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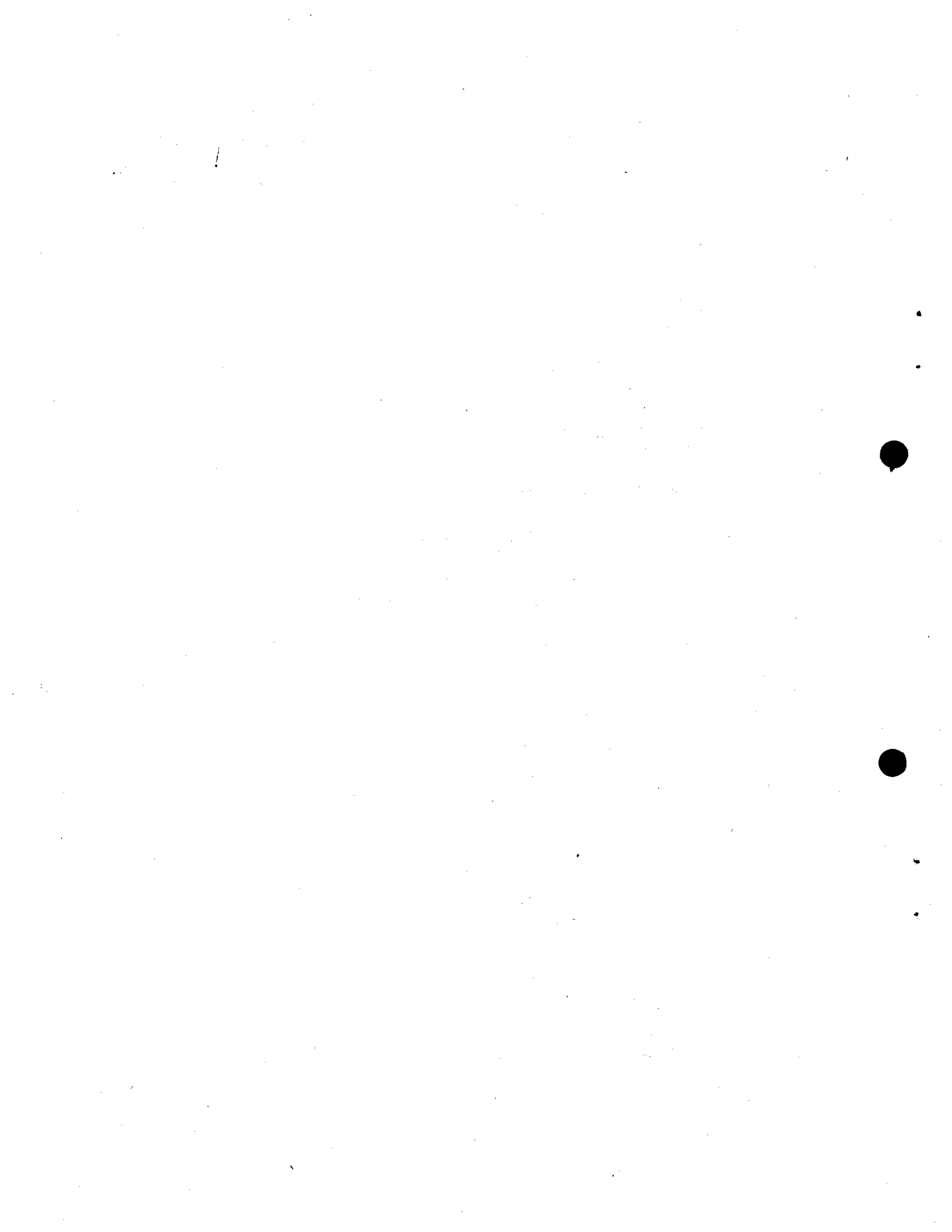
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NATIONAL RESEARCH COUNCIL OF CANADA

PROCEEDINGS
OF THE
FIFTEENTH MEETING
OF THE
SUBCOMMITTEE ON FOREST TREE BREEDING

OTTAWA

12 AND 17 DECEMBER, 1945



NATIONAL RESEARCH COUNCIL

PROCEEDINGS

of the

FIFTEENTH MEETING

of the

Subcommittee on Forest Tree Breeding

Held at Ottawa in No.3 Temporary Building, 12 December,
and at the National Research Laboratories, 17 December, 1945.

Members present:

Mr. D. Roy Cameron, Chairman
Dr. N. H. Grace
Dr. C. Heimbürger
Mr. W. L. Kerr
Mr. C. G. Riley
Mr. W. M. Robertson
Dr. H. A. Senn
Mr. J. Walker
Dr. L. P. V. Johnson, Secretary

Executive members present:

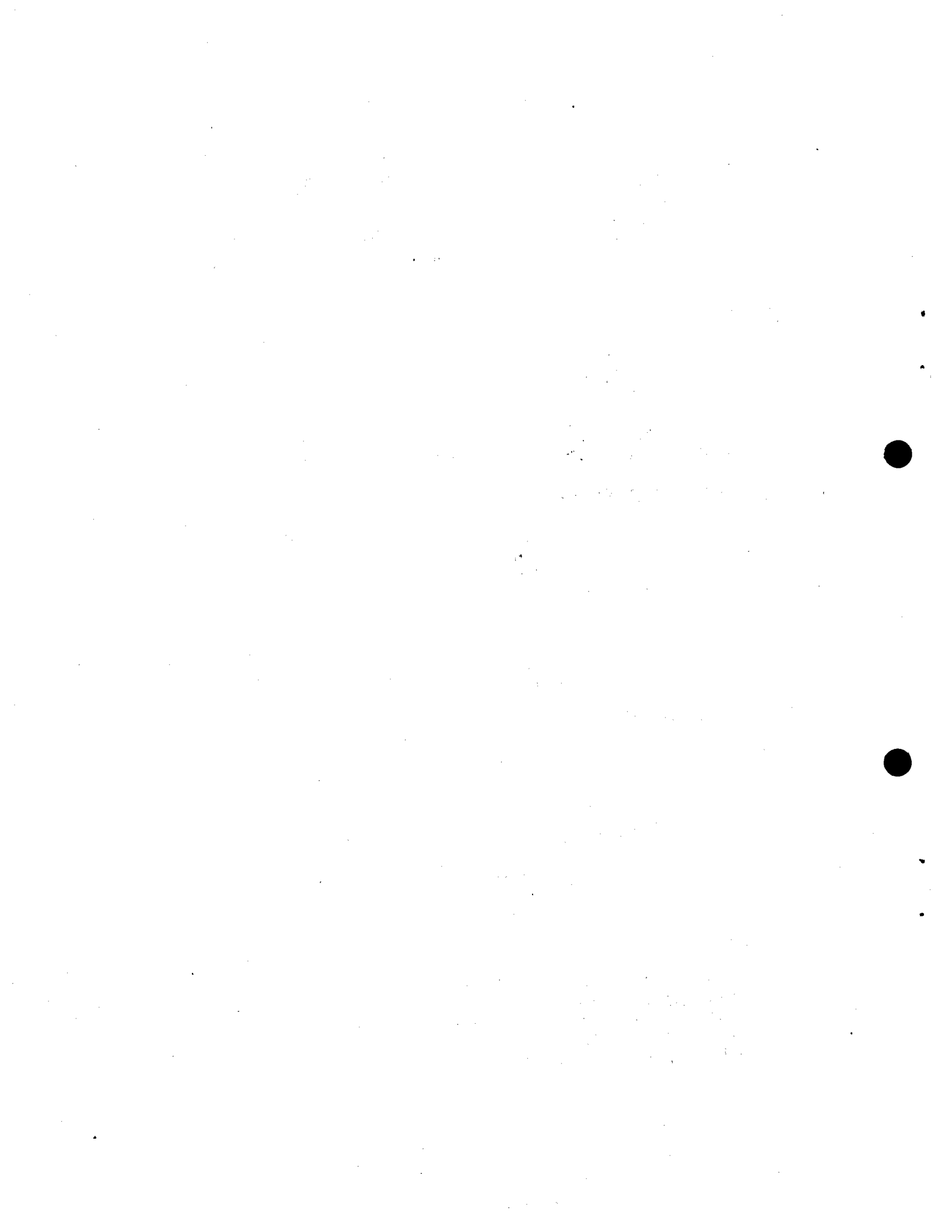
Dr. E. S. Archibald
Dr. W. H. Cook
Mr. D. A. Macdonald

Visitors present:

Mr. J. L. Farrar
Dr. Margaret L. Landers
Dr. A. J. Skolko

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Minutes Minute 143, paragraph two, sentence one (Fourteenth Meeting) was changed to read as follows: "Dr. Heimbürger stated that he had undertaken some cytological work on poplars and was able to fix and stain the chromosomes in roots tips grown on cuttings cultured in water.



