

When zero-span tensile strength was plotted over age, it was obvious that the age range of the trees used was extremely narrow (32–44 years) and that satisfactory age-related base lines could not be established. Considerable zero-span tensile strength variation existed between trees of the same age and these data are an example in which the area mean values and the standard deviation from the mean should be used as a basis of comparison. Zero-span tensile strength values for Areas D, C, and E were considered to be from the same population and a common mean and standard deviation was calculated for use as a base line ($\bar{X} = 65.2$ and $s = 4.1$).

Summary and Conclusions

Natural quaking aspen stands in five geographic areas were measured, wood samples obtained, and soils data taken as part of the experimental procedure. The results of a statistical comparison of the data indicated that there existed a well-defined south-to-north trend of decreasing specific gravity. No geographic trend was evident for fiber length, fiber strength, pulp yield, or any of the tree growth characteristics.

The percent clay and the exchangeable bases which were correlated with the percent clay were the soil factors that appeared to have the most influence on tree growth. Fiber length was correlated with height and volume growth and several soil properties. The lack of geographic trend in fiber length seems to have resulted from the overriding influence of genetic and local site factors. The positive correlations of fiber length to specific gravity, height growth, and volume growth, simplifies the selection of these important properties for genetic improvement. The negative correlations of fiber strength with specific gravity, tree volume growth, and diameter growth suggest the need for independent selection for this property.

The data collected on growth and wood quality provided suitable information for establishing "base lines" for judging the potential of selected trees. Highly significant differences were obtained between clones within stands and stands within areas for a number of important growth and wood properties. Such differences are encouraging and suggest properties in which genetic variation is sufficient to war-

rant consideration as properties to emphasize in a tree improvement program.

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Chiasma Frequency in *Pinus roxburghii* Sarg. and *P. elliotii* Engelm.

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SAX and SAX (1933) reported a detailed study of chiasma frequency at meiosis in microspore mother cells in 22 species of conifers belonging to *Taxaceae* and two sub-families of *Pinaceae*. Among the pines the study was confined to only five species of *Pinus* viz., *P. banksiana*, *P. jeffreyi*, *P. nigra*, *P. strobus* and *P. thunbergiana*. Later SAX (1960) studied meiosis in interspecific hybrids involving Himalayan, Japanese and American species of white pine. He concluded that though these species were geographically separated for very long period, they appeared to be similar in chromo-

some constitution and genetic compatibility. MERGEN *et al.* (1963) studied microsporogenesis in *P. echinata* MILL. and *P. taeda* L., but chiasma frequency in these species was not reported. The objective of the present study was to determine the chiasma frequency in two species of *Pinus*, viz., *P. roxburghii* SARG. (Chir pine) and *P. elliotii* ENGELM. (Slash pine), a pine introduced in Dehra Dun from the U. S. A.

Two trees for each species were chosen and the male strobili were prefixed in CARNOY'S fluid (6:3:1) for two

hours immediately after collection in the morning hours and were later transferred to 1:3 acetic-alcohol (acetic acid saturated with ferric-acetate) for 24 hours and stored in 70% alcohol in a refrigerator till they were used. Squashes of microsporangia were made using 1% propionocarmine. Chiasma frequency was scored from Metaphase I plates. For each tree 100 cells showing good metaphase plates were used for scoring. Averages of the chiasma frequency as expressed by percentage values are presented in the table 1.

Table 1. — Chiasma frequency in *P. roxburghii* and *P. elliotii*.

Species	Chromosome Number (n)	Percentage of chiasma frequency with bivalents				Average chiasmata per bivalent
		1	2	3	4	
<i>P. roxburghii</i>						
Tree No. 1	12	6.50	57.00	26.50	10.00	2.40
Tree No. 2	12	5.83	56.83	28.66	8.66	2.40
Average		6.16	56.92	27.58	9.33	2.40
<i>P. elliotii</i>						
Tree No. 1	12	4.41	57.25	31.10	7.25	2.41
Tree No. 2	12	6.71	56.50	27.00	10.33	2.41
Average		5.29	56.87	29.05	8.79	2.41

The meiotic divisions were found to be very regular and multivalents or univalents were not encountered. From the table 1 it would be seen that in *P. roxburghii* bivalents with two chiasmata showed the highest frequency (56.92%), next in order were with three chiasmata (27.58%), four

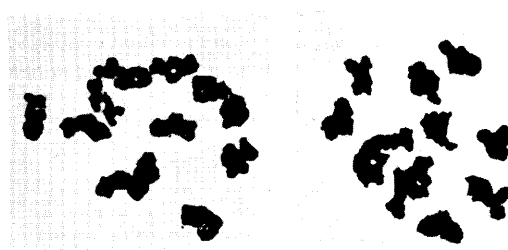


Fig. 1. — Photomicrographs of meiotic metaphase I in *Pinus roxburghii* (on the left) and *P. elliotii* (on the right) showing 12 bivalents ($\times 1000$).

chiasmata (9.33%) and bivalents with one chiasma (6.16%). A similar pattern was observed in *P. elliotii*-bivalents with two chiasmata (56.87%), three chiasmata (29.05%), four chiasmata (8.79%) and one chiasma (5.29%).

