J. Amer. Soc. Hort. Sci. 123(2):273–277. 1998.

Derivatives of *Vaccinium arboreum* x *Vaccinium* Section *Cyanococcus*: I. Morphological Characteristics

Sylvia J. Brooks and Paul M. Lyrene
Department of Horticultural Sciences, University of Florida, Gainesville, FL 32611

Additional index words. *Vaccinium darrowi*, *V. corymbosum*, sparkleberry, wide hybridization

Abstract. **Morphological characteristics of many derivatives from *Vaccinium arboreum* Marsh x *Vaccinium* section *Cyanococcus* crosses were studied. The purpose of the study was to determine if *V. arboreum* traits were being inherited and expressed in hybrid progeny and to identify characteristics that would enable hybrid field identification. This study focused on the F_1 hybrids of *V. darrowi* Camp x *V. arboreum* (F_1 hybrids) and the open-pollinated progeny of the F_1 hybrids [mother is known (MIK)]. Also included in the study were the parents: *V. darrowi*, *V. arboreum*, and *V. corymbosum* L. (pollen parent of the MIKs). Many leaf, flower, and fruit characteristics were measured for all five taxa. Leaf characteristics included length, width, and presence or absence of stalked glands, pubescence, and marginal bump glands. The floral characteristics measured were corolla length and width, corolla aperture, pedicel length, peduncle length, bracteole length and width, and the presence or absence of anther awns and bracteoles. Berry and seed mass were the fruit characteristics investigated. Four unique *V. arboreum* traits were found to be expressed in the F_1 and MIK hybrid populations. These were the presence of anther awns, large seed size, bracteole shape, and marginal glands. These traits should permit field identification of hybrid plants.**

Vaccinium arboreum Marsh (2n = 2x = 24) is in the same genus as, but in a different section than, the cultivated highbush blueberry. While blueberries are in section *Cyanococcus*, *V. arboreum* is in section *Batodendron*. Common names for *V. arboreum* include sparkleberry, farkleberry, winter-huckleberry, and tree-huckleberry (Ballinger et al., 1982; Camp, 1945). Sparkleberry is typically a small monopodial tree that can reach a height of 10 m with a trunk diameter of 35 cm. The inflorescence is an elongated raceme. The long pedicels (8 to 12 mm) are subtended by leafy bracts. The berries are small, black, shiny, and often described as dry, gritty, and inedible. The seeds are much larger than those of cultivated blueberries, ≈2 mm long (Vander Kloet, 1988).

The range of sparkleberry extends from southern Virginia to central Florida and west to eastern Texas, central Oklahoma and southeastern Missouri. *Vaccinium arboreum* is one of the few Ericaceous species that can tolerate calcareous soils (Ballinger et al., 1982). In Texas, *V. arboreum* has been found growing on sandy or sandy loam soils with a pH >6.0. The organic matter content of these soils ranged from 0.1% to 4%, with a large number of sparkleberry sites having soil organic matter <1% (Stockton, 1976).

Sparkleberry has several characteristics that would be desirable in southern highbush blueberry cultivars (cultivated taxon based largely on *V. corymbosum*, which contains genes from other *Vaccinium* species). One of these is the sparkleberry's ability to thrive on soils that southern highbush tolerate poorly. Highbush blueberries require soils that are acid (pH 3.5 to 5.5), low in bicarbonates, and high in organic matter. Sparkleberries grow well on highbush blueberry soils and on soils that are low in organic matter and have a pH as high as 6.2. Incorporation of wider soil tolerance could extend the range of the southern highbush as a cultivated crop.

Seedlings were obtained by open-pollination of large, diploid *V. darrowi* x *V. arboreum* F_1 hybrid plants in a field containing southern highbush cultivars and other *Vaccinium* genotypes (Brooks and Lyrene, 1995; Lyrene, 1991; Lyrene and Brooks, 1995). The plants resulting from the open-pollinated berries of the F_1 hybrids were designated as mother is known (MIK). The pollen could have come from any of three sources: diploid, tetraploid, or hexaploid blueberries. The physical appearance of the MIKs indicated that they were probably tetraploid. Their leaves, flowers, and berries were much larger than those of the diploid F_1 mother parents. In addition, the mean fertility level of the MIKs had increased dramatically over that of the F_1s, which were essentially male sterile and had very low female fertility. Research indicated that the most likely pollen parent of the MIKs was highbush (Brooks, 1996).

