'Bladen' Southern Highbush Blueberry

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Vaccinium L. x 'Bladen' is an early ripening southern highbush blueberry with cane canker [*Botryosphaeria corticis* (Demaree & Wilcox) Arx and Muller] resistance and field tolerance to stem blight [*B. dothidea* (Mouq. ex Fr.) Ces. & de Not.]. 'Bladen' has medium fruit size, a good picking scar, and good flavor and productivity; it is adapted to mechanical harvesting for fresh- or processing market outlets. Color development of 'Bladen' fruit is uniform during ripening. Bushes are upright and vigorous. 'Bladen' propagates easily from softwood and hardwood cuttings. In greenhouse studies, the blossoms were not completely self-fruitful, and interplanting with a cultivar, such as 'Reveille', ensures adequate cross-pollination. Flowering is early, and irrigation is recommended for frost protection of flowers and young berries.

Origin

'Bladen' (tested as NC 2055) originated from the cross NC 1171 x NC SF-12-L made by J.R.B. in Raleigh, N.C., in 1972 (Fig. 1). It is a tetraploid southern highbush blueberry and includes three species of southern origin (*V. ashei* Reade, *V. darrowi* Camp, and *V. tenellum* Ait.), a standard highbush blueberry (*V. corymbosum* L.), and a minor contribution from lowbush blueberry (*V. angustifolium* Ait.). 'Bladen' was selected at Castle Hayne, N.C., in 1974 by J.R.B. and evaluated by J.R.B., S.D.R., and C.M.M. It has been tested in North Carolina's coastal plain, piedmont, and lower mountains. The name 'Bladen' was chosen to recognize Bladen County, N.C., the leading blueberry-producing county in the state.

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Description and performance

'Bladen' was established first in duplicate plot selection trials at the Horticultural Crops Research Station, Castle Hayne, and then in 10-plant duplicate plot trials in White Lake, N.C., and a four-plant plot, five-times replicated, randomized complete-block trial at Castle Hayne. Observation plots also were established at several grower locations in Fletcher, N.C. 'Bladen' was compared with 'Reveille', 'Croatan', and 'O'Neal' at all of these trial locations. Data collected from White Lake (1987 to 1989), Castle Hayne (1987 to 1991), and observations from grower locations (1990 to 1991) have shown 'Bladen' to be worthy of release.

Mechanical harvesting was compared with hand-harvesting at White Lake. A commercial-type over-the-row harvester (model R; BEI, South Haven, Mich.) was used. Total

yield was not different among cultivars (Table 1). Mechanical harvesting did not result in differences in total yield among any of the cultivars, and only 'Croatan' showed a reduction in fruit recovered from mechanical harvesting compared to hand-harvesting. 'Bladen' had about the same percentage of ripe fruit recovered at first harvest (31 May to 2 June) as 'Reveille' and 'O'Neal' and a higher percentage than 'Croatan'. 'Bladen' fruit weight was similar to that of 'Croatan', whether mechanically or hand-harvested. Mechanically harvested 'Bladen' fruit was equal in color to hand-harvested 'O'Neal' and superior to mechanically harvested 'O'Neal' fruit. Color of hand- and mechanically harvested 'Bladen' and 'Reveille' fruit were similar when fully ripened. 'Bladen' color, whether hand- or mechanically harvested, was similar to that of 'O'Neal'. Hand-harvested 'Bladen' fruit was as firm as hand-harvested 'Reveille'; mechanically harvested 'Bladen' fruit was less firm than mechanically harvested 'Reveille' fruit. Mechanically harvested 'Bladen' fruit was similar in firmness to hand-harvested 'Croatan' and firmer than mechanically harvested fruit of that cultivar. 'Bladen' flavor ratings, in our opinion, and fruit scar ratings were similar to those of 'Reveille' and higher than those of 'Croatan'. The fruit scar rating for 'Bladen', whether hand- or mechanically harvested, was higher than that of mechanically harvested 'O'Neal'; flavor ratings between these two cultivars were similar regardless of harvest method.

Plots were hand-harvested only at Castle Hayne (Table 2). Yield was significantly higher

Fig. 1. Parentage of 'Bladen', southern highbush blueberry.

*US 39 is a hybrid of Berkeley x US 17, and US 17 is a reported tetraploid hybrid between *Vaccinium tenellum* Ait. ($2n = 2x = 24$) and 'Callaway' (*V. ashei* Reade, $2n = 6x = 72$).

†According to R.H. Sharpe, the unknown highbush (*V. corymbosum* L., $2n = 4x = 48$) was either 'Angola', 'Berkeley', 'Bluecrop', 'Earliblue', or 'Ivanhoe'.

for 'Croatan' in this location; however, yields of the other cultivars, which are more upright-growing likely were more adversely affected by topping with a sickle bar mower in mid-Summer 1987. (This is a standard commercial practice for controlling plant height.) 'Bladen', 'Reveille', and 'O'Neil' were earlier than 'Croatan'. Overall fruit weight was greater at Castle Hayne than at White Lake, and 'Bladen' fruit weight was similar to that of 'Reveille' and 'Croatan' and lower than that of 'O'Neil'. 'Bladen' and 'Reveille' fruit color was lighter blue than of 'O'Neil' and 'Croatan'. 'Bladen' fruit was firmer than 'Croatan' but less firm than 'Reveille'. Fruit scar and flavor characteristics, as determined by the authors, were similar to those observed at White Lake. Be-

fore harvest at Castle Hayne, rain caused some fruit cracking in 'Bladen', but it was not as severe as with 'Reveille'. At the grower locations and in Fletcher, bush growth and fruiting were similar to those in White Lake and Castle Hayne test sites.

