'Cabot' Strawberry

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'Cabot' strawberry (*Fragaria ×ananassa* Duchesne) was commercially introduced in Canada in June, 1998 by the Atlantic Food and Horticulture Research Centre of Agriculture and Agri-Food Canada. 'Cabot' ripens in late midseason, offering growers an alternative to 'Mira' and 'Jewel' with larger berries. Plants of 'Cabot' are large and produce fewer runners than 'Mira'. Plants are resistant to red stele root rot disease (incited by *Phytophthora fragariae* Hickman var. *fragariae*) and several leaf diseases. The name 'Cabot' is significant in Atlantic Canada as it commemorates John Cabot, the Venetian explorer whose English-backed voyage arrived in the region in 1497.

Origin

'Cabot', tested as K92-17, is a seedling from a K87-5 × K86-19 cross made under the

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direction of A.R. Jamieson in 1990 at Kentville, N.S. The genetic background of 'Cabot' is quite broad; its pedigree contains cultivars from Canada, U.S., and The Netherlands (Fig. 1). The cross was intended to combine the fruit firmness of K86-19 with the fruit size of K87-5 while maintaining the red stele resistance of both parents. 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. Symptomless plants were moved to a poorly drained field infested with *P. fragariae* located at Sheffield

Mills, Kings Co., N.S., in Spring 1991 and 'Cabot' was selected for its very large fruit in July 1992 by A.R.J.

Description and Performance

'Cabot' was first tested in a trial at Kentville in 1995 and then in regional trials planted in 1996 and 1999 in Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland. All trials in Atlantic Canada consisted of matted rows developed from seven plants set at 50 cm. In the 1995 trial at Kentville, the entire row (3.5 m) was harvested. In the regional trials, a 3-m section of each row, centered on the midpoint, was harvested. All trials were harvested two times per week. Plantings were arranged in randomized complete block designs repeated over several sites with three replications at each site except the 1995 Kentville trial, which had four. 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). 'Cabot' has also been tested in Ontario, Manitoba, Alberta, Maine, Michigan, Iowa, and Minnesota. These trials were also laid out as replicated matted rows but varied as to the number of replications and the length of the rows. The Minnesota trials at Grand Rapids consisted of mulched and unmulched plots to better evaluate winter hardiness.

Fruit firmness was determined by penetration using an Ametek firmness tester (Ametek, Hunter Spring Division, Hatfield, Pa.) with a

Fig. 1. Pedigree of 'Cabot' strawberry.

Table 1. Fruit production^a of 'Cabot' and standard cultivars for 1996 to 2000 averaged over sites in Atlantic Canada.

Cultivar	Yield (t·ha ⁻¹)		Wt/fruit (g)	Mean harvest (day of year)
	Marketable	Unmarketable		
1996 (Site 1; trial 1) ^y				
Cabot	26.2 b ^x	7.6 a	23.4 a	194.3 c
Mira	32.5 a	1.9 b	11.6 b	195.5 b
Bounty	24.8 b	2.6 b	10.4 b	197.2 a
1997 (Site 1; trial 1)				
Cabot	22.4 a	1.4 a	17.0 a	197.5 b
Mira	19.3 a	1.5 a	10.8 b	197.8 b
Bounty	19.3 a	1.6 a	8.7 c	200.5 a
1997 (Sites 1,2,3,4,5; trial 2)				
Cabot	6.7 a	1.5 a	22.7 a	204.3 a
Mira	7.9 a	0.9 b	12.9 b	203.8 a
1998 (Sites 2,3,4,5; trial 2)				
Cabot	5.5 b	1.5 a	20.2 a	191.0 a
Mira	8.2 a	1.8 a	11.1 b	191.0 a
2000 (Sites 1,2,6; trial 3)				
Cabot	14.5 a	1.7 a	25.1 a	198.9 a
Mira	15.6 a	1.3 a	12.6 b	197.9 a

^aData for 1996 and 1997 (trial 1) from plots established in 1995; data for 1997 and 1998 (trial 2) from plots established in 1996; data for 2000 (trial 3) for plots established in 1999. Data from entire trials, containing 5 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.

^bTrial locations: 1 = Kentville, N.S.; 2 = Charlottetown, P.E.I.; 3 = Bouctouche, N.B.; 4 = Pynn's Brook, Nfld.; 5 = Grand Lake, N.B.; 6 = Belleisle Creek, N.B.

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

Fig. 2. 'Cabot' strawberries in a 1.14-L box.

Table 2. Mean fruit firmness of 10 berries of 'Jewel', 'Cabot', 'Mira', 'Bounty', and 'Sparkle' harvested red-ripe.

Cultivar	Firmness ^a (N)	SE
Jewel	3.6	0.06
Cabot	3.2	0.10
Mira	3.2	0.13
Bounty	2.4	0.05
Sparkle	2.0	0.09

^aFruit firmness in Newtons as determined by penetration using an Ametek firmness tester with a 6-mm-o.d. v-notched tip.

