

‘Valley Sunset’ Strawberry

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‘Valley Sunset’, a short-day strawberry (*Fragaria ×ananassa* Duchesne ex Rozier), was commercially introduced in Canada in May 2009 by the Atlantic Food and Horticulture Research Center of Agriculture and Agri-Food Canada (AAFC). ‘Valley Sunset’ produces medium yields of very large, sweet-tasting fruit ripening in the late season offering growers a cultivar to extend the harvest season beyond that of ‘Cabot’ and ‘Bounty’.

Origin

‘Valley Sunset’ is a seedling of a K94-15 × K95-24 cross made under the direction of A.R. Jamieson in 1998 at Kentville, N.S. (Fig. 1). It is the first introduction from a program of crosses begun in 1989 designed to extend the harvest season beyond ‘Bounty’ (Craig and Aalders, 1972) with improvements in fruit size and firmness. During the mid-1980s, we considered introducing K73-18, a second-generation derivative of ‘Vesper’ (Fig. 1), but despite high yields of large fruit in the

late season, we thought the lack of skin and flesh firmness and weak flavor would inhibit its success. In addition to K73-18, key sources of late ripening from diverse genetic backgrounds were ‘Pandora’ and ‘Bogota’ (ASHS Press, 1997). Key sources of fruit firmness were ‘Scotland’, ‘Allstar’, and ‘ArKing’ (Dale et al., 1993; Galletta et al., 1981; Moore, 1982). The genetic background of ‘Valley Sunset’ is geographically diverse, making it difficult to place it in one of the specific cultivar groups proposed by Sjulín and Dale (1987). The cross was made in the winter of 1998 in a greenhouse and seeds were extracted from the resulting fruit and started in Spring 1998 and subsequently transplanted into the field at Sheffield Mills, N.S. ‘Valley Sunset’, tested as K99-28, was selected by A.R. Jamieson in 1999 for its late harvest of large, flavorful fruit.

Performance

‘Valley Sunset’ has fruited at Kentville each year since 2002 in at least one 5-m matted row developed from 10 plants. In addition, ‘Valley Sunset’ was tested in Atlantic Canada in regional trials planted in 2003, 2004, 2007, and 2008. Fruit of ‘Valley Sunset’ was harvested from one or more of these replicated plantings at three AAFC sites, Kentville, N.S., Bouctouche, N.B., and Harrington, P.E.I., and one grower site in Waterville, N.B. from 2004 to 2009 (Table 1). Plants were arranged in latinized randomized block designs across sites. Each site had three blocks. Site was analyzed as a factor, not as a treatment, because the purpose was to test the average performance of cultivars in the Maritime Provinces, not to measure the genotype × environment interaction. Matted rows were developed from seven plants per plot spaced 0.5 m between plants within rows and 1.4 m between rows. To reduce the plot-end effects, the central 3 m of each plot was harvested. Fruit was harvested two times per week and sorted into marketable

and unmarketable categories. The average fruit weight for the season was a weighted mean based on the mass of a randomly selected 25 marketable fruit subsample from each plot from each harvest and the yield for each harvest. Similarly, the average harvest date for the season was a weighted mean based on the dates of harvest and the yield for each date. Data from the randomized block trials were subjected to analysis of variance (ANOVA) (GenStat 11.1; VSN Intl. Ltd., Oxford, U.K.) and when F probabilities were significant, means were separated by least significant difference ($P \leq 0.05$).

Fruit firmness was determined in 2003 by penetration using an Imada Digital Force Gauge (Model DPS-4R; Imada, Northbrook, IL) with a 7.5-mm o.d. V-notched tip. The maximum force (Newtons) that occurred during insertion of the probe 6 mm into both sides of each of 10 secondary fruit was recorded and averaged. These secondary fruit were picked at Kentville on 4 July (‘Wendy’), 14 July (‘Bounty’), and 17 July (‘Valley Sunset’) and were selected based on color as fully red but not overripe. The two measurements per fruit were averaged and the 10 means were used to calculate a cultivar mean and SD by Quattro® Pro (Corel Corporation, Ottawa, Canada).

In 2009, red ripe fruit samples were frozen and subsequently thawed and analyzed for soluble solids concentration (SSC), pH, and total acid. SSC was measured with a Reichert Mark II digital refractometer (Reichert Scientific Instruments, Buffalo, NY) and pH and titratable acidity with a Man-Tech automatic titrator (Model QC-Titrate™ Man-Tech Associates Inc., Guelph, Ontario, Canada). For each cultivar, three replications of 200-g fruit samples were harvested at each of three dates and data were subjected to ANOVA.