The identification of hybrids from a wide cross is often based on morphology. Unfortunately, for this purpose, hybrids are not always intermediate in morphology between their parents. After surveying the literature on hybrid morphology, Rieseberg (1995) reported that hybrids are just as likely to exhibit parental characteristics as intermediate ones. In fact, his survey showed that hybrids in general were a mosaic of parental, intermediate, and extreme (novel) characteristics. The expression of the trait in the hybrid depended on the nature of the genetic control of that particular trait and its interaction with the environment. The frequency of extreme or novel characteristics that were found in neither parental species was found to be >10% in F_1 hybrids and >30% in subsequent generations.

The goal of this study was to observe the introgression of sparkleberry characteristics into cultivated blueberry. Two generations were observed—the F_1s and the MIKs—along with the three parental species. Many characteristics of leaves, flowers, and berries were measured. Since hybrids are often difficult to identify based on a single trait (Rieseberg, 1955), it was hoped that one or more of the unique sparkleberry traits would be consistently expressed in the hybrids. Such traits would facilitate hybrid identification in the field.

Materials and Methods

Except for the individuals of *V. arboreum*, all the plants used in this study were growing at the Univ. of Florida Horticultural Unit in Gainesville, Fla. The *V. arboreum* plants were located in a forest 10 km north of High Springs, Fla. The *V. corymbosum* plants used were all cultivars or advanced selections of southern highbush blueberry.

In Spring 1994, leaves were collected from 20 genetically distinct plants of each of the following taxa: *V. arboreum*, *V. darrowi*, *V. corymbosum*, MIK, and 16 *V. darrowi* x *V. arboreum* F_1s. Leaves were chosen at random from the outside canopy where they had been exposed to full sun. Five leaves were collected from each clone, pressed, and stored for later examination.

Received for publication 12 June 1997. Accepted for publication 13 Nov. 1997. University of Florida Agricultural Experiment Station journal series no. 05472. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

The leaf characteristics measured were length and width (at widest point). Stalked glands were scored as present or absent. Pubescence was scored as none present, low, medium, or high. Marginal bump glands were scored as exserted or sunken. All data were collected using a dissecting scope.

Flowers were collected in Spring 1994. Highbush and MIK flowers were collected during the first week of March. *Vaccinium darrowi* and *V. arboreum* flowers were collected on 1 Apr. Five inflorescences were collected from each of 20 different genotypes in each taxa. Flowers from 14 of the F_1s were harvested on 6 Apr. F_1 clone 85-128 was harvested the following year on 4 Apr. 1995. No flowers were produced either year by F_1 clone 85-136. Inflorescences were preserved in 70% ethanol for later examination.

The fruit characteristics measured were corolla length, corolla width, corolla aperture, pedicel length, peduncle length, bracteole length, and bracteole width. Anther awns and bracteoles were scored as absent or present. Measurements and observations were made using a dissecting scope.

Fifty berries were harvested from each of twenty different genotypes of highbush, *V. darrowi*, *V. arboreum*, and the MIKs. Only seven F_1s produced enough berries for all or part of this study. The *V. darrowi* berries were harvested from 12 to 30 May 1994. Highbush berries were picked on 27 Apr. 1994. Berries of *V. arboreum*, which ripen in fall, were all harvested on 19 Oct. 1993. Berries from the MIKs were harvested 26 Apr. to 23 May 1994. Four F_1s were harvested 1 June to 26 July 1994. The other three were harvested between 7 and 25 July 1995.

The characteristics measured were berry mass and large-seed mass. Thirty berries were weighed per clone. Berries to be weighed were selected randomly from the 50 that were harvested and were randomly divided into 2 samples of 15. After the berries were weighed, the seeds were removed using a food blender. The seeds were dried overnight on a laboratory bench and weighed the next morning. *Vaccinium arboreum* berries contain sclereids that aggregate into large clumps around the seeds. These were removed with a no. 25 (0.713-mm) sieve before weighing. The other taxa also contain sclereids, but they do not aggregate into clumps and are washed away during seed extraction. The 30 largest seeds were separated out and randomly divided into 2 samples of 15, and weighed for each clone.