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 'Cabot' are large. They develop large crowns, which produce moderate numbers of runners, fewer than 'Mira'. Leaves are trifoliate: the central leaflet is as long as

it is wide, with an obtuse base and obtuse to rounded serrations. Leaflets tend to be cupped. Leaf petioles are medium long with a sparse to medium density of outwardly oriented hairs. Flower clusters are produced on short to medium long peduncles, shorter than 'Mira' and 'Bounty', and flowers open at the height of the canopy. Petals are longer than wide (1.1 length: 1.0 width). The inner calyx of 'Cabot' has a greater diameter than the outer calyx (1.2 inner: 1.0 outer), a trait which differs from 'Mira' and 'Bounty'.

Fruit are very large (Table 1) and typically short conic in shape (Fig. 2). The larger primary fruit may have a rough appearance with bumps on the shoulders. The calyx is typically appressed to the fruit on secondary and subsequent berries and its diameter is similar in size to the diameter of the fruit. The calyx is not easily removed from the fruit; more force is required than for 'Mira'. Fruit surface is a glossy, bright red with a lighter interior color. In a study of fruit quality characteristics of 51 genotypes (Jamieson et al., 2002), 'Cabot' had the highest rating for glossiness at harvest, averaging 6.9 on a scale of 1 (no gloss) to 7 (highest gloss). In the same study, the total soluble solids concentration (TSS) of 'Cabot' was 5.5% compared to 6.2% for 'Mira' and the titratable acidity (TA) was 0.84% compared with 1.01% for 'Mira'. TSS/TA was 6.5 for 'Cabot' and 6.1 for 'Mira' which reflect the field comments on flavor, which has been described in different seasons as mild, or sweet and juicy, or watery, whereas the flavor of 'Mira' is usually described as acid. 'Cabot' fruit are noted for their juiciness.

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

'Cabot' ripens in the late midseason. The seasonal average harvest date, when weighted according to the yield at each harvest, is usually not different from the harvest date for 'Mira' and about 3 d earlier than 'Bounty' (Table 1). Compared with 'Mira', the leading late midseason cultivar in Atlantic Canada, the duration of harvest is the same length. The harvest period was 19.1 d for 'Cabot' and 19.3 d for 'Mira' in 2000, averaged over three sites. 'Cabot' fruit weight, when averaged over the harvest season, is much larger than 'Mira' and 'Bounty' (Table 1) and remains heavier throughout the season. Primary berries of 'Cabot' typically weigh 30 to 50 g although individual berries may reach 100 g. In the Kentville trial planted in 1995, the mean fruit weight on the final harvest day was 10.9 g for 'Cabot', 5.9 g for 'Mira', and 5.3 g for 'Bounty' in 1996 and 5.7 g for 'Cabot', 5.1 g for 'Mira', and 4.5 g for 'Bounty' in 1997. The large fruit size of 'Cabot' has been confirmed in trials in Maine (Handley and Dill, 2002), Ontario, Michigan, Iowa, Manitoba, Minnesota, and Alberta (J. Madill, E.J. Hanson, G.R. Nonnecke, C.G. Davidson, D.K. Wildung,

and L. Hausher, respectively, personal communications). Fruit yields in these trials have generally been medium but yields have been low in plots where the plant population was low, due to inadequate runner production. In hardiness trials at the North Central Research and Outreach Centre, Grand Rapids, Minn., where winter injury is expressed as a reduction in the plant stand density from the fall to the spring or as lower plant vigor, 'Cabot' plants have exhibited more winter injury than Winona™ in unmulched plots in 1998, 2000, but not 2001 (D.K. Wildung, personal communications).

Disease Response

In greenhouse bench tests, 'Cabot' 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 'Cabot' in nine years of field testing. In field plots at Kentville, 'Cabot' plants have demonstrated resistance to leaf scorch [caused by *Diplocarpon earliana* (Ellis & Everh.) F.A. Wolf], leaf spot [caused by *Mycosphaerella fragariae* (Tul.) Lindau], and powdery mildew [caused by *Sphaerotheca macularis* (Wallr.:Fr.) Jacz. f. sp. *fragariae*].

Fruit rot (caused by *Botrytis cinerea* Pers.: Fr.) has been more severe on 'Cabot' than 'Mira' and 'Bounty' in years favorable to the disease and this is reflected in the portion of unmarketable fruit (Table 1). Virus diseases of strawberries are uncommon in Atlantic Canada, and the virus tolerance of 'Cabot' is unknown. Green petal disease (caused by clover phylloidy phytoplasma) is common, however, and plots of 'Cabot' have contained plants with symptoms indicating susceptibility.

'Cabot' appears to be well adapted throughout the milder regions of eastern Canada and northeastern U.S. In preliminary trials in north-continental climates, 'Cabot' may have inadequate winter-hardiness for consistent production. In all areas with matted-row production, it is important to take measures to ensure sufficient runner production, such as in-row plant spacings of 40 to 50 cm, and optimum irrigation and soil fertility. 'Cabot' will be of particular value on soils infested with *P. fragariae* var. *fragariae*, providing exceptionally large berries in the late midseason for local markets.

Availability

Certified 'Cabot' plants are being propa-

gated under royalty agreements with licensed nurseries, the names of which will be supplied upon request. The Atlantic Food and Horticulture Research Centre has been granted Plant Breeder's Rights for 'Cabot' (Certificate No. 0462) 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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