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Reader's Reaction and Author's Reply to " M. Huehn, J. Kleinschmit and J. Svolba: Some Experimental Results concerning Age Dependency of Different Components of Variance in Testing Norway Spruce (Picea abies (L.) Karst.) Clones", published in Silvae Genetica 36 (2), 68–71, 1987

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Summary

Time trends in the relative importance of the variance components for "locations", "clones", "locations × clones", „blocks" and „experimental error" have been estimated in a Norway spruce clonal test for total plant-height and 10 years of measurements. In this "Short Note" these former results are completed (caused by a reader's question) by the results for the within-site clonal h² over time. Additionally, referring to another reader's reaction the results for annual growth are presented and discussed.

Key words: Norway spruce, clonal test, components of variance, early testing.

Zusammenfassung

Zeitliche Trends in der relativen Bedeutung der Variationsursachen „Anbauorte", „Klone", „Anbauorte × Klone", „Blöcke" und „Versuchsfehler" wurden in einer Fichten-Klonprüfung für das Merkmal „Pflanzenhöhe" bei 10 vorliegenden Messungen geschätzt. In dieser „Short Note" werden — angeregt durch eine Leserzuschrift — die früheren Resultate durch die Ergebnisse für das Verhältnis $\sigma^2_{\text{Klone}}/\sigma^2_{\text{Klone}} + \sigma^2_{\text{Fehler}}$ ergänzt. In Beantwortung einer weiteren Leseranfrage werden die Ergebnisse für das Merkmal „jährlicher Zuwachs" präsentiert und diskutiert.

Introduction

A Norway spruce clonal test, established with 5 clones on 5 extremely contrasting sites in 1967 and remeasured for total plant-height 10 times until 1981 has been used to estimate the relative importance of the components of variance for "locations", "clones", "locations × clones", "blocks" and "experimental error" dependent on the time. The results show, that in this study "blocks" and "interaction" are of minor importance, accounting to less than 5% of the total variation. "Clones" account for roughly 10% due to the limited numbers of clones included. These three sources of influence remain more or less constant over time. Considerable changes, however, occur in the components for "locations" and "experimental error". The first one increases quickly until it reaches a plateau at about 70% corresponding to the extreme sites included. The last one decreases correspondingly and ends up after few years at 15%. All values are quite stable at the end of the time of measurement.

The following question may be of general interest (LIBBY, personal communication): "What happens to within-site clonal h² over time — i.e: $\frac{\sigma^2_{\text{clone}}}{\sigma^2_{\text{clone}} + \sigma^2_{\text{error}}}$? It must go up a lot, right?"

It can be answered as follows: For this ratio $\sigma^2_{\text{clone}}/\sigma^2_{\text{clone}} + \sigma^2_{\text{error}}$ one obtains the results of *Table 1*. Two different evaluations have been performed: Evaluation I (4 sites, 5 clones, 2 blocks, 10 years of measurement) and evaluation II (5 sites, 4 clones, 2 blocks, 9 years of measurement). Both evaluations have been calculated 1) by using equal numbers of trees per plot ('orthogonal') and, additionally, 2) by using unequal numbers of trees per plot ('non-orthogonal') (see HUEHN *et al.*, 1987).

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Table 1. — Ratio $\sigma^2_{clone}/\sigma^2_{clone} + \sigma^2_{error}$ for evaluations I and II (non-orthogonal and orthogonal) for the different years.

year	evaluation I non-orth.	evaluation I orth.	evaluation II non-orth.	evaluation II orth.
1967	0.16	0.18	-	-
1968	0.21	0.23	0.29	0.29
1969	0.23	0.27	0.32	0.35
1971	0.21	0.21	0.29	0.29
1972	0.23	0.18	0.29	0.26
1973	0.30	0.25	0.36	0.32
1974	0.35	0.31	0.41	0.38
1975	0.38	0.33	0.43	0.38
1976	0.38	0.33	0.44	0.39
1981	0.42	0.37	0.43	0.42

The numerical values show a tendency of increase with time. The initial range is between 0.16 to 0.29, the final range between 0.37 to 0.43.

There are some interesting analogies to results in the recent paper of FOSTER (1986) with loblolly pine and to the previous paper of FRANKLIN (1979) with Douglas-fir, ponderosa pine, loblolly pine and slash pine.

There is another question of general interest (LIBBY, personal communication): "One expects total height to settle down as increasing % of total height are due to previous year's growth? What happens to annual growth? It probably continues to vary — or even increases as measurement error goes up?"

