'Brunswick' Strawberry

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The 'Brunswick' strawberry (*Fragaria ×ananassa* Duchesne) was commercially introduced in Canada in May, 1999 by the Atlantic Food and Horticulture Research Centre of Agriculture and Agri-Food Canada. 'Brunswick' ripens in early midseason, offering growers an alternative to 'Cavendish' with greater uniformity of fruit color and shape. Plants of 'Brunswick' are vigorous, resembling 'Cavendish' in habit, and they produce ample runners to establish matted rows. Plants are resistant to red stele root rot disease (incited by *Phytophthora fragariae* Hickman var. *fragariae*) and several leaf diseases. 'Brunswick' is named after the Canadian province of New Brunswick, a region where it performed well in early trials.

Origin

'Brunswick', tested as K90-12, is a seedling from a 'Cavendish' × 'Honeoye' cross

made under the direction of A.R. Jamieson in 1988 at Kentville, N.S. 'Cavendish' is a large-fruited early-midseason cultivar which has resistance to red stele root rot (Jamieson et al., 1991). 'Honeoye' is a highly successful cultivar of the New York Agriculture Experiment Station (Sanford et al., 1982) notable for its wide geographic adaptability. The cross was intended to combine the productivity of 'Honeoye' with the fruit size and red stele root rot resistance of 'Cavendish'. Seedlings of the cross were screened for red stele resistance using the sand bench method of Scott et al. (1976) with six isolates of race A-6 as inoculum. Race A-6 is the predominant type in eastern Canada (Nickerson and Jamieson, 1995) and is effective at selecting the *Rpfl* resistance gene (Van de Weg, 1997). Symptomless plants were moved to a poorly drained field infested with *P. fragariae* located at Sheffield Mills, Kings Co., N.S., in Spring 1989 and 'Brunswick' was selected for its fine berry appearance in 1990 by A.R. Jamieson.

Description and Performance

'Brunswick' has been tested widely in Atlantic Canada in regional trials planted in 1994, 1996, 1997 and 1999 in Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland. Trials located in Atlantic Canada consisted of matted rows developed from seven plants set at 50 cm. A 3-m section of each row, centered on the midpoint, was harvested two times per week. Plantings were arranged in randomized complete block designs repeated over several sites with 3 replications at each site. The data collected included marketable and unmarketable yield, and fruit weight based on a 25-fruit sample from each row on each harvest date. The average fruit weight for the season was a weighted mean based on the 25-fruit sample and the yield from each plot for each harvest

date (Moore, 1970). Mean harvest date was also weighted by yield in the same way. All statistics were calculated with Genstat 5.31 (Payne, 2000).

Fruit firmness was determined by penetration using an Ametek firmness tester (Ametek, Hunter Spring Division, Hatfield, Pa.) with a 6-mm-o.d. v-notched tip. Secondary berries, red-ripe, were carefully selected to avoid over-ripe berries and picked to avoid bruising. The maximum force that occurred during insertion of the probe 6 mm into each of 10 fruit was recorded. Two measurements were made per berry (darker and lighter red sides) and these were averaged to give a mean berry value. The 10 means were averaged and the standard error was calculated to show the variation around the cultivar mean.

Plants of 'Brunswick' are vigorous and produce moderate numbers of runner plants, similar to 'Cavendish' but less than 'Honeoye'. Matted rows of 'Brunswick' are less dense and more open than 'Honeoye', but often more dense than 'Cavendish'. Crown size is small to medium. Leaves are trifoliate: the central leaflet is slightly longer than wide, with an acute base and obtuse serrations. 'Brunswick' and 'Cavendish' leaflets tend to be cupped but 'Honeoye' leaflets tend to be flat. Leaf petioles are medium long with a medium to high density of outwardly oriented hairs. Flower clusters are produced on medium long peduncles, longer than for 'Cavendish' and 'Honeoye', and flowers open slightly beneath the canopy, similar to 'Honeoye'. Petals of 'Brunswick' are as wide as they are long and flowers are large [31 ± 0.6 mm (diameter $\pm$ SE) for secondary flowers], similar to 'Honeoye' (30 ± 0.7 mm), but larger than 'Cavendish' (26 ± 0.7 mm).

Fruit are large (Table 1) and typically ovoid to short conic in shape, broader than 'Honeoye' (Fig. 1). The larger primary fruit have a broad tip giving a wedge shape. 'Brunswick' fruit are more even in shape and color than 'Cavendish'. For secondary berries, the calyx is typically appressed to the fruit and its diameter is smaller than the diameter of the fruit. Calyx removal from the fruit is easier than for 'Cavendish' but more difficult than 'Honeoye'. Fruit surface is medium glossy, medium to dark red with a medium red interior flesh color. The flavor of 'Brunswick' is usually rated as good, more intense but less sweet than 'Cavendish', with tartness slightly less than 'Honeoye'.

In field plots, the firmness of the flesh of 'Brunswick' and 'Cavendish' berries are most commonly rated as medium to firm whereas 'Honeoye' is rated medium, and 'Jewel' is rated as firm. Field ratings of berry skin toughness are medium to firm for 'Brunswick' and firm for 'Jewel' (data not shown). Pressure tests have placed 'Brunswick' below 'Jewel' but more firm than 'Honeoye' (Table 2).

'Brunswick' ripens in the early midseason or midseason, depending upon the trial. In different trials, its harvest period has been earlier than 'Honeoye' to later than 'Cavendish'. In the Atlantic regional trials, the seasonal average harvest date of 'Brunswick', when

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Table 1. Fruit production^z of 'Brunswick' and standard cultivars for 1995 to 2000 averaged over sites in Atlantic Canada.