Results and Discussion

Leaves. The length and width of the F_1 leaves were intermediate between those of the two parents—*V. darrowi* (small) and *V. arboreum* (large) (Table 1, Fig. 1). The mean leaf lengths for the three taxa differed significantly ($P = 0.01$). The upper range of the F_1 hybrid population overlapped slightly with the lower range of the *V. arboreum* population. Mean leaf width also differed significantly among the three taxa ($P = 0.01$). The population ranges of the three overlapped slightly. Although mean leaf length of the F_1s was almost exactly midway between the two parents, mean leaf width of the F_1s was much closer to *V. darrowi* than to *V. arboreum.*

MIK leaves were intermediate in length and width between those of the F_1s and *V. corymbosum* (Table 1). In both characteristics, means of the MIKs were closer to *V. corymbosum* than to the F_1s. The ranges of all three taxa overlapped somewhat.

Stalked glands are found on the abaxial (lower) surface of the leaf blade of some *Vaccinium* species. These glands were found on all of the *V. arboreum* leaves examined. None of the *V. darrowi* leaves had stalked glands. In a survey of *V. darrowi* in Florida, however, Lyrene (1986) found that 9 out of 15 clones he surveyed had stalked glands. 'Johnblue', a *V. darrowi* clone that was crossed with *V. arboreum* to produce some of the hybrids used in this study, was examined and found to have stalked glands. Of the six F_1s with 'Johnblue' as a parent, four had stalked glands and two did not. Overall, 50% of the F_1s had stalked glands (Table 1). None of the highbush leaves examined had stalked glands. In the MIK population, 20% of the clones had them. From the data presented in Table 1, it appeared that the stalked gland characteristic could be used to separate the taxa. However, due to the presence of stalked glands in 'Johnblue' (not included in the original study) and the results of Lyrene's (1986) work in *V. darrowi*, this characteristic was not considered satisfactory for taxa separation.

Abaxial leaf pubescence was found on all *V. arboreum* and F_1 plants, 75% of the *V. darrowi* plants, 20% of the highbush, and 95% of the MIKs (Table 1). Most plants within all five taxa that had pubescence were scored as low. Twelve percent of the F_1 plants were highly pubescent. This was the only taxon that showed a high level of pubescence. *Vaccinium darrowi* and highbush were the only taxa

Table 1. Leaf characteristics of five taxa: *Vaccinium darrowi*, *V. arboreum*, F_1 (*V. darrowi* x *V. arboreum* hybrids), southern highbush (HB) and mother is known (MIK) (open-pollinated progeny of the F_1 hybrids).

	Taxa means^z (ranges)				
Characteristic	*V. darrowi*	*V. arboreum*	F_1	HB	MIK
Length (mm)	10.9 d^y	36.3 b	22.6 c	45.1 a	38.6 b
	(8.1–14.3)	(28.8–42.2)	16.9–34.2)	(37.6–56.2)	31.5–46.1)
Width (mm)	5.2 d	22.5 a	9.6 c	24.4 a	18.4 b
	(3.1–7.1)	(16.6–27.)	(6.8–16.6)	(17.8–31.4)	(15.4–21.3)
Stalked glands (percent with)	0	100	50	0	20
Pubescence					
Percent with none	25	0	0	80	5
Percent low	40	95	88	20	90
Percent medium	35	5	0	0	5
Percent high	0	0	12	0	0
Margin glands					
Percent with none	0	0	0	75	0
Percent with sunken	95	0	6	20	50
Percent with exserted	5	100	50	0	35
Percent with both	0	0	44	5	15

^{z}Each mean is the average of 29 genetically distinct plants with 5 replications (leaves) per plant except the F_1 hybrids, which had 16 plants.
^{y}Mean separation within rows by least square means with a Tukey-Kramer adjustment on log-transformed data. Means followed by a common letter do not differ significantly at $P = 0.01$. Actual means are presented here.

Fig. 1. Examples of leaves from *Vaccinium arboreum* (**left**), *V. darrowi* (**right**), and their F_1 hybrid. (**middle**).

in which some plants had no pubescence, 25% and 80%, respectively.