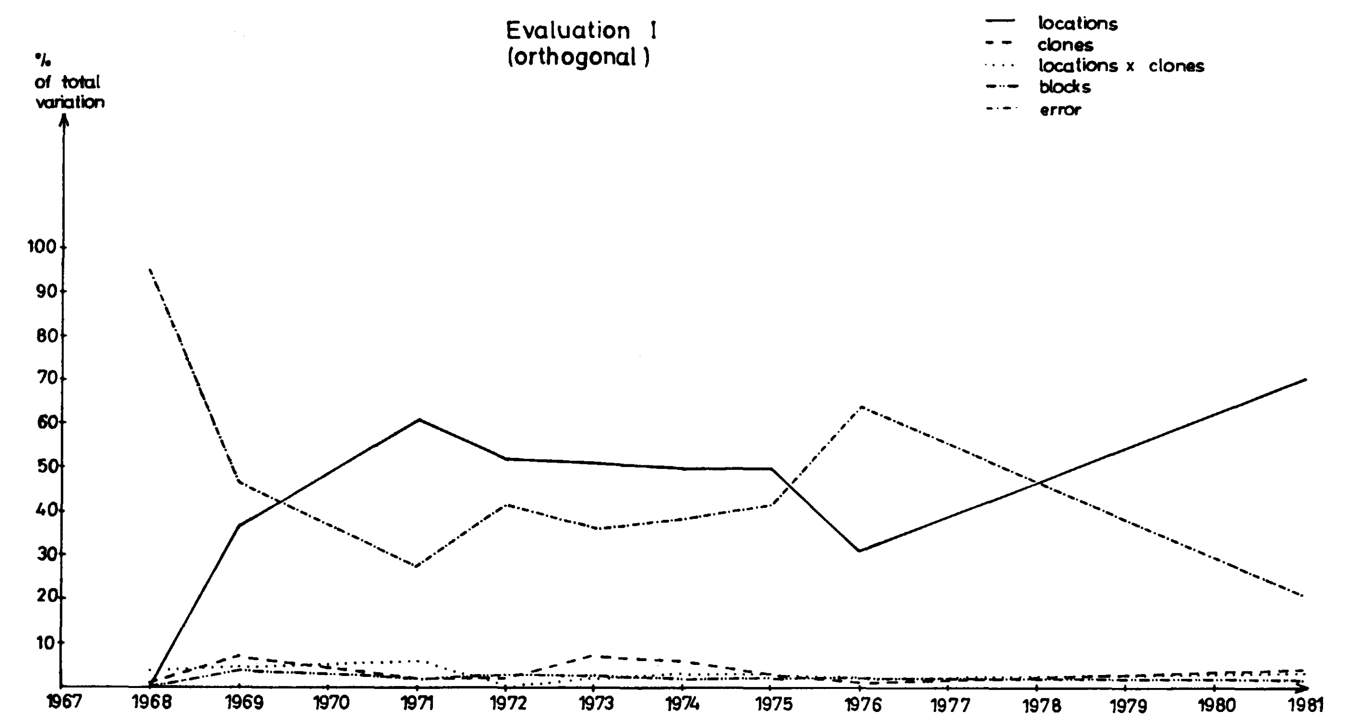
This question can be answered as follows: For the trait "total height increase" = "growth" variance components for "clones", "locations", "clones × locations", "blocks" and "experimental error" have been estimated for the periods 1967 to 1968, 1968 to 1969, 1969 to 1971, 1971 to 1972, 1972 to 1973, 1973 to 1974, 1974 to 1975, 1975 to 1976 and 1976 to 1981 for evaluation I and 1968 to 1969, 1969 to 1971, 1971 to 1972, 1972 to 1973, 1973 to 1974, 1974 to 1975, 1975 to 1976 and 1976 to 1981 for evaluation II. For two situations the resulting time intervals are larger than one year because of the unequally spaced years of measurements (1969 to 1971 and 1976 to 1981).

