'Nanaimo' Strawberry

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'Nanaimo' (Fig. 1) is a new short-day strawberry (*Fragaria ×ananassa*) cultivar released from the breeding program at the Pacific Agri-Food Research Centre (PARC) of Agriculture and Agri-Food Canada (AAFC), Agassiz, B.C. 'Nanaimo' produces medium-sized fruit of excellent quality for both fresh and processing uses. It is at least as virus tolerant as 'Totem', the most widely planted cultivar in the Pacific Northwest (PNW) (Daubeney et al., 1993). Virus tolerance is essential for a cultivar to succeed in the PNW.

The name 'Nanaimo' is a version of a British Columbian native Indian word, "Snenymo," that translates as "big strong people." 'Nanaimo' is now the name of the second largest city on Vancouver Island. The choice of the name is in keeping with the tradition of choosing appropriate B.C. native Indian words for cultivars developed by the PARC program.

Origin

'Nanaimo', tested as BC86-33-2, was selected by H.A.D. from a 1986 cross of 'Totem' × 'Korona'. 'Totem' has been used extensively in PNW breeding programs; it is a parent of 'Tyee', 'Bountiful', and 'Redcrest', and appears in the derivations of several other cultivars (Daubeney et al., 1993). 'Korona', a Dutch cultivar from the cross of 'Tamella' × 'Induka', has been grown in Western Europe because it is particularly well-adapted to the waiting-bed system (Baumann and Daubeney, 1989). 'Nanaimo' has been tested throughout the PNW in research plots and in grower trials.

Performance and description

Performance data comparing 'Nanaimo' with five other PNW cultivars, 'Rainier', 'Redcrest', 'Shuswap', 'Sumas', and 'Totem', are given in Table 1 from trial plantings made at Abbotsford, B.C., in five different years.

These data are fairly typical of those obtained from other trial plantings in the PNW. 'Nanaimo' produced a higher total yield than 'Shuswap' and similar yields to those obtained from the other cultivars, and marketable yields from 'Nanaimo' were similar to those obtained from the other cultivars. Fruit mass of 'Nanaimo' was less than that of 'Rainier', 'Redcrest', and 'Sumas' and similar to that of 'Totem' and 'Shuswap'.

The first harvest date of 'Nanaimo' was later than 'Sumas' and 'Shuswap' and similar to that of the other cultivars (Table 1). The 50% harvest date of 'Nanaimo' was later than 'Sumas', 'Shuswap', and 'Totem' and similar to 'Rainier' and 'Redcrest', both of which are considered relatively late (Baumann et al., 1991; Stahler et al., 1995). Harvest duration of 'Nanaimo' was similar to that of all other cultivars.

Fruit firmness of 'Nanaimo' was less than that of 'Redcrest', a cultivar recognized as producing particularly firm fruit (Stahler et al., 1995) and similar to that of 'Shuswap', 'Sumas', and 'Totem' (Table 2). In some trials, 'Shuswap' has also been recognized for its firm fruit (Daubeney et al., 1991). The soluble solids concentration (SSC) of 'Nanaimo' fruit was higher than that of the other cultivars with the exception of 'Redcrest' (Table 2). Titratable acidity of 'Nanaimo' fruit was similar to that of 'Sumas' and less than that of 'Totem' (Table 2). There were no differences in pH among these three cultivars (Table 2).

'Nanaimo' fruit (Fig. 1) is slightly lighter in color than that of 'Totem'; it is described as bright medium-red both externally and internally. The fruit is mostly wedge-shaped and, at times, has a prominent constriction near the tip. The calyx is readily removable. Achenes are yellow and slightly raised. The scapes tend to be slightly more erect than those of 'Totem'.