The marginal glands on the basal half of *V. arboreum* leaves can be easily seen with a 10× field lens. On most *V. arboreum* leaves, the glands are present along the entire margin. There are no reports of marginal leaf glands in *V. darrowi* or highbush (Godfrey, 1988; Vander Kloet, 1988). All taxa in this survey exhibited marginal glands, at least in some individual plants. Seventy-five percent of the highbush plants had no glands. Of the 25% that had glands, most of the glands were sunken into the margin. All plants in the other four taxa had marginal glands. In *V. darrowi*, 95% of the plants had glands that were sunken as the highbush glands were. All of the *V. arboreum* plants and 5% of the *V. darrowi* plants had glands that were exserted from the margin. The fact that they were exserted made the glands much more obvious to casual observation. Half of the F_1 plants had glands that were exserted as on the *V. arboreum* parent, 6% of the glands were sunken, and 44% contained both types. All of the MIKs had marginal leaf glands. Thirty-five percent of the plants had exserted glands, 50% had sunken glands, and 15% displayed both types. The large percentage of exserted marginal glands in the MIKs compared to 5% in *V. darrowi* and 0% in highbush, indicated the presence and expression of *V. arboreum* genes.

Flowers. Corolla size (length and width) of the F_1s was intermediate between their parents, *V. darrowi* and *V. arboreum* (Table 2, Fig. 2). Mean corolla length differed significantly ($P = 0.01$) for these three taxa. The mean corolla length of the F_1s exceeded both parents. The mean corolla width of the F_1 population was significantly different ($P = 0.01$) from *V. arboreum*, but not from *V. darrowi*. Despite the lack of significance for the difference in mean corolla width between the F_1 and *V.*

Table 2. Floral characteristics of five *Vaccinium* taxa: *V. darrowi*, *V. arboreum*, F_1 (*V. darrowi* x *V. arboreum* hybrids), southern highbush (HB), and mother is known (MIK) (open-pollinated progeny of the *V. darrowi* x *V. arboreum* F_1 hybrids).

	Taxa means[z] (ranges)				
Character	*V. darrowi*	*V. arboreum*	F_1	HB	MIK
Corolla length (mm)	6.0 d	6.7 c	7.6 b	10.3 a	9.9 a
	(4.8–7.4)	(5.5–7.6)	(6.7–8.8)	(9.3–11.5)	(8.4–11.7)
Corolla width (mm)	3.4 c	5.6 b	3.8 c	6.2 a	5.4 b
	(3.0–4.1)	(4.6–6.7)	(3.1–4.5)	(5.4–7.0)	(4.7–7.3)
Corolla aperture (mm)	1.7 d	5.0 a	2.3 c	3.2 b	3.1 b
	(1.3–2.2)	(4.1–6.0)	(1.8–3.2)	(2.6–4.0)	(2.5–4.2)
Pedicel length (mm)	4.3 c	11.6 a	6.7 b	4.2 c	5.8 b
	(2.5–5.5)	(7.8–15.8)	(3.1–9.1)	(2.6–7.1)	(3.4–8.1)
Peduncle length (mm)	4.1^{y} d	44.3 a	15.8 b	9.1 c	11.3 bc
	(2.2–8.0)	(28.6–7.04)	(3.9–26.2)	(4.4–13.2)	(7.2–18.0)
Bracteole length (mm)	1.7^{yx} c^{w}	1.7^{v} c	2.7^{u} b	3.8 a	3.5 a
	(1.4–2.2)	(1.5–2.0)	(2.1–3.9)	(3.2–4.9)	(2.5–4.1)
Bracteole width (mm)	1.1^{yw} c^{t}	0.3^{v} d	0.9^{u} c	2.2 a	1.5 b
	(0.95–1.35)	(0.25–0.30)	(0.50–1.35)	(1.40–2.75)	(1.05–1.95)
Anther awns (% of plants)					
Present	0.0	100.0	93.0	0.0	60.0
Present as nubs	25.0	0.0	7.0	20.0	35.0
Persistent bracteoles (% of plants)					
Present	70.0	30.0	67.0	100.0	100.0

[z]Each mean is the average of 20 genetically distinct plants with 5 replications per plant, except the F_1 hybrids, which had 15 plants.
[y]Mean separation was performed on log-transformed data. Actual means are presented here. Mean separation within rows by least square means with a Tukey-Kramer adjustment, $P = 0.01$ unless otherwise noted.
[x]Average of 14 plants.
[w]$P = 0.04$.
[v]Average of 4 plants.
[u]Average of 9 plants.
[t]$P = 0.02$.