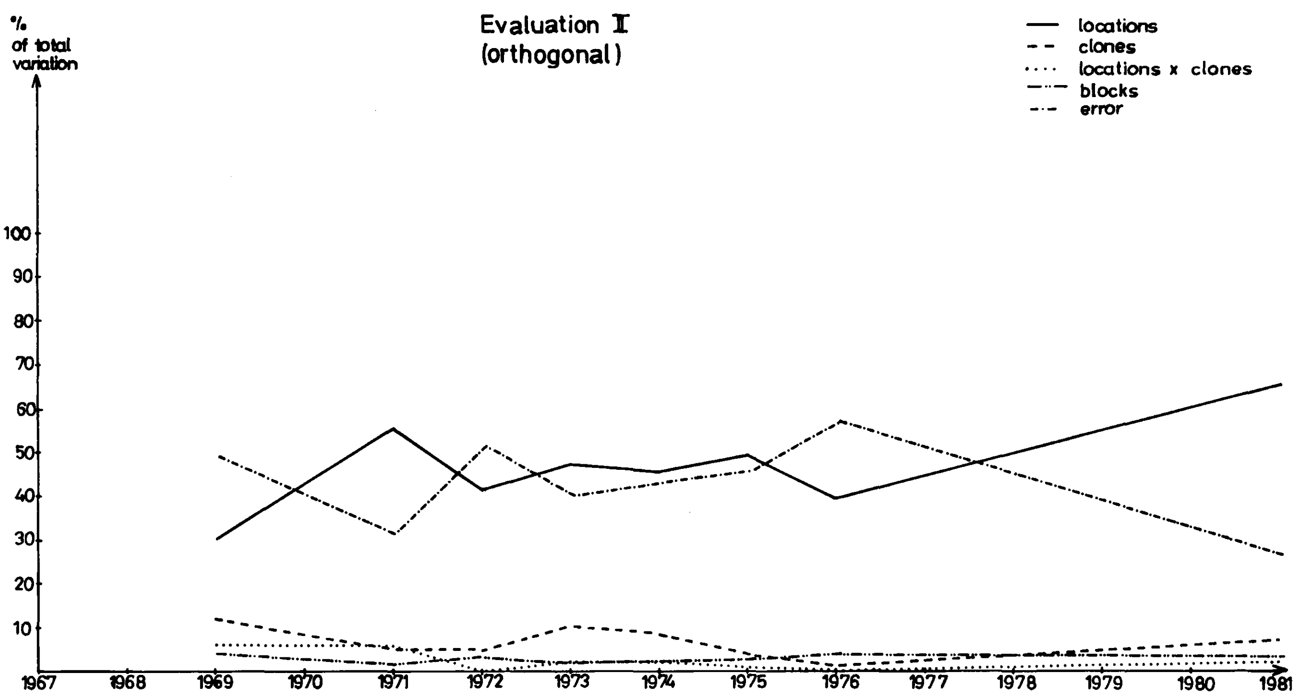
Again, we are mainly interested in the proportions of variability of each source of variation. Therefore, each variance component has been divided by the sum of all variance components. Because one obtains nearly identical results for the two analyses ('orthogonal' and 'non-orthogonal') results here are presented only for the orthogonal case (*Figures 1a* and *1b*).

The sources "clones ", "clones × locations" and "blocks" are all of minor importance (≤ 10%).

The predominant sources "locations" and "error" show no clear tendency dependent on time (see: *Figs. 1a* and *1b*). Both continue with moderate fluctuations. (It must be mentioned that this graphical representation of annual growth gives a somewhat distorted impression because of the included unequal growth periods (for example: 1976 to 1981)).

Compared to the development of the components derived from the overall growth, the components derived from the annual growth fluctuate considerably and the fluctuation does not decrease with age. Even the ranking between error and locations change in few cases.





Figures 1a and *1b*. — Proportions of variability for the different sources of variation for the orthogonal evaluations I and II dependent on age (trait: growth = height-increase).

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Short Note: Albino Gene Carriers and Mating System in Bambusa arundinacea (Retz.) Willd.

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Summary

On analysis of the frequencies of albinos produced by two albino gene carriers, it is inferred that *Bambusa arundinacea* (RETZ.) WILLD. prefers selfing. A possible explanation for favouring self pollination is discussed.

Key words: Albino gene carriers, Mating System, *Bambusa arundinacea*.

Bambusa arundinacea (RETZ.) WILLD., an important species for paper and pulp production, is very much preferred since it can be used as a raw material for high quality paper due to its long fibred nature and also for its many other uses. Hence, there is a great demand for this species, which exceeds raw material supply. India has achieved great strides in production of bamboo forests with 160,000 hectares of bamboo plantations raised till 1980 (SHARMA, 1980). Even then, the demands cannot be fully satisfied without sacrificing the natural resources and due to overexploitation there is a very rapid depletion of the natural resources. To overcome this, plantations of improved bamboos are to be raised on a large scale.

To attain increased volume production and growth rate, genetic principles should be followed for which the information on natural breeding system is necessary.

B. arundinacea is generally considered to be cross-pollinated. KONDAS *et al.* (1973) deduced the species to be self-compatible as they observed seed set on bagged and unemasculated inflorescences. The present author also observed seed set adopting the same method. But that does not give an idea that the species is self or cross pollinating. The degree of selfing can be calculated either by using gene markers or by allozyme studies. SQUILLACE and KRAUS (1963) estimated the degree of natural selfing in slash pine using albino gene carriers as gene markers.

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