We consider the fresh flavor of 'Nanaimo' to be especially pleasing, probably because of the relatively high SSC and good acid/SSC balance. This makes it attractive for local fresh-market sales. Preliminary observation indicated that processing quality is comparable to 'Totem'. It is particularly useful as a sliced product for dessert packs that have excellent appearance and flavor. It does not look especially promising for individual quick-

Fig. 1. Fruit of 'Nanaimo' strawberry.

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Table 1. Yield, fruit mass and production season of 'Nanaimo' and other Pacific Northwest strawberry cultivars.^{z,y}

Cultivar	Yield (kg/6 m plot)		Fruit mass ^x (g)	First harvest (date)	50% Harvest (date)	Harvest duration (days)
	Total	Marketable				
Nanaimo	7.56 a-c	7.10 ab	8.5 c	7 June a	18 June ab	27 ab
Rainier	7.19 b-d	6.83 ab	12.4 a	7 June a	20 June a	28 ab
Redcrest	8.12 ab	7.78 a	10.3 b	7 June a	19 June ab	28 ab
Shuswap	5.68 d	5.51 b	8.3 c	3 June b	15 June d	29 a
Sumas	8.93 a	8.42 a	10.1 b	2 June b	14 June d	29 a
Totem	6.13 cd	5.86 b	8.9 c	6 June a	16 June c	26 b

^zMean separation within columns by Student-Newman-Keuls multiple range test, $P = 0.05$.^yData collected from a 6 m plot of each cultivar in each of four replications in 1990, 1991, 1992, 1994, 1995, and 1996 harvest years.^xFruit mass based on 25 fruit per harvest, per year.Table 2. Fruit quality of 'Nanaimo' and other Pacific Northwest strawberry cultivars.^z

Cultivar	Firmness ^x (N)	Soluble solids conc ⁿ (%)	Titratable acidity ^{w,v} (%)	pH ^v
Nanaimo	2.52 b	8.9 a	0.80 b	3.65 a
Redcrest	3.48 a	8.3 ab	---	---
Shuswap	2.77 b	7.0 c	---	---
Sumas	2.84 b	7.5 bc	0.78 b	3.62 a
Totem	2.65 b	7.6 bc	0.89 a	3.59 a

^zMean separation within columns by Student-Newman-Keuls multiple range test, $P = 0.05$.^xData are means for three samples of ten fruit from a minimum of three harvests in 1991, 1992, 1994, 1995, and 1996.^wTitratable acidity expressed as percent citric acid.^vMeans taken from 1992 data, no determinations were made for 'Redcrest' and 'Shuswap'.Table 3. Leaf and inflorescence characteristics of 'Nanaimo' and other Pacific Northwest strawberry cultivars.^z

Cultivar	Central leaflet ^y			Petiole length ^y (cm)	Peduncle length ^x (cm)
	Length (cm)	Width (cm)	Serration no.		
Nanaimo	6.50 b	5.83 c	21.3 c	20.3 b	17.0 a
Sumas	7.19 a	6.72 a	28.1 a	17.4 a	16.0 a
Totem	6.73 b	6.26 b	22.7 b	19.2 a	15.6 a

^zMean separation within columns by Student-Newman-Keuls multiple range test, $P = 0.05$.^yMeans for 10 leaves, collected on 14 Nov. 1995, and 30 July 1996.^xMeans for 10 plants, collected on 30 July 1996.

freeze because the fruit does not have the firmness to maintain its integrity.

Plants of 'Nanaimo' are vigorous and produce more runners than those of 'Totem'; this is particularly apparent in the planting year. 'Nanaimo' plants appear to be at least as winter hardy as 'Totem' plants and probably as hardy as those of 'Sumas', which is recognized for its relatively high level of winter hardiness (Daubeney, 1987). Leaves of 'Nanaimo' are medium in size and are smaller than those of 'Totem' and 'Sumas' (Table 3). The serrations on the leaf are generally even in size and symmetric on both halves of the leaflets. Leaf color of 'Nanaimo' is lighter green than that of 'Totem'. 'Nanaimo' can be readily distinguished from other PNW cultivars by growth habit and leaf and fruit characteristics (Table 3).

