PRELIMINARY OBSERVATIONS ON HYBRIDIZATION OF ROCKY MOUNTAIN SPRUCES

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Intraspecific, interspecies, self, and wind pollinations were made on single blue spruce (Picea pungens Engelmann) and Engelmann spruce (Picea engelmannii Parry) females in 1964. Studies of germination and early seedling development were carried out in the laboratory.

An average seed set of 2.2 sound seeds per cone was obtained from blue spruce pollen on the Englemann spruce mother tree; the reciprocal cross failed. Intraspecific pollinations also produced low seed set on the blue spruce mother tree, but about 87 sound seeds per cone were obtained on the Engelmann spruce mother tree from intraspecific pollinations. The production of normal size seed did not differ significantly among pollen sources on either mother tree.

The mean day of initial germination of the Engelmann spruce X blue spruce putative hybrid progeny was intermediate between that of the two intraspecific parental progeny groups, suggesting control by quantitative genes.

The mean cotyledon number of the Engelmann spruce X blue spruce putative hybrid seedlings (5.4) did not differ significantly from that of the female parental progeny (5.8); however, both differed significantly from the blue spruce intraspecific progeny (7.2). Some maternal influence is suggested by these results. Hypocotyl color of the putative hybrids was green, as was that of the Engelmann spruce intraspecific progeny; that of the paternal blue spruce progeny was red. Other authors have found hypocotyl color of hybrids to resemble that of the paternal parent rather than the maternal parent.

One-fourth of the putative hybrid seedlings displayed weak germination, growth ceasing shortly after emergence of the radicle. Another one-fourth exhibited abnormal germination in that the cotyledons emerged from the seed coat and the radicle remained inside. One-half of the putative hybrid seedlings germinated normally.

All measurements were subjected to statistical analysis in order to determine the relation between the variation observed and factors of the environment at place of origin. The results of both studies testify to the overwhelming influence of environmental pressures associated with altitude with respect to variation in the white-Engelmann complex and its hybrid components. In regard to the white-Sitka complex, both studies indicate the extent and effect of the penetration of Sitka spruce populations into populations of white spruce. There is some indication that hybridization between black and white spruce is occurring along the Alaska highway in northern British Columbia.

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