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Natural Variability in Yield of Lowbush Blueberries

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Abstract. **One hundred lowbush blueberry *(Vaccinium angustifolium* Ait.) clones were randomly sampled from a commercial field to estimate potential productivity. Yield data exhibited a normal distribution ranging from 300 to 17,000 kg·ha^{-1} with a mean of 7726 kg·ha^{-1}. Commercial use of selected clones or improved cultivars through new plantings, interplanting into existing clones, or replacement of low-yielding clones in native stands and increasing the intensity of field management would increase the yielding potential of native lowbush blueberry fields.**

Lowbush blueberries are produced on 42,000 ha of native stands in Maine and in the Maritime Provinces and Quebec. Blueberries are pruned to the soil surface every other year, so a crop is produced every 2nd year. Lowbush blueberry yields fluctuate among clones and years but yields have generally increased in recent years (DeGomez et al., 1990). Although yield fluctuations may be attributed to weather conditions, no significant correlations were found between yield and climatic conditions in Canada (Hall et al., 1982).

Production from native fields is low compared to cultivated highbush blueberries *(V. corymbosum)* or rabbiteye blueberries (V. *ashei).* Lowbush blueberries in Maine yielded an average of 960 kg·ha^{-1} from 1969 to 1974 (Metzger and Ismail, 1976) and 1580 kg·ha^{-1} from 1985 to 1989 (DeGomez et al., 1990).

Barker et al. (1964) found lowbush yields in rod-square plots in New Brunswick weighed from 43 to 11,000 kg·ha^{-1} over 5 years. Highbush in Michigan yielded ≈ 2300 to 8800 kg·ha^{-1} (Nelson, 1979) and rabbiteye in Arkansas 7700 to 13,800 kg·ha^{-1} (Moore, 1975).

Selection and breeding of lowbush blueberries have produced several high yielding named cultivars. 'Augusta' has yielded 14,000 kg·ha^{-1} (Aalders et al., 1978), and progeny of selections have produced from 4600 to 8400 kg·ha^{-1} (Hall, 1983). Field trials of native clones under intensive management have produced yields of 6600 kg·ha^{-1} (Smagula and Hepler, 1978).

This project was initiated to study genetic and phenotypic variability in productivity of *V. angustifolium.* One hundred discrete blueberry clones were randomly located in a commercial blueberry barren in Deblois, Maine, in May 1974. A 38 × 38 × 13-cm sod was removed from each clone, placed in a box, and transported to the Maine Agricultural Experiment Station in Jonesboro. The clones in their containers were randomly plunged into the soil as a 10 x 10 clone sod block. Plants were fertilized from 1974 through 1976 with a 473-ppm solution of 21N-7P-7K soluble fertilizer (7.46% NO_3, 1.63% NH_4, 11.9% urea) to saturation three times per season and hand-weeded and watered as needed through Aug. 1976. Plants were pruned by burning in Apr. 1975. In May 1976, a screen cage was placed over the block of clones and a hive of honeybees was placed within for the duration of flowering to effect maximum pollination. Blueberries were harvested with a hand-held rake in Aug. 1976. The data were subjected to descriptive statistical analysis using SAS Proc Univariate (SAS Institute, Inc., 1982). The mean yield of the 100 blueberry clones was 7726 kg·ha^{-1} with a standard deviation of 3240 and a coefficient of variation of 42%. Yields ranged from 400 to 17,000 kg·ha^{-1}, which indicates the extreme variability one would expect in an unselected species. The yields were normally distributed (Prob > D 0.15) with minimal skewness (0.168) or kurtosis (– 0.008). The frequency distribution (Fig. 1) shows that > 30% of the clones yielded at the 7500 kg·ha^{-1} midpoint with 9% at the 2500 kg-ha-' midpoint and 10% at the 12,000 kg·ha^{-1} midpoint.

A small percentage of the clones had yields equivalent to those of released, cultivated cultivars of blueberries. The disparity between the low average yield obtained for fields in commercial production and the high yields obtained in this study may be due to the differences in pollination, irrigation, and plant cover.

The blueberry clones in this study were subjected to a high density of bees for pollination. Lowbush blueberries can set up to 100% of their blossoms, but set in the field seldom exceeds 40% with native pollinators and 70% when supplemented with honeybees (Wood, 1969). Moisture is necessary for flower bud development-and for increasing the weight of the berries (Benoit et al., 1984). Because the plants were hand-watered, moisture was always available for maximum production of fruit.

A third factor affecting yield is the plant cover. Plant cover depends on the number of years a field has been in production. Blueberry clones spread very slowly (Hall et al., 1979); fields in production for 50 or more years may have nearly 100% cover, but younger fields usually have <50% cover. Data from vegetation transects taken in commercial blueberry fields in Maine indicated that cover averaged from 40% to 70% (Yarborough and Bhowmik, 1989). Increasing the blueberry cover by the introduction of improved selections could greatly improve the productivity of native lowbush blueberry fields.

Horticulturists (Barker et al., 1964; Kender, 1967; Trevett., 1972) have indicated a need for domesticating the lowbush blueberry using matted row culture with improved varieties. Except for a few small plantings (Vandenberg, 1982), this type of culture has not been adopted by the industry. The limited availability of plant material, the high cost of establishment, and the slow rate of plant spread have prevented growers from establishing cultivated, lowbush blueberry fields. Recent information indicates that seedlings and micropropagated lowbush be-

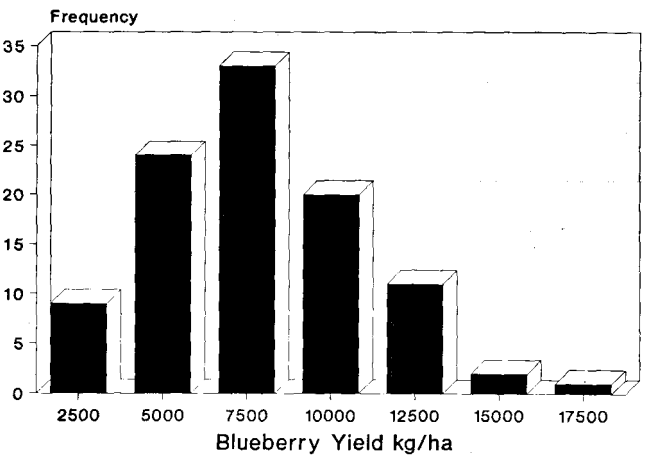

Fig. 1. Frequency distribution of 100 blueberry clones.

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come established and spread faster than conventional rooted cuttings (Morrison and Smagula, 1985).

The presented data indicate that native stands under more intensive management are capable of producing much greater yields than obtained now. Removing the less productive clones and interplanting high-yielding clones into the interclonal spaces in existing fields would greatly increase the average yields. Using improved micropropagated selections or seedlings from polycrosses of selected clones in natural stands will preserve the variable nature of the lowbush blueberry fruit and markedly increase yields.

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