149.
Annual
Reports

The matter of circulating annual reports of members prior to the March meeting (arising out of Minute 146) was discussed. It was agreed that these reports should be circulated through the membership prior to the meeting, and that after being approved by the meeting they should be attached as appendices to the Proceedings, extra impressions of the reports being made for the purpose of filing separate from the Proceedings.

150.
Post-war
reorgan-
ization:
prelimin-
ary dis-
cussion

The chairman introduced the subject of post-war reorganization by outlining the existing organization. He then called on Dr. Cook to indicate more specifically the present situation in relation to the Subcommittee as a subsidiary of the Associate Committee on Forestry.

It was agreed that in considering reorganization it was prerequisite that the need for expansion, if any, should be established.

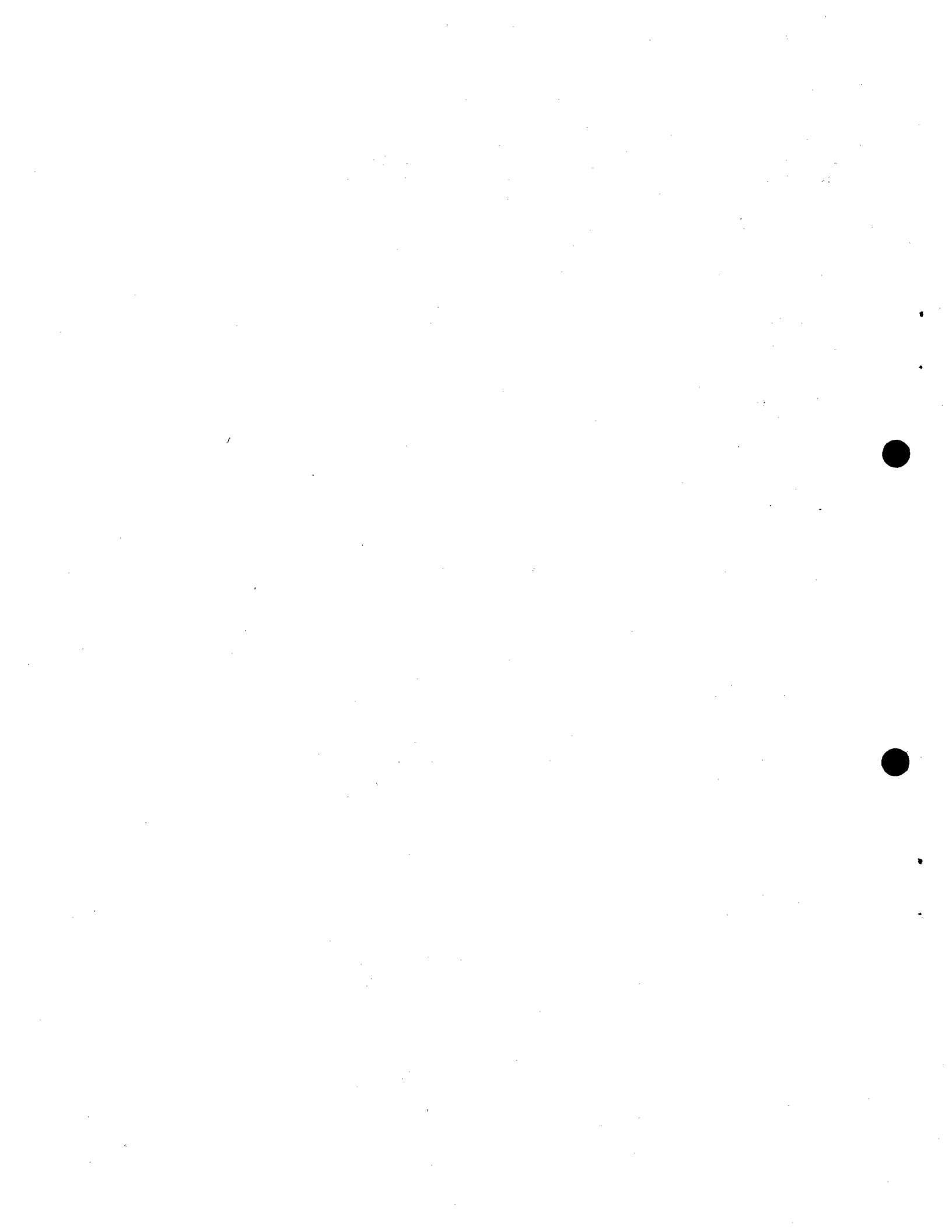
Dr. Johnson stated that, in his opinion, the work warranted a very considerable extension of activities which at the moment were at the war-time "maintenance" level. He considered that, with some fifty million trees being planted annually in Canada, even small improvements in planting stock would justify a far more ambitious program than that at present in force.

As a specific example, Dr. Johnson cited the work being done on testing white pine selections for reaction to white pine blister rust. *The present disease garden of about two acres will accommodate perhaps thirty lines of material and, since each individual test requires up to ten years, a great deal of time will be required to make appreciable coverage of the great range of material available. On the other hand, if a disease garden of twenty or thirty acres were established there should be good prospects of obtaining a number of resistant strains from the first set of tests.

Some discussion took place as to the advisability of giving such emphasis to this work. It was pointed out that the apparent damage to white pine stands did not reveal the matter to be one of particular urgency.

Due to the lack of time, discussion on the need for expansion of the other projects were dispensed with.

*At the Ninth Meeting (June, 1942) it was agreed that this project was "... the most important at the present time and should receive the greatest emphasis".



151. The chairman divided the meeting into executive and Division technical sections. The executive members, Mr. Cameron, of the Dr. Archibald, Dr. Cook and Mr. Macdonald, retired to Meeting another room and the meeting continued as the technical section.

152.
Dr.
Johnson's
report

Dr. Johnson briefly outlined his activities since April, which included the following work: hybridization (mainly in spruce), colchicine treatments of seedlings in the nursery, artificial inoculation of poplar hybrids with Septoria canker, and a trip to the prairies in the interests of shelterbelt improvement. A full report will be presented at the March meeting.

Plans for the winter include: Colchicine treatments of seeds and seedlings; rooting studies on cuttings of birch (white and yellow), elm (white, Chinese and Japanese), brasswood, Alnus glutinosa, catalpa, silver maple, and Japanese larch; studies on the inheritance of rooting capacity in poplar hybrids; greenhouse hybridization in Populus; and, the preparation of reports, for publication, on all completed work.

In the discussion of Dr. Johnson's plans it was suggested that white pine might be included in the rooting studies.