The marketable yield of ‘Valley Sunset’, when combined over sites, was similar to ‘Bounty’ in 2006, 2008, and 2009 but less than ‘Bounty’ in 2004 and 2005 (Table 1). Compared with ‘Ovation’ (Lewers et al., 2004), a cultivar with a similar harvest season, ‘Valley Sunset’, had a similar yield in 2004 and 2005 but a greater yield in 2006. The harvest season of ‘Valley Sunset’ is ≈ 5 d later than ‘Bounty’ and up to 1 d earlier than ‘Ovation’ (Table 1). For ‘Valley Sunset’ harvested in trials from 2004 to 2009 at Kentville, N.S. (lat. 45°04′ N, long. 64°29′ W), the average first and last day of harvest were 7 July and 27 July giving a harvest period of 21 d.

‘Bounty’, the traditional late-season cultivar of eastern Canada, produces inflorescences with numerous flowers, 16.0 ± 1.4 (10) [mean \pm SD (n)], giving many small late-harvest berries that increase the quantity graded unmarketable (Table 1). ‘Valley Sunset’ produces fewer flowers per inflorescence, 7.6 ± 0.6 (10), and nearly all fruit are of marketable size (greater than 18 mm in diameter). ‘Valley Sunset’ produces very large berries, comparable in size to ‘Cabot’ and much larger than ‘Bounty’ and ‘Ovation’ (Table 1). Like ‘Cabot’ (Jamieson et al., 2004), ‘Valley Sunset’ produces medium numbers of runners and early planting is recommended to ensure sufficient runners to fill the matted row.

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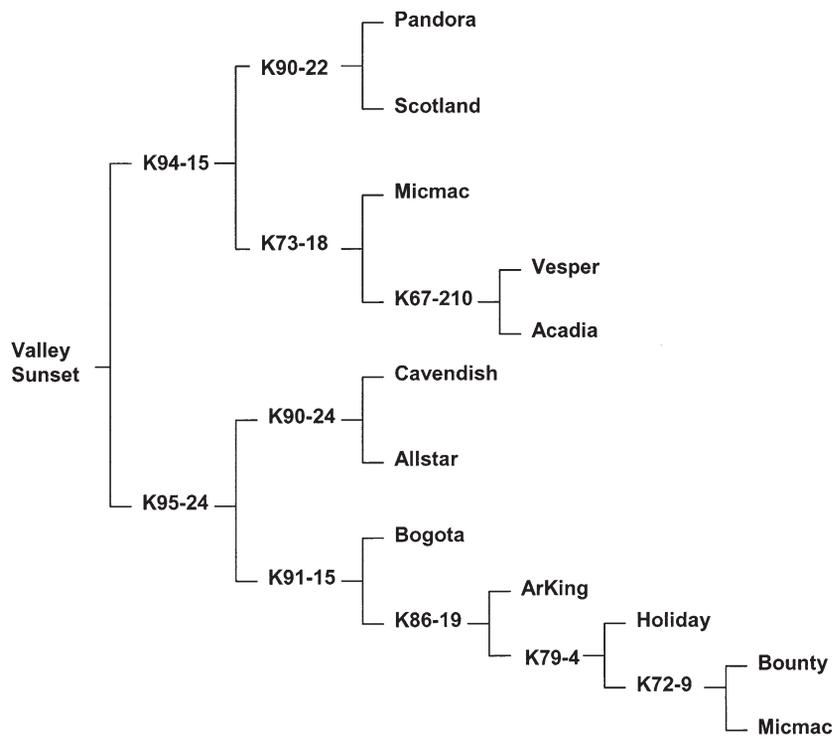


Fig. 1. Pedigree of 'Valley Sunset' strawberry.

Table 1. Fruit production² of 'Valley Sunset' and standard late season cultivars for 5 years averaged over various sites in Atlantic Canada.

Cultivar	Yield (t·ha ⁻¹)		Wt/fruit (g)	Mean harvest (day of year)
	Marketable	Unmarketable		
2004 (Site 1) ³				
Bounty	15.7 a ^x	8.2 a	13.2 b	200.7 c
Cabot	9.7 b	2.0 c	25.5 a	199.1 d
Mira	16.7 a	2.9 b	15.0 b	199.2 d
Ovation	7.7 bc	1.5 c	15.5 b	206.7 ab
Sophie	4.8 c	2.0 c	12.6 b	207.2 a
Valley Sunset	10.2 b	1.6 c	23.9 a	205.3 b
2005 (Sites 1, 2, 3)				
Bounty	9.0 a	3.1 a	10.5 c	198.1 b
Ovation	6.9 b	2.6 ab	12.1 b	203.3 a
Valley Sunset	6.5 b	1.9 b	20.1 a	203.2 a
2006 (Sites 1, 2)				
Bounty	9.5 a	5.3 a	9.3 c	189.9 c
Ovation	5.4 b	2.6 c	12.1 b	195.3 a
Valley Sunset	8.9 a	4.1 b	17.9 a	194.4 b
2008 (Sites 1, 3, 4)				
Bounty	4.8 a	2.7 a	9.0 b	193.7 b
Valley Sunset	5.4 a	1.9 a	17.3 a	198.5 a
2009 (Sites 1, 3)				
Bounty	9.4 b	2.4 a	9.2 c	192.4 b
Mira	13.4 a	1.7 b	12.2 b	191.6 b
Valley Sunset	7.5 b	1.0 b	18.3 a	196.7 a