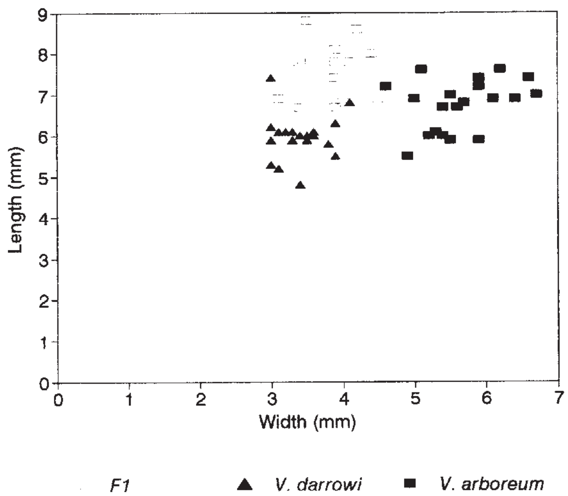

Fig. 2. Corolla size for *Vaccinium darrowi*, *V. arboreum*, and the F_1 hybrids. Each point represents the mean of five replications for one plant.

darrowi populations, individual plant means for the three taxa tended to cluster in three separate populations (Fig. 2).

The MIK population was also intermediate in corolla size between the F_1s and highbush (Table 2, Fig. 3). The mean corolla length of the MIKs was significantly different ($P = 0.01$) from that of their F_1 parents but not from highbush. The population ranges of the MIKs and highbush were almost identical. The MIKs and highbush did not differ significantly in mean corolla length; however, three distinct population groupings, with the MIKs intermediate between the parental taxa, were evident from the clustering of individual means with the population ranges (Fig. 3). The means for corolla width were significantly different ($P = 0.01$) for all three taxa.

The mean corolla apertures for *V. darrowi*, *V. arboreum*, and the F_1s were significantly different ($P = 0.01$) from each other (Table 2), with *V. arboreum* the largest and *V. darrowi* the smallest. The ranges of *V. darrowi* and the F_1 overlapped considerably. The F_1s were significantly smaller ($P = 0.01$) than the MIKs, but the MIKs and highbush did not differ significantly. The ranges of the MIKs and highbush were almost identical and overlapped with the upper part of the range of the F_1s.

Long pedicels (secondary axis of the inflorescence) are characteristic of *V. arboreum* (Fig. 4). The mean pedicel length of *V. arboreum* was more than twice that of *V. darrowi* (Table 2). The mean of the F_1s was between the parental means. It was significantly different ($P = 0.01$) from both parents but was much closer to that of *V. darrowi*. The range of the F_1s extended into the range of *V. arboreum* and covered that of *V. darrowi*.

The mean pedicel length of the MIKs (Table 2) was significantly greater ($P = 0.01$) than that of highbush, but not different from the F_1s. The ranges of the three taxa overlapped considerably. However, the clustering of the individual means indicated that the MIKs were intermediate with respect to the other two. Highbush did not differ significantly ($P = 0.01$) from *V. darrowi*.

Long peduncles (primary axis of the inflorescence) are another characteristic of *V. arboreum*. Mean peduncle length for *V. darrowi*, *V. arboreum*, and the F_1s were statistically different ($P = 0.01$) (Table 2). The mean for *V. arboreum* was 10 times that of *V. darrowi*. The range of the F_1s covered the distance between the upper and lower ranges of the other two taxa.

There was no significant difference ($P = 0.01$) (Table 2) between the MIKs and the F_1s for mean peduncle length. There also was no significant difference between the MIKs and highbush. However, the ranges of the three taxa overlapped in a manner that indicated intermediacy of the MIKs between the other two taxa.

The bracteoles (two small bractlets located on the pedicel) in some blueberry taxa are quickly deciduous, falling off soon after the flowers open. In *V. arboreum*, only 30% of the plants had bracteoles (Table 2) that remained on the inflorescences at the time of examination. Seventy percent of the *V. darrowi* plants had inflorescences that had retained their bracteoles. The retention of bracteoles in the F_1s was very close to *V. darrowi* at 67%. All of the MIK and highbush plants examined had inflorescences that had retained their bracteoles. The presence of bracteoles in the hybrids was essentially the same as for the *Cyanococcus* parent.

The F_1 bracteoles retained the lanceolate shape of their *V. arboreum* parent. Although not as pronounced, the MIK bracteoles also had a lanceolate shape. The shape of highbush and *V. darrowi* bracteoles was more ovate (wider at the base) than lanceolate.

The mean bracteole lengths of *V. arboreum* and *V. darrowi* were identical (Table 2), as were their ranges. The mean bracteole length of the F_1s was significantly different ($P = 0.04$) from its parents and exceeded both of them by ≈33%. The lower range of the F_1s barely overlapped the upper range of both parents. This is another example of transgressive character expression in the F_1s, corolla length being the other.