Disease and pest reactions

In the Abbotsford plantings, the tolerance of 'Nanaimo' to the aphid-borne virus complex that infects PNW strawberries was similar to that of 'Totem' and slightly less than that shown by 'Sumas' (data not shown). Both of these cultivars are recognized for their relatively high level of tolerance compared to that of other cultivars (Daubeney, 1987; Daubeney et al., 1993).

As described by Daubeney and Pepin (1977), 'Nanaimo' is similar to 'Rainier' and 'Shuswap' in susceptibility to preharvest rot caused by *Botrytis cinerea* Pers. ex Fr., and more susceptible than 'Redcrest', 'Shuswap', or 'Totem' (Table 4). Instances of postharvest rot, most of which was caused by *B. cinerea*, were similar for 'Nanaimo', 'Rainier', 'Sumas', and 'Totem'. 'Redcrest' showed more postharvest rot, and 'Shuswap' less, than 'Nanaimo'.

'Nanaimo' plants are slightly susceptible to powdery mildew, caused by *Sphaerotheca macularis* (Fr.) Magn. This disease has not been seen on the fruit. No leaf spot, caused by *Mycosphaerella fragariae* (Tul.) Lindau, has been observed on plants, despite the presence of the disease on other cultivars or selections in the trial plantings. At Kentville, N.S., 'Nanaimo' was susceptible to leaf scorch, caused by *Diplocarpon earliana* (Ell. and Everh.) Wolf, and to green petal virus, which occurs only in eastern North American strawberry production regions (A. Jamieson, personal communication).

Unlike 'Totem', 'Nanaimo' was not selected in the seedling stage for resistance to red stele root rot, caused by *Phytophthora fragariae* var. *fragariae* Hickman (Daubeney et al., 1993). In two commercial plantings where red stele

Table 4. Susceptibility of 'Nanaimo' and other Pacific Northwest strawberry cultivars to pre- and postharvest rot incited by *Botrytis cinerea*.^z

Cultivar	<i>Botrytis</i> -incited fruit rot	
	At harvest ^y (%)	After 48 h ^x (%)
Nanaimo	6.45 a	49.5 b
Rainier	4.76 ab	50.4 b
Redcrest	4.32 b	80.6 a
Shuswap	2.87 b	16.7 c
Sumas	4.87 ab	31.1 bc
Totem	4.48 b	41.7 b

^zMean separation within columns by Student-Newman-Keuls multiple range test, $P = 0.05$.^yMeans from 1990, 1991, 1992, 1994, 1995, and 1996 harvests.^xMeans from 1994 and 1996 harvests. Fruit was stored at 22 °C.

was present, 'Nanaimo' plants showed fewer symptoms of the disease and were more uniform and vigorous than adjacent plants of 'Totem'. 'Nanaimo' may be more resistant or tolerant than 'Totem' to the race or races of *P. fragariae* var. *fragariae* present in these fields.

Information on the reaction of 'Nanaimo' to two-spotted spider mite, *Tetranychus urticae* Koch., is limited. However, in most years in which the Abbotsford trials were conducted, the mite was present but there has been no evidence of damage to 'Nanaimo'.

Adaptability and use

'Nanaimo' appears to be adapted for use throughout the PNW. However, current evidence suggests that it may be best adapted to the northern areas of the region. It has performed particularly well at Abbotsford, in B.C., and at the Washington State Univ. unit at Mt. Vernon, Wash. It has an especially pleasant fresh flavor that makes it well-suited to local sales. Its attractive medium red color and high SSC concentration make it equally well-suited to processing. Thus, its designation as a multipurpose variety is reasonable. It seems that 'Nanaimo' will be an alternative to 'Totem'.

Availability

Certified 'Nanaimo' plants are being propagated under royalty agreements with two PNW propagators, the names of which will be supplied upon request.

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