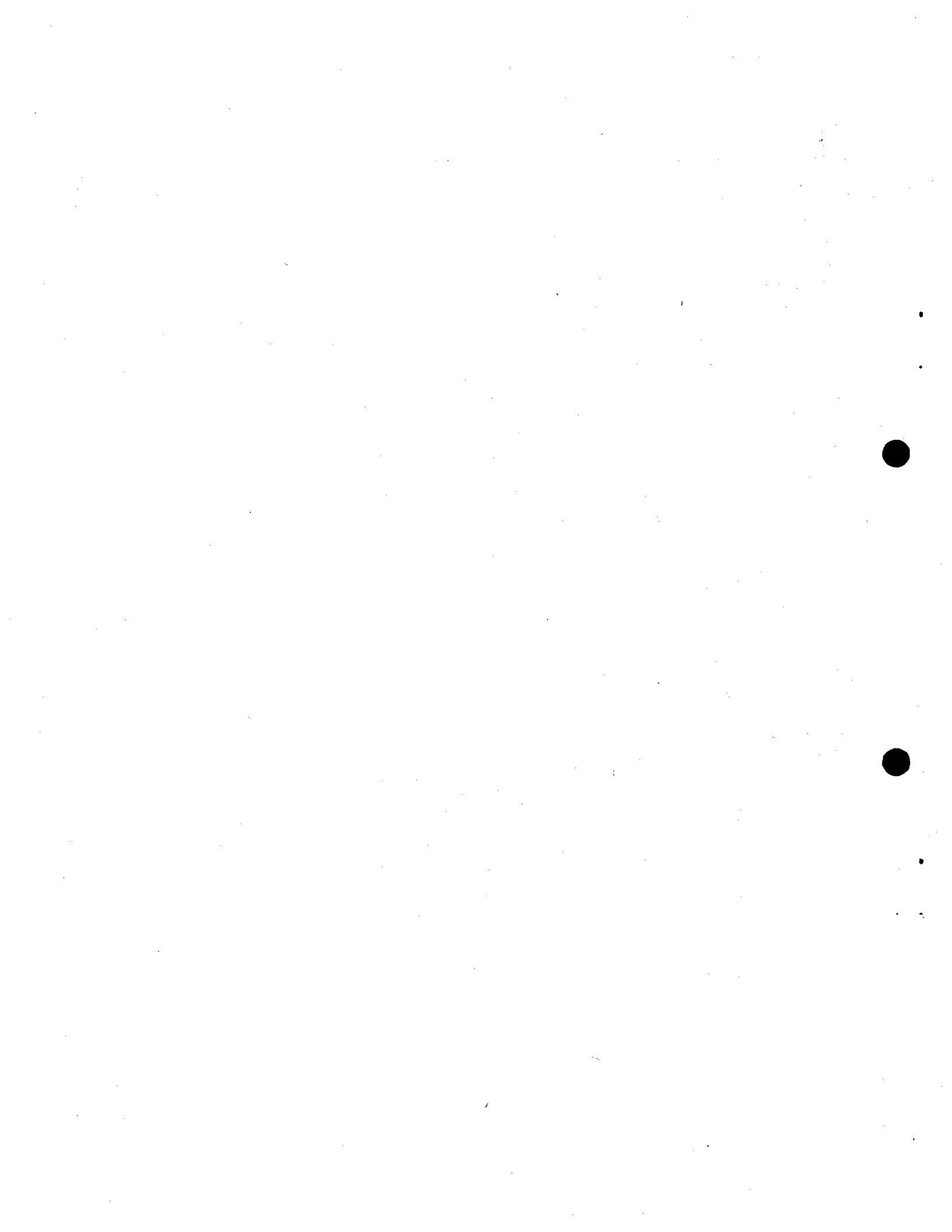
153.
Dr.
Heim-
burger's
report

Dr. Heimburger gave a short report on his activities at Petawawa during the current season. The cross pollination of white and Norway spruces with black spruce pollen gave good seed sets. Cross pollinations of a New Brunswick strain of white spruce (which roots well) and a number of native strains of the species were also successful. Red and Scotch pines were cross pollinated with Austrian pine and native white pine with western white pine.

Vegetative propagation studies were undertaken on an increased scale, and new types of screens were used to good advantage. A small greenhouse was added to the equipment of the station.

Some very interesting results were obtained from the use of certain fatty acids (presumably acting as wetting agents) on poplar cuttings. Other substances were used to advantage on spruce cuttings.

A full report will be presented by Dr. Heimburger at the March meeting.



Dr. Johnson suggested that an effort be made to obtain pollen from species, particularly spruce and pine, not yet used in the hybridization work. He thought that such pollen might be obtained from the Arnold Arboretum and similar institutions by arranging to pay a student to make the collections and prepare them for transporting. No action was taken on this point, but the general feeling was that such arrangements would be justified.

154.
Mr.
Riley's
report

Mr. Riley submitted a prepared report on the reaction of poplar materials (Petawawa) to leaf rust, and of white pine seedlings (N.R.C. Annex disease garden) to blister rust. The report deplors the fact that the salaries paid to forest pathologists are such that the trained personnel required to carry on the work cannot be obtained and that, as far as is known, no students are being trained in this special field.

The report will be circulated to members and attached as an appendix to the proceedings of the March meeting.

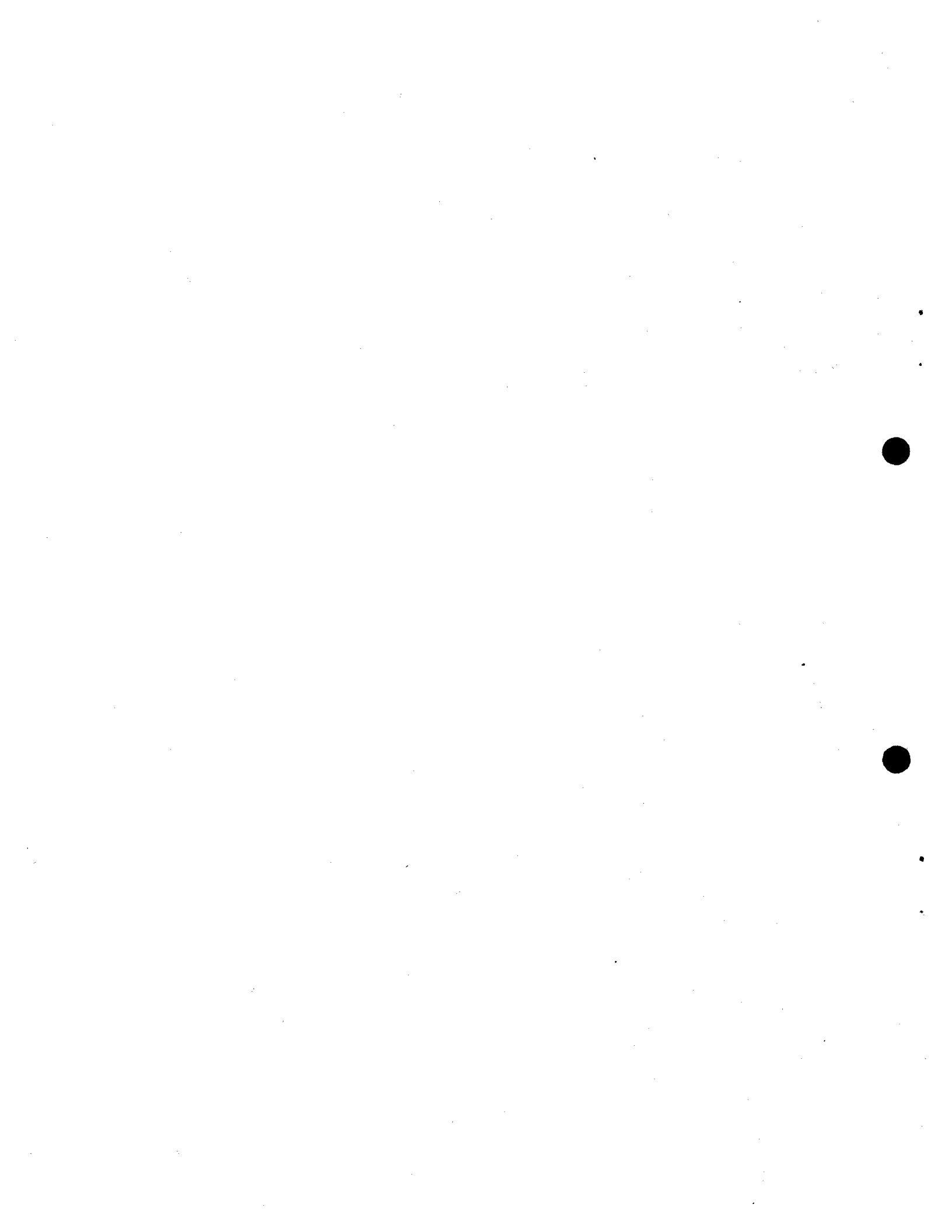
Mr. Riley was welcomed back from the armed forces and will reassume the position of pathology member of the Subcommittee, which was very ably filled during his absence by Dr. A. J. Skolko.