A comparison of the present data with that reported by SAX and SAX (1933) for five different species of pines, shows general agreement as to the frequency of bivalents with 1, 2, 3 and 4 chiasmata. Only in the case of *P. jeffreyi* they recorded a 0.6% with no chiasma or univalent. Average chiasmata per bivalent in the five species studied by them ranged from 2.3 to 2.5.

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Newsletter

Proceedings Tenth Meeting of the Committee on Forest Tree Breeding in Canada, held jointly with the Western Forest Genetics Association. University of British Columbia, Vancouver, B. C., September 7—10, 1966.

One hundred members and guests attended this meeting which included progress reports by members, special technical sessions and field trips to the University of British Columbia Research Forest at Haney and the British Columbia Forest Service Research Station at Cowichan Lake, Vancouver Island. The reports presented at this meeting will be published in due course as Part II, Proceedings, and will be distributed to libraries, organizations and individuals throughout the world according to lists already prepared. Any representative of an organization not listed and who wishes to receive these reports should write to the Executive Secretary, C. F. T. B. C., Petawawa Forest Experiment Station, Chalk River, Ontario, Canada.

The next meeting will be held in 1968 in eastern Canada and enquiries concerning attendance will be welcomed by the secretary.

Following are brief notes on the reports and papers given at the meeting.

Member Progress Reports Committee on Forest Tree Breeding in Canada

BOYER, M. G.: — Seedlings of white pine (*Pinus strobus* L.) were grown on good and poor soil to test the effect of seedling vigour on susceptibility to white pine blister rust (*Cronartium ribicola* FISCHER). Seedlings grown on poor soil produced fewer infections, but there was no evidence that immunity was induced under conditions of high inoculum potential.

CARMICHAEL, A. J.: — Studies of wood properties of black spruce (*Picea mariana* [MILL.] BSP) in relation to tree age, position in tree, and paper properties conducted by the Ontario Department of Lands and Forests and the Ontario Research Foundation. Pulp

yields were negatively correlated with specific gravity, which in turn was influenced by amount of compression wood. Paper made from outer wood of a forest grown tree was markedly stronger than that made from core wood or from wood of rapidly grown plantation trees. Preliminary analyses indicate that only fibre length could account for the differences in paper strength.

CRAM, W. H.: — Tree improvement studies for the prairie regions include: self and cross compatibility studies in *Caragana* and *Picea* and determinations of combining ability for vigour; tests of species and provenances of trees and shrubs for prairie planting, including some established as early as 1905; nursery cultural investigations, including seed harvesting, storage, stratification and sowing and plant propagation.

DURZAN, D. J., and V. CHALUPA: — Amino acid and protein content of the embryo and female gametophyte of jack pine as related to climate at the seed source. More than 20 free amino acids and 18 proteins were found in the female gametophyte (haploid) and embryo (diploid). Their concentrations reflected not only the genetics of the tissue but also climate at the seed source and seed size. All protein amino acids were detectable free, together with γ -aminobutyric acid, ornithine, citrulline, β -alanine, and the amides. Almost twice as much soluble protein occurred in the gametophyte as in the embryo.

DYER, W. G.: — Seed orchards and seed production areas in Ontario are being established on a regional basis for jack pine (*Pinus banksiana* LAMB.), red pine (*P. resinosa* AIT.), white pine, white spruce (*Picea glauca* [MOENCH] VOSS) and black spruce (*P. mariana* [MILL.] BSP). Development of seed production areas and seed orchards must keep pace with the expanding artificial regeneration program.

EBELL, L. F.: — A continuing program dealing with the application of nitrogenous fertilizers and drought treatments to Douglas fir (*Pseudotsuga menziesii* [MIRB.] FRANCO) has emphasized the importance of fertilizer formulation, dosage and timing of application. Evidence suggests that qualitative differences in nitrogenous assimilates at the locus of cone-bud production may result from the two different ionic forms of nitrogen. When correctly timed, the application of nitrate nitrogen reduced the proportion of aborted buds and favoured the floral initiation process.