²Data for 2004 from plots established in 2003; data for 2005 and 2006 from plots established in 2004; data for 2008 from plots established in 2007; data for 2009 from plots established in 2008. Data from entire trials, containing four to 12 cultivars or selections, were used in the analysis of variance.

³Trial locations: 1) Kentville, N.S.; 2) Bouctouche, N.B.; 3) Harrington, P.E.I.; 4) Waterville, N.B.

^xMean separation within columns by least significant difference test at $P \leq 0.05$.

Growers in eastern Canada who have tested 'Valley Sunset' have reported acceptable yields of very large berries produced later than standard short-day cultivars.

Fruit Description

The red ripe fruit of 'Valley Sunset' are substantially firmer than 'Bounty' but less

firm than 'Wendy' as measured by the force of penetration: $4.0 \text{ N} \pm 0.14$ (mean \pm SD), 3.4 ± 0.09 and 4.8 ± 0.15 , respectively. The flavor of 'Valley Sunset' is frequently described as sweet and mild: 7 to 8 on a scale of 1 to 9 compared with 8 to 9 for 'Bounty' and 5 to 7 for 'Ovation' when grown in Kentville. The mean SSC of 'Valley Sunset' was 8.5 °Brix, greater than the other cultivars tested

(Table 2). The titratable acidity (TA) of 'Valley Sunset' was slightly less than 'Bounty' but substantially lower than for 'Mira' and KRS-25. Berries of 'Mira' and KRS-25, which had the highest TA and lowest SSC:TA, often are described as tart. Although strawberry flavor is a complex trait, Kader (1991) stated that high sugars and relatively high acid levels are required for good flavor. 'Valley Sunset' fits this model; however, KRS-24, and to a lesser extent K93-20 and 'Bounty', all considered to have excellent flavor, have lower SSC. Wang et al. (1997) demonstrated that good flavor can be perceived in various combinations of SSC and TA, including strawberries with medium SSC and medium to low acidity.

Fruit of 'Valley Sunset' are broader than long, usually conical or cordate, and the larger primary fruit are commonly wedge-shaped and often asymmetrical (Fig. 2). Achenes of 'Valley Sunset' are even with the surface of the fruit. Fruit exterior color is bright medium red (Red Group 46B; Royal Horticultural Society, 1986) and interior cortex and pith color is lighter red (45C) with white vascular tissue surrounding the pith. 'Valley Sunset' has a large calyx with broad sepals; the calyx diameter is smaller than the fruit diameter.

Plant Description

Plants of 'Valley Sunset' are moderately vigorous, producing sufficient runners to establish matted rows. Plant size is medium to large, crowns are large, and stolons are thick. 'Valley Sunset' leaflets are large, cupped, pubescent, and exhibit strong interveinal blistering. The leaf petioles are thick, stiff, pubescent, and they often bear a pair of midpetiole bracts. The average terminal leaflet's length-to-width ratio is 1.0 with an obtuse base and rounded shape of the teeth. The flower stalks of 'Valley Sunset' are stiff, erect, pubescent, and medium long. Flowers are large and perfect, producing ample pollen, and they open slightly beneath the canopy. Unlike the very late-fruiting pistillate cultivars Pandora and Yamaska, 'Valley Sunset' does not require a pollinizer.

Disease Response

In field plots at Kentville, 'Valley Sunset' plants have demonstrated moderate resistance to leaf scorch [caused by *Diplocarpon earliana* (Ellis & Everh.) F.A. Wolf] and leaf spot [caused by *Mycosphaerella fragariae* (Tul.) Lindau] but susceptibility to powdery mildew [caused by *Podosphaera aphanis* (Wallr.) and fruit rot (caused by *Botrytis cinerea* Pers.:Fr.). 'Valley Sunset' is susceptible to *Phytophthora fragariae* Hickman var. *fragariae*, the cause of red stele root rot. Virus diseases of strawberries are uncommon in Atlantic Canada, and the virus tolerance of 'Valley Sunset' is unknown. Green petal disease (caused by clover phyllody phytoplasma) is common, however, and plots of 'Valley Sunset' have contained few plants with symptoms indicating a moderate level of resistance.