155.
Report
of the
Execu-
tive
section

With the return of the executive members to the meeting Mr. Cameron reported on their deliberations as follows:

It is now the established policy of the National Research Council that Committee funds shall not be used to provide for the employment of personnel "in continuing positions" in government departments (which have a direct approach to government funds) Specifically, this means that (beyond a period of adjustment) the Subcommittee would no longer employ Dr. Johnson and his staff on the present basis.

It was agreed among the Executive members that the interested Government Departments (Dominion Forest Service and Dominion Department of Agriculture) should be responsible for and support the forest tree breeding programme, and that the work of these departments should be co-ordinated, in so far as would lead to mutual benefits, under the Subcommittee. This would relieve the National Research Laboratories from maintaining projects that, while co-ordinated through the Committee, are really a part of the continuing program carried out by the Government Departments concerned. If the Subcommittee should have in the future any special problems that the existing staff or facilities of the National Research Laboratories could assist in solving, the staff of these laboratories will be pleased to co-operate with the Subcommittee in the solution of these problems.



The Subcommittee can also recommend to the National Research Council that financial assistance be given for conducting research in problems approved by the Committee to scientists in universities, or other non Government institutions having personnel qualified to direct research on a specific project, within the Subcommittee's field of interest.

156. Mr. Cameron submitted his resignation as chairman explaining that his new duties removed him from the close contact with the work which he felt the chairman should have. He then called for nominations for the office of chairman.

Dr. Cook nominated Mr. D. A. Macdonald, Acting Dominion Forester. The nomination was seconded by Dr. Archibald and, there being no further nominations, Mr. Macdonald was declared elected to the office of Chairman.

Mr. Cameron then suggested that a Vice-chairman be elected.

Mr. Riley nominated Dr. Archibald. This was seconded by Dr. Cook and, with no further nominations, Dr. Archibald was declared elected to the office of Vice-chairman.

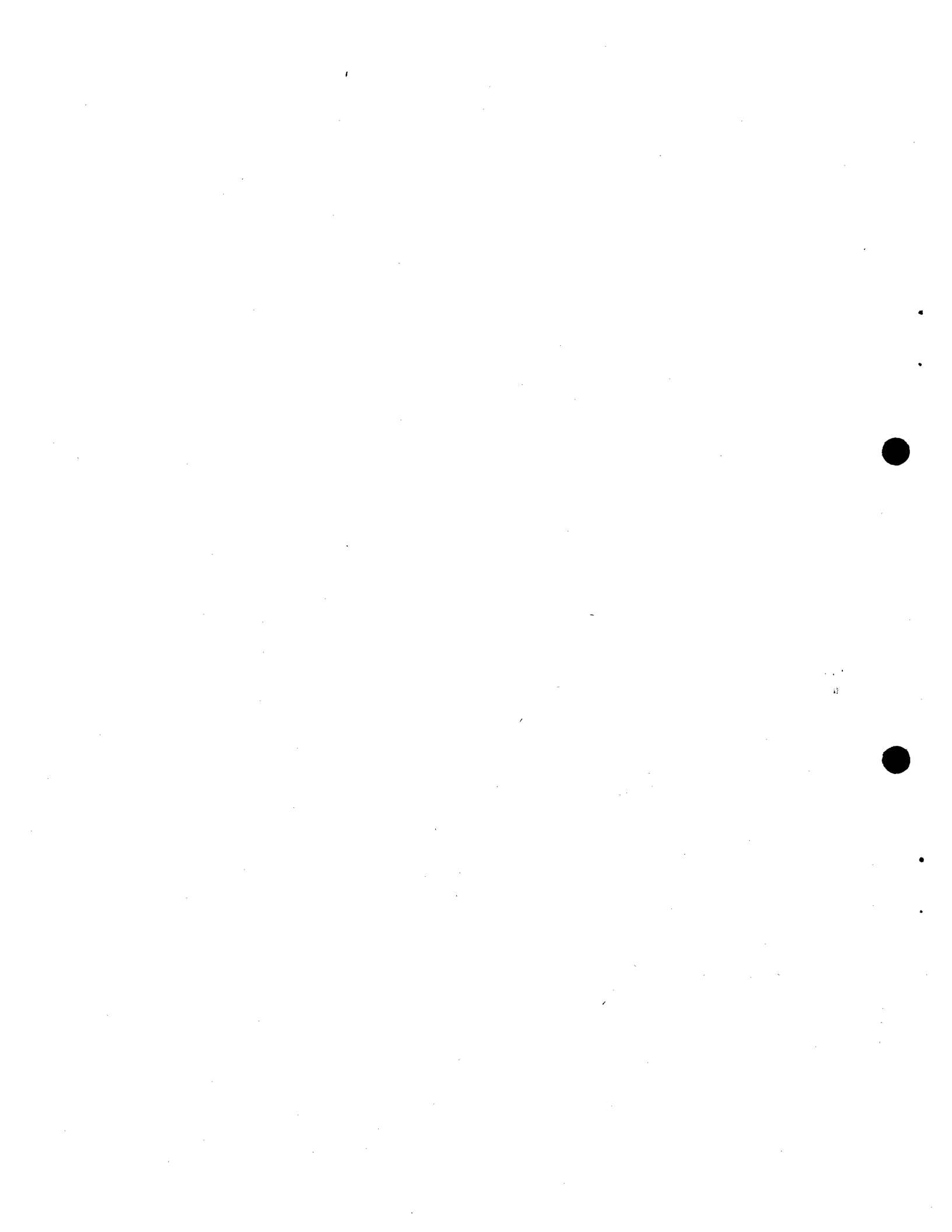
These actions of the Subcommittee will be submitted to the Associate Committee on Forestry in order that Mr. Macdonald and Dr. Archibald may be confirmed in their respective offices.

157. It was agreed that the meeting should be reconvened to complete the business of reorganization as soon as the co-operating departments were prepared to submit their individual programmes for future work, and before Messrs. Walker and Kerr returned to Western Canada.

158. On the 17 December the meeting was continued under the new chairman, Mr. Macdonald, who stated that the purpose of the meeting was to have the co-operating departments outline their respective programs in order that opportunities for mutually beneficial co-operation might be brought to light.

Speaking on behalf of the Dominion Forest Service, Mr. Macdonald said that no expansion of their program was proposed at the present time. He assured others concerned that every effort would be made to co-operate in the best interests of forest tree breeding generally.

159. The chairman called upon Dr. Archibald for a statement on the program of the Department of Agriculture. Dr. Archibald indicated that his department was primarily concerned with the improvement of trees and shrubs for shelter-belt and other plantings on the prairies. He called upon Mr. Walker to present a prepared memorandum.



Before reading the memorandum Mr. Walker emphasized the fact that they were interested in a breeding program which would produce improved trees in numbers sufficient to meet their distribution requirements. The memorandum is attached to these proceedings as Appendix A.

In discussing the program Dr. Heimburger stated that he would continue to send to the prairie Forest Nursery Stations such of the materials under test at Petawawa as appeared to have promise for prairie conditions. He emphasized the fact that there were no restrictions as to how such materials might be used, but that he thought it would be useful to all concerned if data on growth, disease infection, etc. were reported.

Dr. Johanson complimented those responsible for the memorandum and was of the opinion that the breeding methods set forth were sound and should result in large-scale production of improved trees.

160.
Forest
patho-
logy
report

Mr. Riley emphasized the need for greatly increased work on the pathological phases of the breeding program, and the fact that trained forest pathologists were not available and that universities were not encouraging students to enter this field because of the low scale of salaries. He went on to say that since some improvements were being made in the matter of salaries representations should be made to encourage the training of students. Mr. Macdonald suggested that with the present large enrolments in forestry courses, it might be well to place the matter before the Deans of the forestry schools.