At Castle Hayne, a single 237-ml fruit sample was collected from each of five replications of each cultivar at each harvest date and separated into four categories for color development. These categories (blue, <50% red, and ≥50% red and green) clearly separated 'Bladen' from 'Reveille' on color development (Table 3). Compared to 'Reveille', the 'Bladen' fruit does not show green to red pigmentation around the pedicel attachment point, particularly before the early harvest

Table 3. Fruit color development in 'Bladen' and other blueberry cultivars in Castle Hayne, N.C., 1991.²

Cultivar	Blue (%)	<50% Red (%)	50% Red (%)	Green (%) ³
Croatan	90	6	4	0
Reveille	59	23	14	4
Bladen	90	7	3	0
LSD _{0.05}	6	4	3	3

²Sampling consisted of a single 237-ml sample from each of five replications of each cultivar at each harvest date.

³Green = green at pedicel end.

dates. This feature is important because fruit are graded at the packing shed on the day of harvest before full color development. This procedure can result in the rejection of some of the early fruit and subsequent loss of the early fresh-market advantage.

'Bladen' was susceptible to stem blight (*B. dothidea*) in moist chamber and greenhouse screening tests (Cline et al., 1993). However, in field plots, 'Bladen' plants have not succumbed to this disease in >12 years. 'Bladen' is resistant to races 1 and 4 of stem canker (*B. corticis*) (Rooks et al., 1994).

'Bladen' is intended primarily as an early ripening cultivar that can be mechanically harvested for fresh- and processing market outlets. It is superior to 'Reveille' in uniformity of fruit pigment development during ripening and resistance to fruit cracking. 'Reveille' is another recent cultivar developed for mechanical harvesting for fresh- and processing market outlets (Ballington et al., 1990).

Availability

A list of nurseries propagating 'Bladen' plants is available from S.D.R. and J.R.B. The North Carolina Agricultural Research Service does not have plants for sale or distribution.

Literature Cited

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Table 1. Performance of 'Bladen' and other blueberry cultivars (sixth through eighth growing season) in White Lake, N.C., 1987 to 1989.

Cultivar	Harvest method ²	Total yield ¹ (kg/plant) ³	First harvest ¹ (% ripe) ⁴	Fruit					
				Mass (g/fruit)	Color L* ⁵	Firmness (g·mm ⁻¹) ⁶	Scar ⁷	Flavor ⁸	Cracking (%)
Croatan	M	2.4	18	1.27	20.5	41.0	7.0	6.2	---
	H	7.5	21	1.21	20.8	52.5	7.2	7.0	1
O'Neal	M	2.9	45	1.63	21.3	49.2	7.3	7.8	---
	H	4.1	47	1.58	23.4	66.3	7.5	8.0	5
Reveille	M	4.8	54	1.45	23.9	62.1	8.0	8.0	---
	H	5.9	63	1.46	24.5	68.4	7.8	7.9	11
Bladen	M	3.2	50	1.13	25.2	3.7	7.9	7.5	---
	H	5.3	48	1.22	27.0	62.9	7.8	7.8	3
LSD _{0.05}		4.6	---	0.33	3.5	6.5	0.4	0.3	---

²M = machine-harvested, H = hand-harvested.

³Total yield between cultivars affected by mechanical topping.

⁴First harvest was 2 June 1987, 31 May 1988, 30 May 1989. No least significant difference comparison; data informational value only.

⁵L* are lightness scale readings to determine color, using a chromameter (model CR-110; Minolta, Ramsey, N.J.); higher ratings = lighter color.

⁶The force in grams per millimeter required to deform individual berries one-quarter of the diameter using a Hunter force gauge (AMETEK, Largo, Fla.).

⁷Rated on a scale from 0 to 9, where 0 to 5 = unsatisfactory, 6 = acceptable, 7 = good, and 8 = superior.

Table 2. Performance of 'Bladen' and other blueberry cultivars (sixth through eighth growing season) in Castle Hayne, N.C., 1987 to 1989.²

Cultivar	Total yield ¹ (kg/plant) ³	First harvest ¹ (% ripe) ⁴	Fruit					
			Mass g/fruit	Color L* ⁵	Firmness (g·mm ⁻¹) ⁶	Scar ⁷	Flavor ⁸	Cracking (%)
Croatan	3.8	19	1.40	18.9	53.3	7.0	7.0	1
O'Neal	2.1	50	1.94	21.1	64.7	7.5	8.2	5
Reveille	2.4	49	1.58	22.7	74.6	7.8	7.8	11
Bladen	1.8	51	1.60	23.2	62.6	7.5	7.6	3
LSD _{0.05}	0.9	---	0.33	1.2	3.8	0.4	0.4	---

²All plots were hand-harvested.

³Total yield between cultivars affected by mechanical topping.

⁴First harvest was 2 June 1987, 31 May 1988, 30 May 1989. No least significant difference comparison; data informational value only.

⁵L* are lightness scale readings to determine color, using a chromameter (model CR-110; Minolta, Ramsey, N.J.); higher ratings = lighter color.

⁶The force in grams per millimeter required to deform individual berries one-quarter of the diameter using a Hunter force gauge (AMETEK, Largo, Fla.).

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