‘Cabot’ Strawberry

A.R. Jamieson,1 N.L. Nickerson,2 C.F. Forney,3 and K.A. Sanford4
Agriculture and Agri-Food Canada, Atlantic Food and Horticulture Research Centre, 32 Main Street, Kentville, NS, B4N 1J5, Canada

K.R. Sanderson5
Agriculture and Agri-Food Canada, Crops and Livestock Research Centre, 440 University Avenue, Charlottetown, PE, C1A 4N6, Canada

J.-P. Privé6
Agriculture and Agri-Food Canada, Senator Hervé J. Michaud Research Farm, 1045 St. Joseph Road, P.O. 2069, Bouctouche, NB, E4S 2J2, Canada

R.J.A. Tremblay7
New Brunswick Department of Agriculture, Fisheries, and Aquaculture, P.O. Box 6000, Fredericton, NB, E3B 5H1, Canada

P. Hendrickson8
Newfoundland Department of Forest Resources and Agrifoods, P.O. Box 2006, Corner Brook, NL, A2H 6J8, Canada

Additional index words: Fragaria ×ananassa, Phytophthora fragariae, fruit size, fruit breeding

‘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 direction of A.R. Jamieson in 1990 at Kentville, NS. 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, Hunter Spring Division, Hatfield, Pa.) with a fruit firmness of 8 on an Ametek firmness tester (Ametek, 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 fruit firmness of 8 on an Ametek firmness tester (Ametek, Mills, Kings Co., N.S., in Spring 1991 and ‘Cabot’ was selected for its very large fruit in July 1992 by A.R.J.

Received for publication 4 Feb. 2004. Accepted for publication 5 May 2004. Atlantic Food and Horticulture Research Centre Contribution no. 2275. We thank K.B. McRae, S. Fillmore, and B. Walker for assistance with experimental design and analysis. We thank the following cooperators who evaluated ‘Cabot’ for suitability to their area: J. Madill (Ontario), C.G. Davidson (Manitoba), L. Hauser (Alberta), D.T. Handley (Maine), E.J. Hanson (Michigan), G.R. Nonnecke (Iowa), and D.K. Wildung (Minnesota). For technical support, we thank A.C. Brydon, M. Graves, P. Rand, R.J. Davies, C. Burbidge-Boyd, J. Richards, and K. Nicolas. For helpful comments on the manuscript, we thank P. Hicklenton and J. DeLong.

1Fruit breeder. Corresponding author; e-mail jamiesona@agr.gc.ca.
2Mycologist.
3Postharvest physiologist.
4Sensory scientist.
5Horticulturist.
6Fruit crop physiologist.
7Small fruit specialist.
8Horticulturist, retired.
Table 1. Fruit production of ‘Cabot’ and standard cultivars for 1996 to 2000 averaged over sites in Atlantic Canada.

| Cultivar | Marketable (t·ha⁻¹) | Unmarketable (g) | Mean harvest (day of year) |
|----------|----------------------|------------------|---------------------------|
| 1996 (Site 1; trial 1)⁴ | 26.2 b² | 7.6 a | 23.4 a | 194.3 c |
| Cabot | 32.5 a | 1.9 b | 11.6 b | 195.5 b |
| Mira | 24.8 b | 2.6 b | 10.4 b | 197.2 a |
| 1997 (Site 1; trial 1) | 22.4 a | 1.4 a | 17.0 a | 197.5 b |
| Cabot | 19.3 a | 1.5 a | 10.8 b | 197.8 b |
| Mira | 19.3 a | 1.6 a | 8.7 c | 200.5 a |
| 1997 (Sites 1,2,3,4,5; trial 2) | 6.7 a | 1.5 a | 22.7 a | 204.3 a |
| Cabot | 7.9 a | 0.9 b | 12.9 b | 203.8 a |
| 1998 (Sites 2,3,4,5; trial 2) | 5.5 b | 1.5 a | 20.2 a | 191.0 a |
| Cabot | 8.2 a | 1.8 a | 11.1 b | 191.0 a |
| Mira | 14.5 a | 1.7 a | 25.1 a | 198.9 a |
| 2000 (Sites 1,2,6; trial 3) | 15.6 a | 1.3 a | 12.6 b | 197.9 a |

⁴Data 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.

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

| Cultivar | Firmness (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 |

³Fruit firmness in Newtons as determined by penetration using an Ametek firmness tester with a 6-mm-o.d. v-notched tip.

Calyx is much larger than ‘Mira’ and ‘Bounty’ (Table 1). The large fruit size of ‘Cabot’ has been confirmed in trials in Maine (Handley and Dill, 1997). The large fruit size of ‘Cabot’ has been confirmed in trials in Maine (Handley and Dill, 1997). The large fruit size of ‘Cabot’ has been confirmed in trials in Maine (Handley and Dill, 1997). The large fruit size of ‘Cabot’ has been confirmed in trials in Maine (Handley and Dill, 1997).

Yield (t·ha⁻¹)  Wt/fruit  Mean harvest
1995 1996 1997 1998 2000 (Sites 1,2,6; trial 3)
Cabot 14.5 a 1.7 a 25.1 a 198.9 a
Mira 8.2 a 1.8 a 11.1 b 191.0 a
Bounty 24.8 b 2.6 b 10.4 b 197.2 a
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

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 glosiness 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 1996 (Site 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, Minnesota, and Alberta (J. Madill, E.J. Hanson, G.R. Nannecke, C.G. Davidson, D.K. Wildung, 2002), Ontario, Michigan, Iowa, Manitoba, Minnesota, and Alberta (J. Madill, E.J. Hanson, G.R. Nannecke, 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 phyllody 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 propagated 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.

Literature Cited

Handley, D.T. and J.F. Dill. 2002. Performance of strawberry cultivars grown in narrow matted-row system in Maine, p. 32–36. In: S.C. Hokanson and A.R. Jamieson (eds.). Strawberry research to 2001. ASHS Press, Alexandria, Va.

Jamieson. A.R., C.F. Forney, J. Richards, and K.U.K.G. Nicholas. 2002. Strawberry fruit characteristics that contribute to postharvest quality. Acta Hort. 567:723–726.

Moore, J.N. 1970. Fruit size of strawberry cultivars. Fruit Var. Hort. Dig. 24:58–62.

Payne, R.W. (Editor). 2000. The guide to GenStat®. Part 2. Statistics. VSN Intl. Ltd. Oxford, U.K.

Scott, D.H., A.D. Draper, and J.L. Maas. 1976. Mass screening of young strawberry seedlings for resistance to *Phytophthora fragariae* Hickman. HortScience 11:257–258.