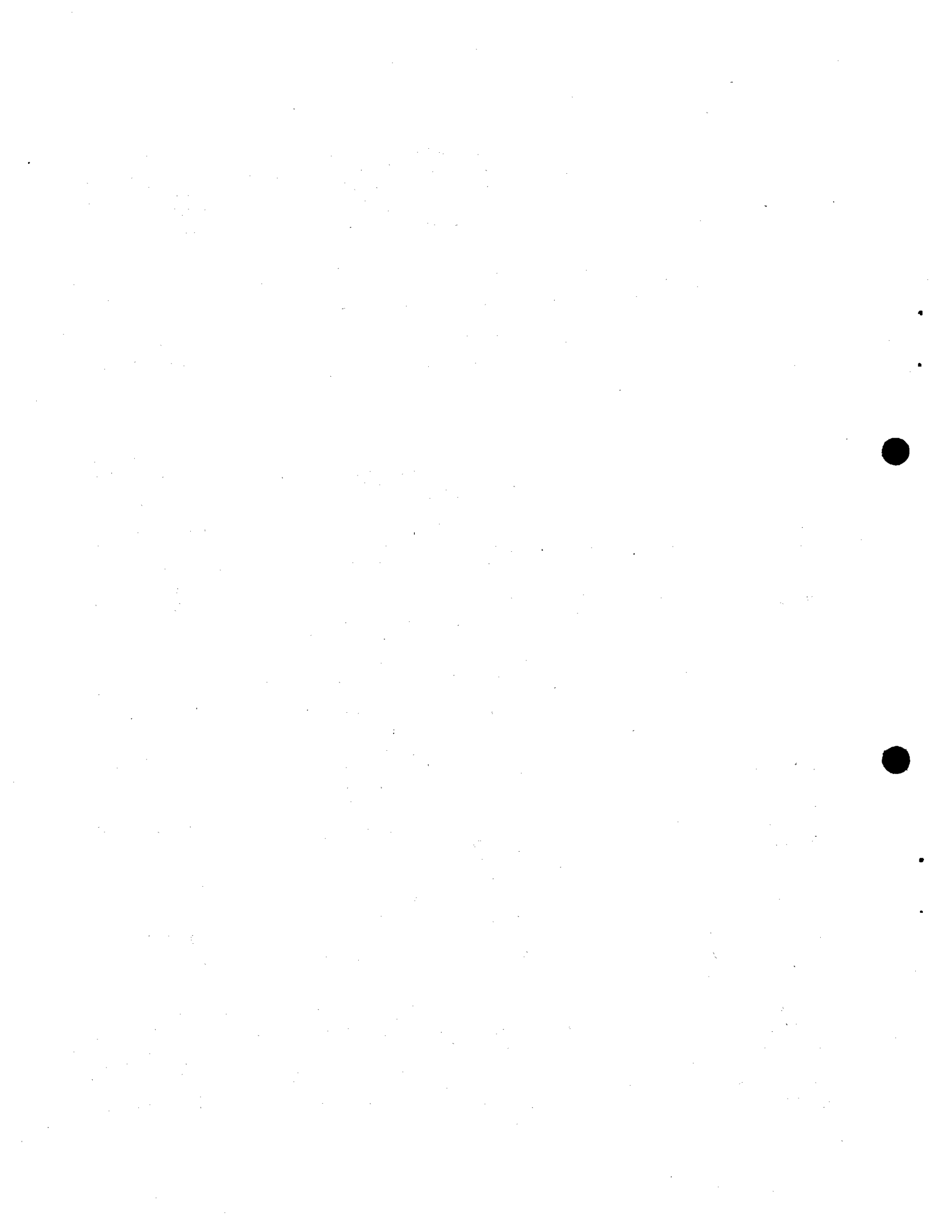
161.
Resolu-
tion
on
forest
patho-
logy

In consequence of Mr. Riley's report the following resolution was moved by Mr. Robertson, seconded by Mr. Kerr and passed unanimously by the meeting.

In consideration of (a) the fact that pathological studies are a necessary part of any tree breeding program, and (b) the proposed expansion of the present tree breeding program at both the Petawawa and the Prairie Stations, be it resolved that the Department of Agriculture be requested immediately to provide adequate staffs of Forest Pathologists for the specific purpose of meeting the requirements of the tree breeding program.

162.
Vegeta-
tive
propa-
gation
of coni-
fers

Messrs Walker and Kerr expressed some doubts about the practicability of producing large quantities of upright-growing stock of evergreen species from cuttings. Dr. Heimburger gave information on the productivity of rooted cuttings in relation to bed space, which indicated that 1500 to 3000 plants could be produced per year in a covered, 12-ft bed. He advocated the establishment of a "hedge-



clone" which could be extended year after year to the point where sufficient cutting material was available for the annual requirements.

In reply to Mr. Kerr's suggestion that better growth forms might be obtained by budding or grafting, Dr. Grace stated that results soon to be published (co-authorship with Mr. Farrar) showed that much faster growth with very little plagiotropic response were obtained from large (8-inch) cuttings of Norway spruce than from smaller cuttings.

163.
N.R.C.
breeding
material

Dr. Johnson was asked to outline the position of the National Research Council with respect to the breeding program. He stated that, since the N.R.C. would no longer have its own program nor employ personnel specifically for forest tree breeding, he could only give assurance that everything possible would be done to salvage the materials at the Annex Nursery. A large part of the material not already represented in other nurseries could be transferred in the form of cuttings or small trees. There were, however, some permanent plantings, such as the breeding arboretum, which would have to remain, and every effort would be made to prevent their destruction. He believed that the N.R.C. would in the future make important contribution to forest tree breeding in working-out assigned problems of short term, laboratory character.

