of Forest Biology. In Ontario, this could be made through the Advisory Committee.

#### 44. Shoot Moth Resistance in Hard Pines

Mr. Holst had observed great damage to hard pines by the European pine shoot moth in Ontario and the United States and had prepared a paper on this, to appear in the Forestry Chronicle in the near future. He suggested that arrangements for cooperation be made between the Department of Agriculture, the Ontario Department of Lands and Forests and the Forestry Branch for conducting trials of exotic hard pines and their hybrids in southern Ontario for the evaluation of their resistance to shoot moth. The Department of Agriculture had this year conducted some studies of the behaviour of this insect and of its control, and plans to continue these studies for another couple of years. Dr. Belyea stated that he had visited the Petawawa Forest Experiment Station in this connection and that investigations were carried out in southern Ontario. Mr. Holst suggested that if the investigations are to be continued, our materials be added to these. Dr. Belyea stated that an active research program in this field is under way, especially to find out what causes resistance. Mr. Carmichael stated that he had established a test plantation in southern Ontario where native red pine is being compared with Pinus nigra var. cebennensis from central France in blocks. Dr. Belyea believed that many young pine carried different degrees of infestation by the shoot moth when they were planted. Mr. Holst believed that degree of infestation depended also on the adaptation of the plants to site. Dr. Belyea thought that winter climate was important in determining the degree of infestation.

45. Availability of Seeds from British Columbia

Dr. Heimburger described the difficulties found at present in obtaining small seed portions of definite origin of western tree species required for experimental purposes. Seed collection is at present carried out by large private companies on a wholesale basis. It is almost impossible to obtain small lots of definite origin from these sources. Mr. Porter gave the names of the following organizations in the Northwest from where seeds for experimental purposes possibly could be obtained:

Oregon State Forest Service;  
Douglas Fir Seed Improvement Organization, sponsored by the  
Pacific Northwest Forest Experiment Station in Portland, Oregon;  
Association of West Coast Nurserymen;  
Forest Genetics Foundation, Berkely, California.

The above organizations are especially interested in Douglas fir seed of known origin.

46. Dr. Heimburger's Report

Dr. Heimburger presented a summary of his work during the past year, which is now given in extenso in Appendix "C". Mr. Carmichael inquired about the period of time annual reports should cover. Mr. Holst suggested the reports cover the calendar year, from January to December.

47. Decision of the Nominating Committee

The above committee nominated Mr. A.P. Leslie as Chairman for the year 1956 and Mr. C.W. Yeatman as Secretary.

48. Mr. Carmichael's Report (see Appendix "D")

Mr. Carmichael presented a report on his activities in establishment of provenance test plantations, seed plantations, seed orchards and graftings. In the discussion, Mr. Holst suggested the use of local strains in border row, in test plantations. To save space in greenhouse grafting, he recommended the use of long and narrow pots. Mr. Porter suggested tin cans. Mr. Holst suggested turning the roots of the rootstocks when setting them in the narrow pots. Mr. Yeatman had seen potting tubes that could be suitable for greenhouse grafting. The methods currently used in fall grafting at the Petawawa Forest Experiment Station were then discussed.

49. Mr. Grant's Report (see Appendix "E")

Mr. Grant reported on his work at Glendon Hall on photoperiodism during the past year. Besides photoperiod, other factors of the environment such as temperature, moisture and light, were investigated. Mr. Holst made some remarks on chilling requirements of several conifer species, necessary to initiate new growth after a period of dormancy.

50. Dr. Chouinard's Report (see Appendix "L")

Dr. Chouinard reported briefly on his work in air-layering according to the method of Dr. F. Mergen (How to root and graft slash pine, Southeastern Forest Experiment Station, Station paper No. 46, 1954) in June-July of young trees 10-15 years of age. The species tried were red oak, red maple, sugar maple, silver maple, white birch, trembling aspen, silver poplar, balsam fir, red pine, white pine, white spruce, and larch. He was not successful in rooting trembling aspen in this manner, although abundant callus formation on the air layers were observed. Some of the other species rooted quite well.

51. Dr. Hunter's Report (see Appendix "F")

The report deals with further progress of the Dutch elm disease investigations. It has been possible to root greenwood cuttings of white elm. Irradiation of elm seeds is proposed for 1955.

