WHITE SPRUCE SEED SOURCE VARIATION AND ADAPTATION TO 14 PLANTING SITES IN NORTHEASTERN UNITED STATES AND CANADA

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White spruce seed from 28 sources was collected over the entire range of the species from Alaska to Labrador and south to South Dakota, Michigan, and New York. Seedlings from the seed sources were field tested for 5 years in 14 locations in region extending from 42 to 48 N. latitude, and from New Brunswick to North Dakota. Differences among seed sources in 5-year height growth were significant in all plantings. Rank correlation analysis suggested that the significant genotype-environment interaction resulted largely from the relative magnitude of response of seedlings from the seed sources to the changing environments and not to systematic changes in the ranking of the seed sources. Seed-source adaptation to the test environments was analyzed using the technique developed by Finlay and Wilkinson 2/. This analysis suggested that seedlings from seed sources from the southeastern portion of the range of the species (the Lake States, southern Ontario, parts of Quebec and New England) were well adapted to all the test sites, and that some were growing better than the average for the plantations. Seedlings from some seed sources, notably the more northern ones, showed less response to changes in the environment than seedlings from most other seed sources. Seedlings from these northern sources grew slowly, particularly on the best sites. However, in terms of adaptation to a variety of environments they must be considered above average. The results indicate that individual tree selections and testing of individual tree progenies from the southeastern portion of the white spruce range may, through breeding, lead to improved new strains adapted to the test region used in the study. Selection in southeastern Ontario and adjacent areas in Quebec may yield particularly good genetic types.

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2/ Finlay, K. W., and G. N. Wilkinson. 1963. The analysis of adaptation in a plantbreeding programme. Austral. Jour. Agr. Res. 14:742-754.
