NEWS AND NOTES

TECHNICAL NOTES

NEW SPACING TRAILS ARE NEEDED

BY A. L. VAN SLYKE¹

Growth rates and yields of forest crops are so greatly influenced by available growing space per tree that successful forest management requires knowledge of space requirements throughout the entire life of a stand. Better understanding of these needs has been sought through spacing and thinning research, typically using one of the randomized designs considered necessary for valid analysis of variance. Such experimental designs, require a discouragingly high number of large uniform plots plus sizeable areas of surround.

To reduce these difficulties with field crops, Nelder (1962) proposed five designs in which not only the amount but also the shape of growing space per plant is varied systematically and gradually. (Shape, in rectangular two-dimensional arrays, was termed "rectangularity", and expressed as the ratio of inter- and intra-row distances.) Evaluation of potential forestry uses of these systematic layouts has led to the conclusion that they could provide considerable savings of area, trees and time in spacing studies and in degree-of-thinning experiments (Van Slyke, 1964a, b).

Of the five Nelder designs, the three coded Ia, Ib and II are probably of most interest to foresters. The first two of these are based on a polar coordinate grid, with trees at the intersections of radial spokes and concentric arcs. In design Ia area per tree increases with increasing distance from the origin, but rectangularity remains constant. In design Ib the area per tree is constant but rectangularity increases outward from the origin. Design II is based on a logarithmic grid in which both density and rectangularity are varied but in different directions to permit separate assessment of the effects. Dimensions for field layouts are specified in part by the experimenter's choice of spacing and/or rectangularity ranges to be studied, and in part by simple construction formulae presented in the original article (Nelder, 1962).

An outline of the nature, advantages and possible field layout methods for the three Nelder designs is included in a mimeographed report (Van Slyke, 1964a) which also presents dimensions for several example spacing and rectangularity ranges. The accompanying photograph shows a Ia quadrant established at the University of British Columbia as a greenhouse trial with Douglas fir seedlings grown under mist. Plastic markers at each tree position on five of the spokes emphasize the radial arrangement of tree rows and the increasing tree-to-tree spacing from the origin. Freeman (1964) has reported his use of the Nelder Ia grid, and presented an improved field method for establishing tree locations on long radii. Additional spacing trials

¹ Associate Professor, Faculty of Forestry, University of New Brunswick. This report was prepared while on study leave at the University of British Columbia, Vancouver 8, B.C.

FIGURE 1. Greenhouse trial of Nelder Ia quadrant with Douglas fir seedlings (about 14 weeks old) grown under mist. Photograph by J. Hejjas, June 1, 1964.

with commercial tree species have been started recently using Nelder's designs, and others are proposed for the near future.

A second mimeographed report (Van Slyke, 1964b) which also is available from the U.B.C. Faculty of Forestry deals with the analysis of measured results from such systematic layouts. Regression analyses of the individual-tree data offer opportunity to acquire much statistically valid and useful information from these highly efficient designs.

Of the designs presently available, those proposed by Nelder seem to provide the best compromise for gathering the information needed. Because of the long time required to secure useful data, Canadian foresters should start now with trials of spacing in both natural and planted stands of their important commercial species on representative sites.

REFERENCES

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