

Minutes of a First Conference on Forest Tree  
Breeding and Propagation, held at the National  
Research Laboratories, Wednesday, December 22,  
1937.

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Present: Dr. R. Newton, (Chairman), Mr. J. L. Farrar,  
Dr. N. H. Grace, Dr. C. Heimbürger, and Dr.  
F. H. Peto (Secretary).

1. The chairman outlined the conclusions arrived at by a conference held December 13, 1937, and attended by General McNaughton, Mr. D. R. Cameron, Dr. R. Newton, and Mr. W. M. Robertson. At that time it was decided that the present meeting should be called to outline a programme of research on hormone and genetical studies on forest trees. After full discussion the following recommendations were agreed upon.

2. Hormone studies on conifers: The Norway spruce was selected as the most suitable tree with which to run the initial tests on the rooting response of stem cuttings to hormone treatment. This species was selected because it exhibits a tendency to root naturally from stem cuttings and is, therefore, more likely to give positive results; also it may become an important forest tree in eastern Quebec and the Maritimes. Experiments on a smaller scale with white spruce should also be initiated. When satisfactory methods are developed for these representative species of the two natural groups of spruce (white and Black), the tests can be extended to other species, such as white pine.

It was agreed that the time of collection and treatment were important. Monthly or bimonthly treatments should be carried out during the dormant period and late growth stages but weekly treatments may be necessary during June, when active growth and lignification are taking place.

Dr. Heimbürger pointed out that careful records should be kept as to whether the cuttings were taken from branches of the first, second or third, etc., order as the rooting response and resulting growth form may be affected by the origin of the cutting. It was also pointed out that the natural rooting capacity or ability to root from layering may vary greatly in different individuals, biotypes or ecotypes of the same species. Consequently attempts should be made to test as many different biotypes of the same species as possible.

The co-operation of Dr. Güssow and Mr. Davis of the C. E. F. will be solicited in obtaining information about growing technique of spruce cuttings.

### 3. Hormone studies on deciduous trees:

Basswood: Dr. Heimburger was able to induce rooting in basswood cuttings last year by hormone applications and it was agreed that further work on this species should be carried out this year.

The best results from treatments to date indicate that the branches collected during winter dormancy should be forced into active growth before treatments are applied. It was suggested, however, that comparative tests on dormant cuttings and cuttings collected at different stages of growth should be carried out.

Suggestions for a long-term project were also made which involved sowing a large number of seeds from different basswood trees, testing the layering response of the seedlings and using this material for further hormone studies.

### 4. Hormone studies on poplars.

Poplars: The native aspens root very well from root cuttings but root very poorly from stem cuttings. Some of the European silver poplars, P. alba, however, root readily from both the root and stem cuttings. In hybrids between the native aspens and P. alba, the rooting capacity of stem cuttings appears to be partially dominant. Consequently it should be relatively easy to develop a satisfactory method of rooting stem cuttings of these hybrids by hormone applications. It was therefore suggested that the response to hormones of stem cuttings of many of the natural hybrids available in this district should be tested this winter and checked against the rooting response of P. alba, P. grandidentata and P. tremuloides clones.

It will be necessary also to compare the response during dormancy with that at different stages of development, of cuttings of several hybrid and pure species clones.

### 5. Pine Breeding.

White Pine: White pine blister rust is a serious menace in Canada and one of the most fundamental methods of attacking this problem is by attempting to breed a resistant strain. Oriental species are known which are reputedly resistant to the rust and variability in susceptibility probably exists in native white pines. The inheritance of resistance should be determined by crossing certain oriental with native pines. Certain of these oriental species are already growing in the arboretum at the Central Experimental Farm. It was therefore suggested that Dr. Guseow's co-operation be solicited, crossing technique developed, and initial crosses made using this material.

6. Spruce breeding. Initial experiments should be undertaken to develop technique in spruce breeding.

7. Study of parental material. While there is enough material available to commence breeding along certain lines, nevertheless progress in tree breeding will depend to a large extent on the collection and careful study of suitable parental material.