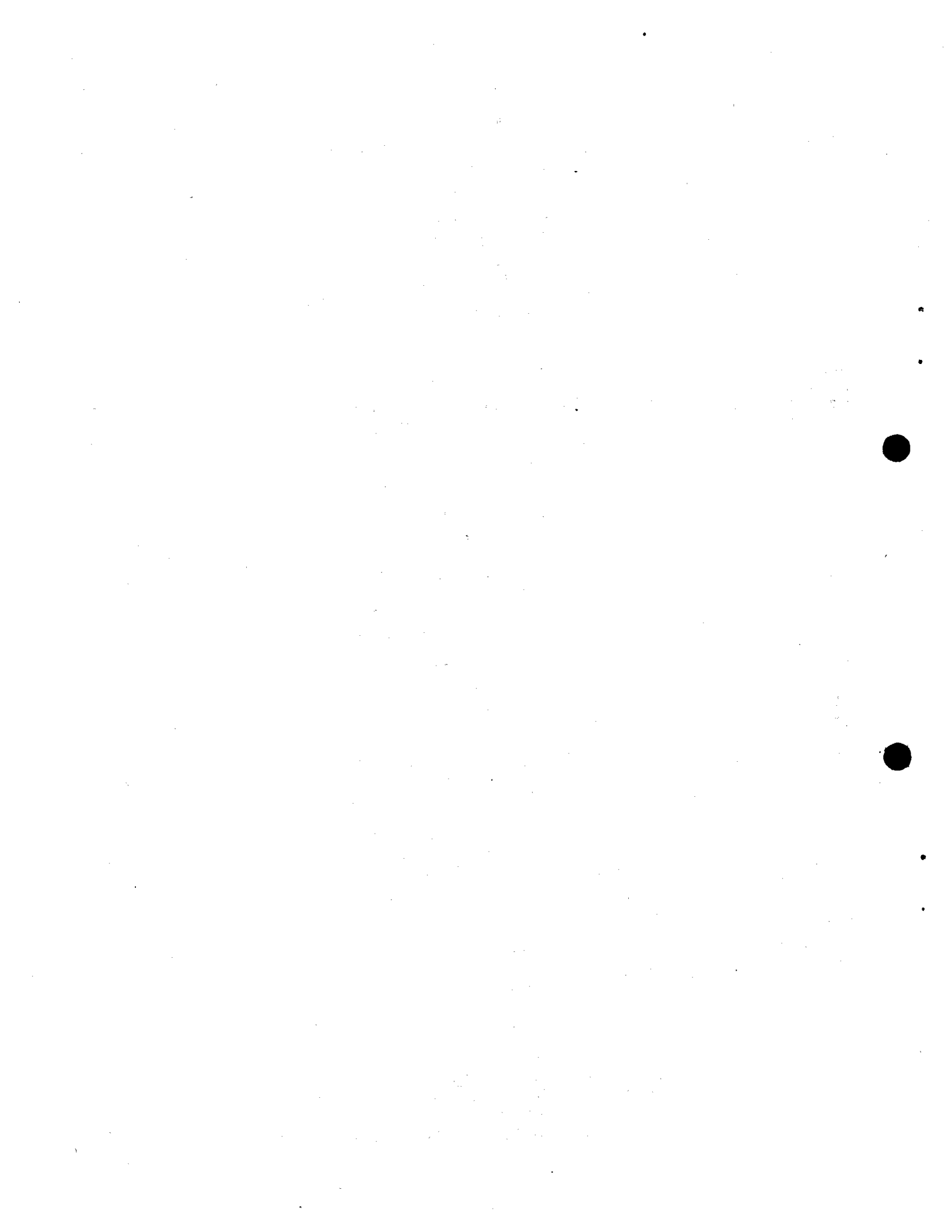
164.
Provin-
cial re-
present-
ation

Mr. Walker said that, since that provinces were responsible for administration of the forests, it seemed only reasonable that they should be represented by membership in the Subcommittee. This was strongly supported by Dr. Johnson who cited numerous instances where provincial institutions were already co-operating in forest tree breeding work. There was general agreement that provincial membership in the Subcommittee should be given consideration, but it was pointed out by Mr. Macdohald that with the issues of the Dominion-Provincial Conferences still undecided it appeared inopportune to move on the matter at this time. It was agreed that the matter should receive further consideration at the March meeting.

165.
Assisted
Research

In response to general interest in the matter, Dr. Cook outlined the procedure to be followed in obtaining financial assistance from the Subcommittee for work which might be done at universities.

Assisted Research grants are provided by the National Research Council for the purpose of promoting and stimulating research on specific, approved problems in university or other laboratories. Any professor qualified to direct research on a specific project may apply for a grant for that purpose or may be asked by the National Research Council (or one of its committees) to undertake the direction of an assigned project.

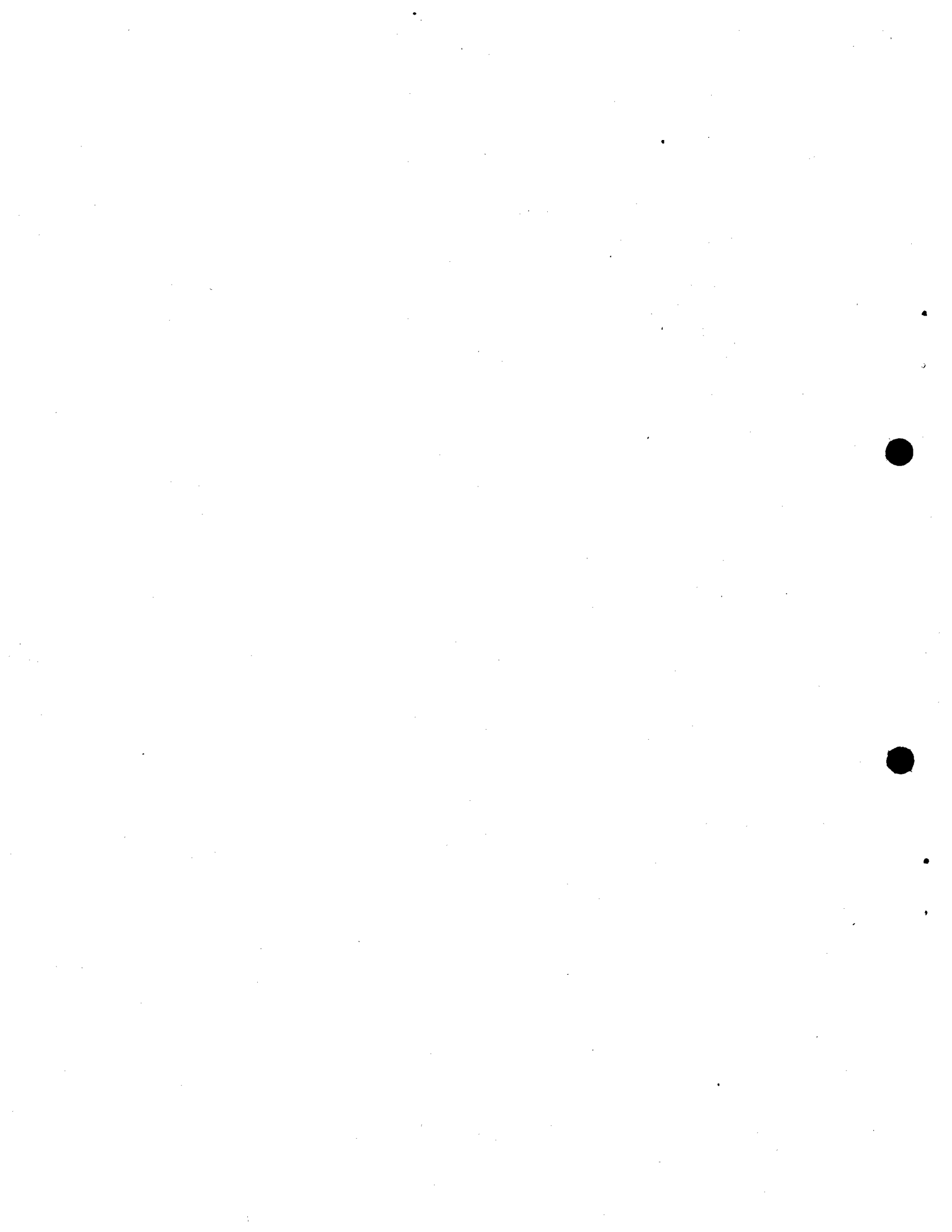


Post-graduate scholarships have been established by the National Research Council for the purpose of promoting and assisting in academic study and the securing of graduate credits. Consequently, it would be improper to use an assisted research grant for that purpose. Normally research assistants employed under research grants are full time employees, and proposals to provide grants for the purpose of engaging university undergraduate or post-graduate students or members of the staff of the university concerned as research assistants should be scrutinized with great care to ensure that the primary purpose of the application is the solution of the research problem proposed.

Research committees of the National Research Council are established for the purpose of organizing and directing necessary or useful work in the field assigned in each case and it would be improper for a committee to expand its activities into the field of financially aiding students engaged in academic study by awarding research grants primarily for this purpose.

The basic test should be whether the Committee considers the proposed project to be of sufficient importance and usefulness to add it to its research programme.

Forms for an "Application for a Grant for Research" may be obtained from The Secretary, National Research Council, Ottawa.



APPENDIX A

MEMORANDUM ON FOREST TREE BREEDING FOR THE PRAIRIES

Suggested Projects to be undertaken by Forest Nursery Stations at Indian Head and Sutherland as part of Co-ordinated Plan approved by Sub-Committee on Forest Tree Breeding.

Two premises must first be made:

1. That trees suitable for shelterbelt planting may not necessarily be equally desirable for planting in a woodlot.
2. That suitable greenhouse accommodation and efficient technical assistance are required for carrying out the proposed projects.

I. Of first importance is a project of Selection and Testing (by a Progeny Test) of Individual Trees as sources of seed (by open pollination) for the production of shelterbelt trees.