52. Dr. Moore's Report (see Appendix "G")

Further cytogenetic work in *Caragana* is presented. Colchicine-induced tetraploidy in *C. arborescens* has been obtained.

53. Dr. Cram's Report (see Appendix "H")

The work on spruce, *Caragana* and damping-off diseases was reviewed. In the discussion, Dr. Heimburger criticised the use of S1 seedlings of *Caragana* in further breeding work.

54. Mr. Porter's Report (see Appendix "I")

Mr. Porter spends about 6 weeks per year on forest tree breeding. The testing of western white pine for resistance to blister rust was continued. Work with *Keithia thujina* on western red cedar has been started. Mr. Porter announced the regrets of Mr. Orr-Ewing for being unable to attend this meeting. He then briefly outlined Mr. Orr-Ewing's working program. It consists of the production of improved seed for reforestation with the B.C. Forest Service. Seed orchards of Douglas fir are being established. The distinguishing features of superior trees are still imperfectly understood. There is incompatibility and self-sterility in Douglas fir. Individual tree selection in Douglas fir has been started. The B.C. Forest Service collects seeds of all species. It was suggested that Mr. Bickerstaff or the incoming executive ask Dr. Spilsbury of the B.C. Forest Service about the possibilities of obtaining small quantities of forest tree seed of specific origin (see minute 45).

55. Mr. Holst's Report (see Appendix "J")

Mr. Holst presented his report on work at the Petawawa Forest Experiment Station. In the discussion, Dr. Heimburger pointed out that Mr. A. Gordon, of the Ontario Department of Lands and Forests, has located

some very good red spruce in the area to the southeast of Algonquin Park which should be of importance to the work of Mr. Holst. Ways and means of obtaining breeding materials from the U.S.S.R. were then discussed, without arriving at a satisfactory conclusion, however.

56. Mr. MacGillivray's Report (see Appendix "K")

Mr. MacGillivray reported on further progress in his work at the Acadia Forest Experiment Station. In the discussion, Dr. Belyea made further inquiry about budworm resistance in balsam fir and weevil resistance in white pine. Mr. MacGillivray thought that frost pockets would be suitable for hardiness tests of breeding materials. Mr. Holst remarked that frost pockets would be of value chiefly for the evaluation of resistance to late spring frosts. Dr. Cram cited the work of Dr. Wellner at Indian Head in testing for hardiness by means of freezing chambers. Detached tree branches are used and their moisture content during the resting period is determined. A search for criteria for testing hardiness in Malus is in progress.

57. Additional Business

Mr. Bickerstaff mentioned the possibility of preparing a resume on forest tree breeding in Canada. Dr. Heimburger and Mr. Holst submitted their memorandum on tree breeding sub-stations. It was moved by Dr. Heimburger and seconded by Mr. Yeatman that it be adopted.

Mr. Bickerstaff then inquired about the status of the Secretary. It was decided to have Dr. Heimburger prepare the proceedings of this meeting and Mr. Yeatman take over the duties of assembling and preparing materials for the next meeting.

Dr. Dance briefly outlined the work at the Forest Pathology Laboratory at Maple, Ontario, in relation to forest tree breeding. The pathogenicity of several fungi attacking forest trees and Septoria canker on Russian poplar in the Prairies are being studied. The rooting of red pine needle bundles has been successful in the greenhouse and its application to the vegetative propagation of this species is under investigation. Dr. Cram requested that invitations to attend the meetings of this Committee be made at least one month in advance of the date of the meeting, to allow distant members time for making necessary travel arrangements. Dr. Belyea believed the first part of the terms of reference a) (see Appendix "B") need re-writing. Mr. Bickerstaff thanked the members of the meeting for their contributions. Mr. Porter thanked the Chairman and Secretary for their work on behalf of the meeting.

58. Adjournment

The meeting adjourned at about noon on March 9, 1955.

List of Appendices  
to  
Proceedings of the Third Meeting  
of  
Committee on Forest Tree Breeding

- Appendix A - Chairman's Report, 1954-55
- B - Memorandum to Chairman, C.F.T.B. from  
Director, Forestry Branch, 28 May, 1954.
- C - Report by Heimbürger
- D - " " Carmichael
- E - " " Grant
- F - " " Hunter and Ouellet
- G - " " Moore
- H - " " Cram
- I - " " Porter
- J - " " Holst
- K - " " MacGillivray
- L - " " Chouinard
- M - Tree Breeding Sub-stations