There was a significant difference ($P = 0.02$) for mean bracteole width between *V. arboreum* and *V. darrowi*. *Vaccinium darrowi* was ≈3.5 times wider than *V. arboreum*. The mean bracteole width of the F_1s was slightly smaller but not significantly different from *V. darrowi* (Table 2).

The mean bracteole length of the MIKs was significantly greater ($P = 0.04$) than that of the F_1 parent (Table 2). There was no significant difference between the MIKs and highbush, although the mean bracteole length of the MIKs was slightly smaller. The upper range of the F_1s overlapped with the lower range of highbush. The range of the MIKs for mean bracteole length spanned almost the entire combined range of highbush and the F_1s.

The mean bracteole width of the MIKs was intermediate between and significantly different ($P = 0.02$) than highbush and the F_1s (Table 2). The population range of the MIKs overlapped that of the highbush and F_1 populations.

All *V. arboreum* anthers had awns (Table 2). None of the *V. darrowi* had awns, but 25% of the plants had anther nubs, a small

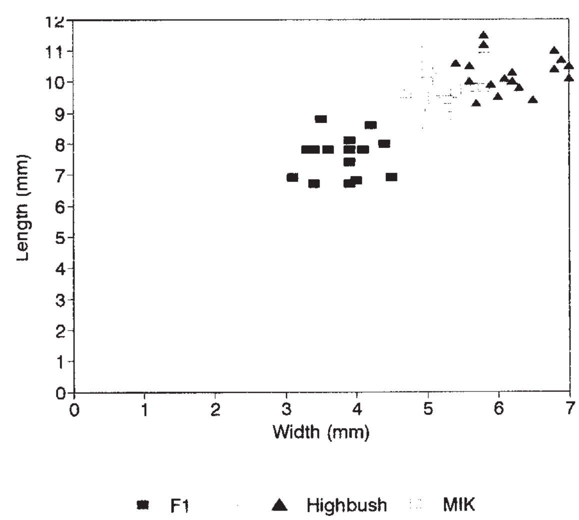

Fig. 3. Corolla size of *Vaccinium darrowi* x *V. arboreum* F_1 hybrids, mother is known (MIK) and highbush. Each point represents the mean of five replications for one plant.

Fig. 4. Inflorescence morphology of *Vaccinium arboreum* (**left**), highbush (**right**), and their F_1 hybrid (**middle**). Note the characteristically long pedicels and peduncles of *V. arboreum.*

protuberance where the anther awn would have been. Ninety-three percent of the F_1 hybrids had anther awns, most of which were about half the length of those found in *V. arboreum.* The remaining 7% had nubs as found in *V. darrowi.* Anther awns are not found in *V. darrowi*; therefore, this was an excellent trait for hybrid confirmation.

None of the highbush plants had fully developed anther awns. Nubs were found in 20% of the plants examined. Sixty percent of the MIKs had anther awns and 35% had nubs. The presence of anther awns in the MIKs indicates that *V. arboreum* genes had been passed to the next generation and were being expressed.

Berries. *Vaccinium arboreum* berries averaged slightly, but significantly ($P = 0.01$), heavier than the berries of *V. darrowi* (Table 3). The mean berry mass of the F_1s was identical to *V. darrowi.* Berry mass for the MIKs was intermediate and significantly different ($P = 0.01$) from the F_1s and highbush.

Large seeds were characteristic of *V. arboreum.* Visually, they were conspicuously larger than the seeds of cultivated blueberries. When weighed, the largest seeds of *V. arboreum* were significantly heavier ($P = 0.01$) than those of *V. darrowi* (Table 3). The mean mass of the largest seeds of the F_1s was not significantly different ($P = 0.01$) from the *V. arboreum* parent. This is a characteristic that again shows the presence of sparkleberry genes in the F_1s. The difference in seed size is sufficient to permit rapid identification of hybrids in the field.

The mean mass of the largest seeds of highbush was significantly less ($P = 0.01$) than for the F_1s (Table 3). Seeds of the MIKs were significantly larger than those of the highbush, indicating that *V. arboreum* genes had been passed to subsequent generations and were being expressed. The F_1s and the MIKs were not statistically different, but the mean of the MIKs was lower than that of the F_1s.

Table 3. Berry characteristics of five *Vaccinium* taxa. Each mean is the average of 20 open-pollinated genetically distinct plants except in the case of the F_1 hybrids, where there were not 20 fruitful plants available.