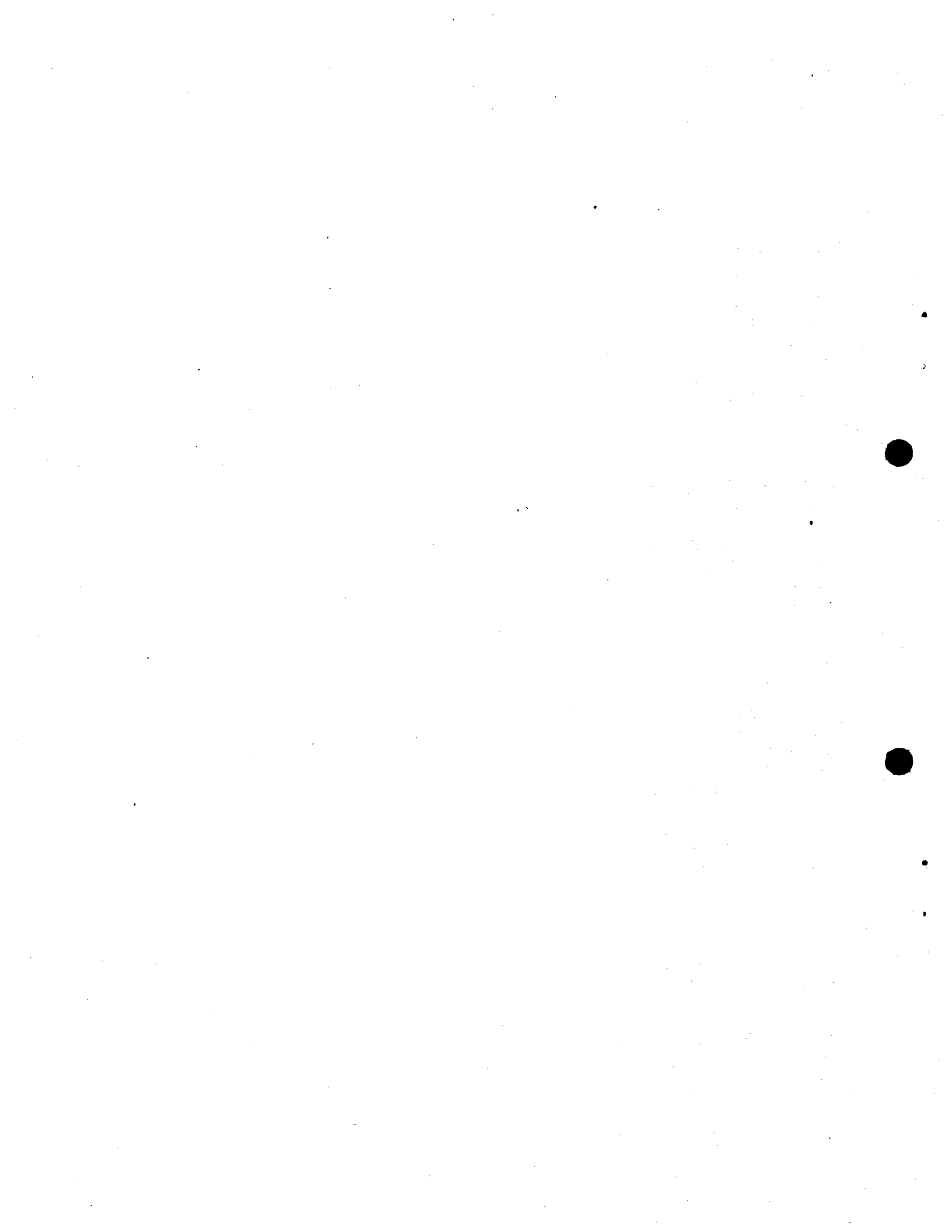
(Stress the value of the established seed-bearing trees at the Forest Nursery Stations and in prairie shelterbelts).

The value of these progenies will be based on disease resistance drought resistance, high survival following planting, uniform and rapid growth, hardiness, ability to withstand alkali, high seed-bearing capacity.

Progenies will be tested in a variety of prairie conditions.

A sufficient number of all Progenies considered outstanding and desirable will then be planted in seed blocks to bring about further improvement, e.g. A, B, C lines of maple or ash are selected as a result of the progeny test. These will be planted as follows.

- | | | |
|----|--|---|
| a) | (A ⁿ) A ⁿ
(B ⁿ) B ⁿ
(C ⁿ) C ⁿ | This will bring about through sib-crossing a certain amount of homozygosity in the next generation. |
| b) | (A ⁿ) B ⁿ
(A ⁿ) C ⁿ
(B ⁿ) C ⁿ | In the progenies of these crosses desirable growth (or other) factors from the parents will be combined. If staminate plants in each line are removed in one cross, e.g. in (A ⁿ) of first, (C ⁿ) of second, and (B ⁿ) of third, the need of planting a) will be removed. There would not be seed from reciprocal crosses, however. |



II. Having determined the best seed trees by the progeny test described in I, the best pollenizers for each should be found. Improvement and the production of seed in large quantities may be accomplished by planting selected progenies in seed blocks, e.g., AxR, BxS, CxT progenies are selected. These will be planted as follows:

- | | | |
|----|---|--|
| a) | (AR) x (AR)
(BS) x (BS)
(CT) x (CT) | As in I, a certain amount of homozygosity will be brought about in the next generation |
| b) | (AR) x (BS)
(AR) x (CT)
(BS) x (CT) | In the progenies of these crosses desirable growth (or other) factors from the parents will be combined. |

The qualifying statement given concerning I a) and b) would also be applicable to II a) and b).

III. Steps described in I and II might be followed in a plan to develop improved poplar (or other) hybrids which can be increased vegetatively: e.g.

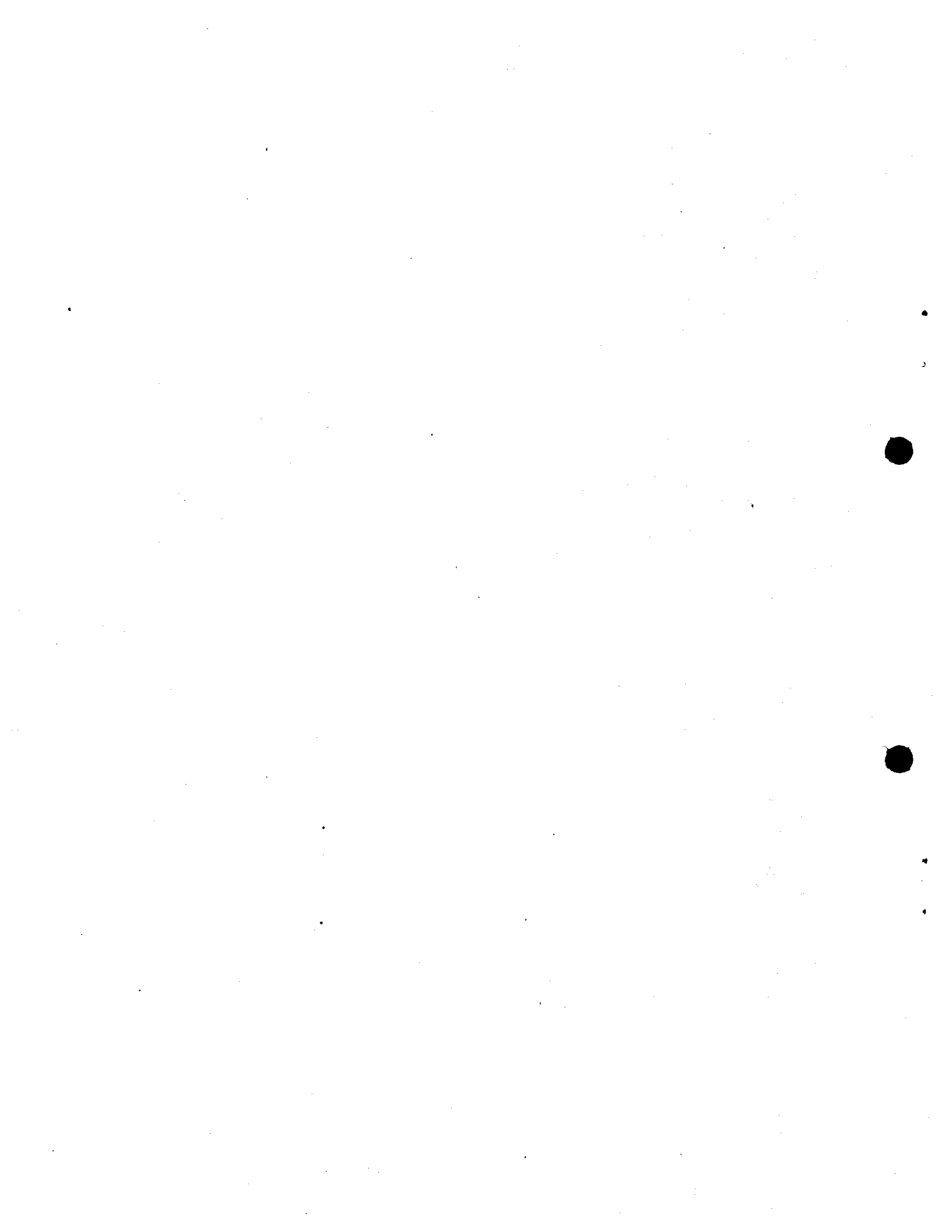
(P. deltoides x) P. acuminata and P. Simonii.