This will involve:

- (a) Additions to the Petawawa arboretum of native and introduced biotypes and species. Short cuts are sometimes possible by grafting to existing trees, thus obtaining flowering shortly after introduction, and also by the introduction of dormant branches bearing flower buds. Pollen can also be shipped considerable distances.
- (b) A thorough study of existing biotypes of the parental species, for example, studies on flowering habits will be essential to determine crossability; studies of growth habit, disease and frost resistance will be essential for the selection of suitable parents. This fundamental and important work can only be undertaken if a long-term programme is initiated. It is highly likely that research of this nature will result in the discovery and isolation of superior biotypes without recourse to breeding, while at the same time providing necessary material and information to facilitate the breeding programme.

8. Breeding Shelter-belt trees. The reaction of various authorities on the situation in Western Canada indicates that this phase of tree breeding is most urgently required and might receive the widest support. If undertaken, it would involve:

- (a) A survey of existing species and natural hybrids.
- (b) The introduction of parental material. In poplar breeding this would involve shipping branches bearing male and female flowering buds.
- (c) The crossing of selected types.

It was agreed that the hybridizing could be carried out in Ottawa or Petawawa and that the progeny should be tested at various stations in Western Canada.

- (d) Finding out whether the present poplar-breeding technique can be applied to elm for shelter-belts.

9. Poplar breeding. It was agreed that the poplar breeding programme now under way should be continued. Preliminary tests of wood quality and growth rates of natural hybrids which are being carried out this winter by the Dominion Forest Service should give some indications of the value of such crosses. Cytological studies of all natural hybrids at flowering age will also be carried out this winter and should give guidance to further breeding work. Since certain natural poplar hybrids are among the more promising shelter-belt trees, it is likely that poplar breeding will form a major part of that project.

10. Personnel. There was considerable discussion on the limitations of personnel in regard to the above programme. It was finally decided that Mr. Farrar could make the most effective contribution in hormone investigations. It was suggested that he should commence at the beginning of the new year on this research under the immediate direction of Dr. Grace but in close consultation with Dr. Heimburger and Dr. Peto. Although it is expected that most of Mr. Farrar's time will be taken up with the hormone experiments, nevertheless it seemed advisable for him to gain as much experience as possible in the elements of genetical research. To this end, it was suggested that he assist with the collection of the poplar breeding and cytological material, and assist whenever possible with the breeding and propagation of poplars.

Progress in the genetical studies will be dependent to a large extent on whether a qualified genetecist can be appointed. The poplar breeding already under way is the only phase that can be carried out without such assistance. Dr. Heimburger can devote a limited amount of time to the actual hybridizing of poplar but the pine and spruce breeding comes at a time when he is occupied with his site classification work. Dr. Peto will co-operate to the fullest extent in the genetical and cytological aspects, but pressure of other duties prevents his devoting the necessary time, especially to the hybridizing work in the field. Mr. Farrar has not yet sufficient experience to undertake such work this season.

The suggestion that more emphasis be given to the application of genetics to forestry is in keeping with the trend in other countries. The United States has organized the Institute of Forest Genetics at Placerville, California. The Oxford Paper Company in Maine has been carrying out extensive hybridization experiments with poplar. The Cabot Foundation in the United States within the last few months made a grant of \$615,000 to establish a long-range research programme for increasing the production of cellulose by plant breeding, especially tree breeding, and by improving forest soils. Dr. E. M. East and

Dr. K. Sax of Harvard are in charge of the genetical research. Their programme includes hybridizing to increase hybrid vigor, and inducing polyploidy to gain additional vigor in pines, spruce and poplar. Dr. K. V. Thimann will be in charge of the hormone research and will attempt to develop methods of rooting stem cuttings of conifers. The objectives of our proposed programme appear to be almost identical with theirs and it is interesting to note that they apparently considered it essential to head the research with such outstanding authorities on genetics and plant hormones.

Dr. Wettstein in Germany, Dr. C. Larsen in Denmark and several others in Europe are also carrying on research in tree breeding. Canada is particularly favoured in having a great many valuable indigenous tree species compared with the paucity of such species in European countries. In addition, the magnitude of the forest industry in Canada is ample warrant for the modest programme of research in forest genetics here proposed.