

Table 1. (Cont.) Performance of 56 peach and nectarine cultivars after 5 weeks on AP medium. N = Nectarine.

Cultivar	Fresh weight (mg)	No. of leaves	Shoot length (mm)	No. of shoots	No. of surviving cultures
Early Sungrand (N)	847	14.5	14.1	3.0	6.0
Independence (N)	824	18.6	14.0	3.6	8.0
Suncrest	797	10.6	13.9	1.9	6.0
Fortuna	748	11.0	14.4	1.9	6.0
J. H. Hale	746	20.3	14.4	4.1	8.0
Late Le Grande (N)	739	14.5	13.6	3.3	6.0
Madelie	658	10.3	13.8	1.8	6.0
Redhaven	621	15.1	13.6	3.1	7.0
John Rivers (N)	608	10.1	14.1	1.9	6.0
Walgant	530	14.8	12.9	2.9	6.0
Treatment means	1,315	25.2	16.2	5.1	7.2
LSD (5%) [†]	235	5.2	1.7	1.4	
X ^{2y} me					12.4

[†]Least significant difference ($P < 0.05$).

[‡]Chi-square ($P > 0.95$).

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Cytoplasm of Highbush Blueberry Cultivars¹

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Abstract

The cytoplasm of 50 highbush cultivars were determined by following published pedigrees back to the original parent. Only 4 cytoplasm were located (Florida 4B, North Sedgwick, Brooks and Rubel) and 2 of them were represented by a single cultivar (Florida 4B and North Sedgwick).

Introduction

The pedigrees of 63 tetraploid highbush blueberry cultivars were recently gathered and their inbreeding coefficients were calculated (4). It was found that there has been an increase in the inbreeding coefficients among the cultivars released over the last 60 years and most of the nuclear genes in our present day cultivars were contributed by the 3 native selections

'Brooks,' 'Sooy,' and 'Rubel.' This may have slowed breeding progress since reductions in fruit weight and vigor have been described in highly inbred blueberry material (5).

We have now determined the cytoplasm of 50 hybrid cultivars by following published pedigrees back to the original maternal parent (2, 6). The cytoplasm of a seed embryo is usually contributed by the egg of the maternal parent during fertilization. It was assumed that all breeders use the convention of listing the maternal parent first in their inbreeding records.

Table 1 lists the cytoplasm of the cultivars released by public agencies. Wild selections are not listed unless they were a cytoplasm donor. In

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Table 1. Cytoplasm source of highbush blueberry cultivars released by public agencies.

Cytoplasm	Cultivars
Florida 4B (<i>Vaccinium darrowi</i>)	Flordablue
North Sedgwick (<i>V. angustifolium</i>)	Bluetta
Brooks (<i>V. corymbosum</i>)	Angola, Avonblue, Berkeley, Bluechip, Bluehaven, Bluejay, Cabot, Catawba, Collins, Concord, Croatan, Earliblue, Greenfield, Herbert, Harrison, Ivanhoe, June, Katherine, Kewbenaw, Lateblue, Meader, Morrow, Murphy, Northblue, Northcountry, Northland, Northsky, Pemberton, Pioneer, Rancocas, Redskin, Scammell, Spartan, Stanley, Weymouth, and Wolcott
Rubel (<i>V. corymbosum</i>)	Atlantic, Bluecrop, Blueray, Burlington, Coville, Darrow, Dixi, Elliot, Jersey, Sharpblue, Patriot, and Wareham

general, very few cytoplasm have been used in highbush blueberry breeding. We were able to locate only 4 cytoplasm and 2 of them are represented by only one cultivar ('Florida 4B' or 'North Sedgwick'). 'Brooks' was the most prevalent cytoplasm being a part of 36 cultivars or 72% of the total.

The recent efforts of blueberry breeders to incorporate broader germ-plasms into highbush types have begun to expand the amount of cytoplasmic diversity (1, 3). For example, Sharp and Sherman (7, 8, 9) used a wide range of genotypes in the development of 'Sharpblue', 'Flordablue' and 'Avonblue' and all three of these cultivars have a different cytoplasm ('Rubel', 'Florida 4B' and 'Brooks', respectively). Even lowbush cytoplasm have also been used successfully in highbush breeding such as *V. angustifolium* ('North Sedgwick') in 'Bluetta' and *V. darrowi* in 'Flordablue'.

It is important to diversify the cytoplasmic base of highbush blueberries as important cytoplasmic-nuclear interactions may have been ignored and the whole blueberry industry is vulnerable to pathogen attack if cytoplasmic resistance ever becomes important. The most widely planted cultivars in the United States have

either 'Brooks' or 'Rubel' cytoplasm, and in Michigan, almost all cultivars contain 'Rubel'.

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