IV. The best combinations of practical methods for producing desirable hybrids readily by (natural) cross-pollination and seed should be thoroughly investigated. Tree species for which such a plan would be highly desirable are Ulmus, Larix, Picea, Pinus. e.g. (U.Americana X) U. Pumila (Manchurian)
U. japonica, U. Thomasii.

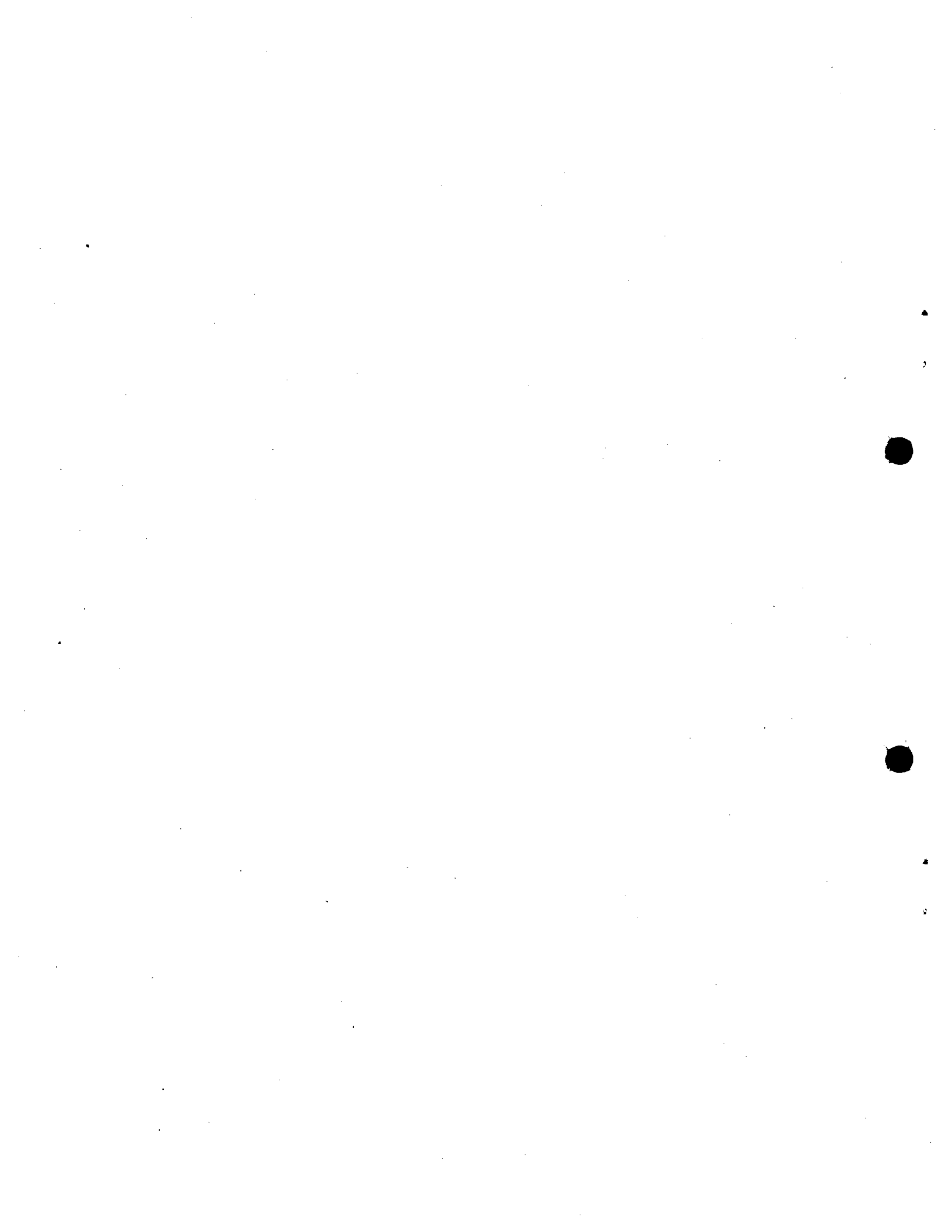
V. Another project of importance is Testing New Species and Testing Strains of Seed (sources of seed). This project would be carried on in close co-operation with the Committee of Plant Introduction and Exploration of the Department of Agriculture. It is strongly recommended that any anticipated plant explorations expedition to foreign lands include some one specifically instructed to collect suitable propagation material (seeds, seedlings, or cuttings) of promising shelterbelt trees and shrubs.

Valuable introductions obtained through such a plan could also be used as breeding material to bring about further improvement.

VI. It is believed that the association of morphological characters in seedling and nature plants should be studied with a view to developing a plan whereby desirable seed trees may be selected while still in an immature state, for future breeding and improvement studies. For instance it would be of great advantage to pick out as seedlings staminate and pistillate trees in ash, maple, etc.



- VII. Greater attention should be given to important diseases and insects which attack shelterbelt and shade trees: e.g. Elm borer, Rusts on Poplars, Ash, Poplar Cankers, Russian Olive Dieback, damping off of evergreen seedlings, etc.
- VIII. The effects of various stocks in the propagation of selected seed trees by grafting should be studied. Influences of stocks on rate and amount of growth, better flowering and greater degree of seed production are important. Studies on this subject carried on in Sweden, using Poplar, Spruce and Pine, indicate how important the stock is.
- The influence of stock on the production of seed on Elm under prairie conditions may be far reaching. Studies with Ash should also be made.
- IX. There is need for new and better types of trees for planting in sub-marginal sandy lands. The problem of planting trees in extensive areas of this kind is of first importance to municipalities and provinces, but on many farms throughout the Prairie Provinces farm woodlots may be planted on similar land.
- X. Improvement by selecting outstanding Aspen clones is worthy of investigation. In this species variation exists, and outstanding clones may be useful for re-establishing Aspen groves in the open plains area.
- XI. The effect of fertilizers in shelterbelt management and in forest nursery practice is another challenging problem worthy of attention and study.



Distribution List

<u>Copy No.</u>	<u>Name</u>
1	Mr. D. A. Macdonald, Chairman
2	Dr. E. S. Archibald
3	Dr. N. H. Grace
4	Dr. C. Heimbürger
5	Dr. L. P. V. Johnson, Secretary
6	Mr. W. L. Kerr
7	Mr. C. G. Riley
8	Mr. W. M. Robertson
9	Dr. H. A. Senn
10	Dr. A. J. Sholko
11	Mr. J. Walker
12	Dean C. J. Mackenzie
13	Mr. S. J. Cook (Board Room Copy)
14	Mr. S. P. Eagleson (Office Copy)
15	Dr. J. M. Swaine
16	Mr. A. W. McCallum
17	Mr. F. T. Rosser
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