Taxa	Berry mass[z] (g) mean (range)	Mass of 15 large seeds[y] (mg) mean (range)
V. darrowi	0.20 d[x]	7.25 d
	(0.12–0.30)	(5.6–9.3)
V. arboreum	0.28 c	20.25 a
	(0.18–0.45)	(14.3–25.3)
Highbush	1.65 a	10. 40 c
	(1.19–2.10)	(8.8–13.0)
F_1[w]	0.20[v] d	19.60[u] ab
	(0.16–0.26)	(12.6–28.9)
MIK[t]	0.77 b	14.80 b
	(0.54–1.45)	(9.5–18.3)

[z]Average of two replications from each plant, each composed of 15 berries.

[y]Average of two replications from each plant, each composed of 15 large seeds.

[x]Means within columns separated by least square means with a Tukey-Kramer adjustment on log-transformed data. Actual means are presented here.

[w]*Vaccinium darrowi* x *V. arboreum* hybrids.

[v]Average of seven F_1s, five plants of which had two replications each, two plants of which had only one replication.

[u]Average of three F_1s, two replications for each plant.

[t]Open-pollinated progeny of F_1 hybrids.

Plant architecture. The plant architecture of the hybrids was intermediate between their parents. *Vaccinium darrowi* is a shrub that reaches a height of 1 to 2 m (Lyrene, 1986) when grown in partial shade, but would normally attain a height of only ≈1 m under the conditions that prevailed where they were planted at the Horticultural Unit. *Vaccinium arboreum* is a small tree, frequently monopodial, attaining a height of up to 10 m (Godfrey, 1988; Vander Kloet, 1988). The F_1s are large shrubs that ranged in height from 1.6 to 3.0 m after 13 years in the field. The F_1s have the suckering and twiggy habit of their *V. darrowi* parent. Highbush ranges in height from 1 to 4 m (Camp, 1945). The MIKs are very similar in height and form to their highbush parent.

In conclusion, there are several unique sparkleberry traits that have been inherited and are being expressed in the hybrid generations. These are presence of anther awns, large seed size, bracteole shape, and marginal glands. These traits should allow for accurate hybrid identification in the field.

Literature Cited

Ballinger, W.E., E.P. Maness, and J.R. Ballington. 1982. Anthocyanins in ripe fruit of the sparkleberry, *Vaccinium arboreum* Marsh. Can. J. Plant Sci. 62:683–687.

Brooks, S.J. 1996. Characteristics of sparkleberry x blueberry hybrids. PhD diss. Univ. of Florida, Gainesville.

Brooks, S.J. and P.M. Lyrene. 1995. Characteristics of sparkleberry x blueberry hybrids. Proc. Fla. State Hort. Soc. 108:337–339.

Camp, W.H. 1945. The North American blueberries with notes on other groups of vacciniaceae. Brittonia 5(3):203–275.

Cockerham, L.E. and G.J. Galletta. 1976. A survey of pollen characteristics in certain *Vaccinium* species. J. Amer. Soc. Hort. Sci. 101:671–676.

Godfrey, R.K. 1988. Trees, shrubs, and woody vines of northern Florida and adjacent Georgia and Alabama. Univ. of Georgia Press, Athens.

Hiirsalmi, H. and A. Lehmushovi. 1982. A Finnish highbush blueberry variety 'Aron'. Ann. Agr. Fenn. 21(4):151–154.

Lyrene, P.M. 1986. Variation within *Vaccinium darrowi* blueberry in Florida. HortScience 21:512–514.

Lyrene, P.M. 1991. Fertile derivatives from sparkleberry x blueberry crosses. J. Amer. Soc. Hort. Sci. 116:899-902.

Lyrene, P.M. and S.J. Brooks. 1995. Use of sparkleberry in breeding highbush blueberry cultivars. J. Small Fruit Viticult. 3(2/3):29–38.

Rieseberg, L.G. 1995. The role of hybridization in evolution: Old wine in new skins. Amer. J. Bot. 82:944–953.

Stockton, Jr., L.A. 1976. Propagation and autecology of *Vaccinium arboreum* and its graft compatibility with *Vaccinium ashei*. MS thesis. Texas A&M Univ., College Station.

Vander Kloet, S.P. 1988. The genus *Vaccinium* in North America. Can. Govt. Publ. Ctr. Ottawa. Publ. 1828.