Cultivar	Yield (t·ha ⁻¹)		Wt/fruit (g)	Mean harvest (day of year)
	Marketable	Unmarketable		
1995 (Sites 1,2,3,4) ^y				
Brunswick	15.0 b ^x	1.5 b	15.2 b	195.0 b
Cavendish	14.9 b	1.8 b	18.8 a	195.3 b
Kent	19.3 a	2.2 a	13.9 c	197.0 a
1996 (Sites 1,2,3,4)				
Brunswick	14.9 a	1.7 b	10.9 b	194.9 b
Cavendish	15.1 a	1.7 b	12.5 a	195.4 b
Kent	17.1 a	2.2 a	10.5 b	197.3 a
1997 (Site 1)				
Brunswick	11.6 a	0.7 a	11.4 a	193.9 a
Cavendish	12.0 a	0.6 a	12.6 a	195.0 a
1998 (Site 1)				
Brunswick	16.1 b	1.0 a	12.8 a	181.0 c
Honeoye	15.2 b	0.6 a	10.8 b	182.8 b
Mira	21.5 a	0.9 a	11.4 b	186.4 a
2000 (Sites 1,2,5)				
Brunswick	12.7 a	1.0 b	14.8 a	195.3 b
Jewel	15.2 a	1.0 b	12.6 b	197.7 a
Mira	15.6 a	1.3 a	12.6 b	197.9 a

^zData for 1995 and 1996 from plots established in 1994; data for 1997 from plots established in 1996; data for 1998 from plots established in 1997; data for 2000 from plots established in 1999. Data from entire trials, containing 14 to 16 cultivars or selections, were used in the Analysis of Variance in which sites were a source of variance in the model and considered random.

^yTrial locations: 1 = Kentville, N.S.; 2 = Charlottetown, P.E.I.; 3 = Bouctouche, N.B.; 4 = Pynn's Brook, Nfld.; 5 = Belleisle Creek, N.B.

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

Fig. 1. Primary 'Brunswick' strawberries.

Table 2. Mean fruit firmness of 10 berries of 'Jewel', 'Brunswick', 'Cavendish', and 'Honeoye' harvested red-ripe.

Cultivar	Firmness ^z (N)	SE
Jewel	3.6	0.06
Brunswick	3.4	0.14
Cavendish	3.3	0.08
Honeoye	3.1	0.15

^zFruit firmness in Newtons as determined by penetration using an Ametek firmness tester with a 6-mm o.d. v-notched tip. The maximum force that occurred during insertion of the probe 6 mm into both sides of each of 10 fruit was recorded and averaged.

weighted according to the yield at each harvest, is usually not different from the harvest date for 'Cavendish' (Table 1).

'Brunswick' fruit weight, when averaged over the harvest season, is typically larger than 'Honeoye' but smaller than 'Cavendish' (Table 1). In the Atlantic regional trials, fruit yields have been medium to high, similar to 'Cavendish' but less than the high yielding 'Kent' or 'Mira' (Table 1). In a trial in Maine, the yield of 'Brunswick' equalled 'Mira', and fruit were described as firm, dark, and with good flavor (Handley and Dill, 2002). In Minnesota, where strawberry trials consist of mulched and unmulched plots and winter injury is expressed as a reduction in plant

density from the fall to the spring or as lower plant vigor, 'Brunswick' plants were rated for hardiness as good, compared to very good for 'Cavendish' and excellent for MesabiTM (D.K. Wildung and J.Luby, personal communications).

Disease Response

In greenhouse bench tests, 'Brunswick' has proven resistant to race A-6 of *P. fragariae* var. *fragariae*. Its reaction to other races has not been tested. Red stele symptoms have not been observed on 'Brunswick' in nine years of field testing. In field plots at Kentville, 'Brunswick' plants have demonstrated resistance to leaf scorch [caused by *Diplocarpon earliana* (Ellis & Everh.) F.A. Wolf], and leaf

spot [caused by *Mycosphaerella fragariae* (Tul.) Lindau]. 'Brunswick' leaves and fruit are slightly more resistant to powdery mildew [caused by *Sphaerotheca macularis* (Wallr.: Fr.) Jacz. f. sp. *fragariae*] than 'Cavendish', which is susceptible. 'Brunswick' exhibits moderate tolerance to fruit rot (caused by *Botrytis cinerea* Pers.:Fr.), a level similar to 'Cavendish'. 'Brunswick' is susceptible to crown rot [caused by *Phytophthora cactorum* (Lebert & Cohn) J. Schröt.]. Virus diseases of strawberries are uncommon in Atlantic Canada, and the virus tolerance of 'Brunswick' is unknown. However, green petal disease (caused by clover phylloidy phytoplasma) is common and 'Brunswick' plants show a level of susceptibility similar to 'Cavendish' but greater than 'Honeoye' which demonstrates resistance.

'Brunswick' appears to be well adapted throughout eastern Canada, northeastern U.S. and in all but the coldest strawberry-growing zones of north-continental regions of North America. 'Brunswick' will be of particular value on soils infested with *P. fragariae* var. *fragariae*, providing large, attractive, richly colored berries in the early midseason for local markets.

Availability

Certified 'Brunswick' plants are being propagated under royalty agreements with licensed nurseries, the names of whom will be supplied upon request. The Atlantic Food and Horticulture Research Centre has been granted Plant Breeder's Rights for 'Brunswick' (Certificate No. 0618) and a U.S. plant patent application has been filed. Nurseries interested in securing a propagating license may contact A.R.J., Agriculture and Agri-Food Canada, Atlantic Food and Horticulture Research Centre, 32 Main St., Kentville, NS, B4N 1J5, Canada or jamiesona@agr.gc.ca.

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