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'SPA343' (Sabina) Apple

C. R. Hampson,[1] R. A. MacDonald, D.-L. McKenzie, W. D. Lane, H. A. Quamme,[2] and P. M. A. Toivonen

Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, Summerland, BC, Canada V0H 1Z0

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'SPA343' (Sabina) is a midseason, medium-sized apple (*Malus ×domestica* Borkh.) that is suitable for home growing or direct sales as a dessert apple and shows promise for fresh-cut apple slices. 'SPA343' is being released because of its unique flavor and partial resistance to apple scab [*Venturia inaequalis* (Cke.) Wint.]. The fruit has a yellow ground color overlain by a dark red blush over 50% to 70% of the fruit surface and some skin russet (Fig. 1). The fruit is firm, moderately juicy, sweet–tart, and intensely flavorful. The cut flesh is virtually free of browning. Fruit can be stored at 1 °C in air for three to four months and has a good shelf life after storage. The tree is low to moderate in vigor, spurs freely, and is easy to train but has limited productivity. Bearing is regular with negligible preharvest drop. 'SPA343' is partially resistant to apple scab. The limited productivity of 'SPA343' and its tendency for fruit skin russet will likely preclude acceptance as a major wholesale cultivar. These disadvantages are expected to be less important to home growers and are offset by unique flavor and useful levels of scab resistance. Trademark protection is being sought for the name Sabina . The name was chosen to honor Dr. Sabina Stan (retired) of Agriculture and Agri-Food Canada, who contributed to early experimental work on the use of 'SPA343' as a fresh-cut sliced product.

Origin

'SPA343' originated from a cross of 'Sandow' x 'Schöner aus Nordhausen' made by W. D. Lane and H. Schmidt at the Pacific Agri-Food Research Center (PARC), Summerland, British Columbia (B.C.), Canada, in 1979. 'Sandow' is an open-pollinated seedling of 'Northern Spy'. The parentage of 'Schöner aus Nordhausen' is unknown. Seedlings from the cross were budded in place onto M.26 rootstock in the field in 1982. The tree was first selected by R. MacDonald and W. D. Lane on the basis of its fruit quality and growth habit in 1987 and was assigned the breeder's number 11W-22-22. Trees were repropagated for a second test in 1988 and the selection was evaluated from the onset of fruiting for fruit size, sensory and storage quality, and bearing habit over 10 years. In 1996, the selection was advanced to elite-stage testing by H. A. Quamme under the name SPA 343. Controlled trials under test agreements have been established at private orchards in British Columbia and at selected research sites, including Agriculture and Agri-Food Canada in Frelighsburg (Quebec), Michigan State University, and in France.

Description

The following description of the flowers, fruit, tree, and leaves uses color designations of the (Royal Horticultural Society 1966). Measurements are the average of 10 plant parts.

Flower

Flowering season. 'SPA343' flowers in early-midseason, a couple of days after 'McIntosh' in Summerland. It has a prolific annual bloom.

Petal color. The unopened bud is 64A/64D/155D. At bloom, the color on the upper side of newly opened king blooms is 155 D; on the lower side, it is 64A/155A.

Size. At anthesis, the corolla diameter of the king bloom (pressed flat) is 54 mm. Pedicel length is 18 mm.

Pollen. The pollen is fertile, and pollen production is ample. 'SPA343' has been used successfully in several crosses to produce fertile offspring and is therefore assumed to be diploid.

Fruit

Shape. The fruit is globose and symmetrical with no ribbing.

Size. Size of commercially thinned fruit is medium, similar to 'Royal Gala' and 'Imperial Gala' or slightly smaller. Based on 10-fruit sample weights over seven year, the average fruit weight at harvest was 190 g.

Color. The ground color at maturity is 10B, and ≈50% to 70% of the surface bears red overcolor 46A. The pattern of the overcolor is blush with faint streaks.

Flesh. The flesh color is yellowish cream, 8D. The cut flesh is nearly free of browning (Table 1).

Skin. The skin is of medium thickness, matte, and slightly rough. Russet is present in the stem bowl, around lenticels, and flecked on the cheeks. Russet is more severe in seasons with cool, moist springs. The lenticels are small to medium in size, round, white or pale tan, and medium to low in density.

Pedicel. The fruit stem is of medium length and medium to deep insertion. Stem length is 23 mm, and thickness is 3 mm.

Calyx. The sepals are persistent, upright, or recurved. The eye is closed and the basin shallow to medium in depth, broad, and has very low crowning.

Core. The core is small and median in position. Locules are open, and their inner surfaces are smooth. There is usually a full complement of seeds, which are nontufted, acute, and brown at maturity.

Texture. The fruit flesh is firm and moderately juicy. Over nine year, fruit flesh averaged 81 N at commercial maturity.

Soluble solids and titratable acidity. At harvest, the soluble solids averaged 16.3% and the titratable acidity averaged 0.95% (as malic acid) over eight years.

Flavor. The fruit is sweet, tangy, and flavorful, with aromatics sometimes described as "nutty" or "cherry-like."

Maturity season. 'SPA343' requires multiple harvests. In Summerland, the average date of first harvest is 2 to 5 Oct., about the same time as 'Spartan' or 'Delicious' picked for controlled-atmosphere storage. Up to three harvests may be needed, depending on the adequacy of fruit thinning.

Sensory attributes and keeping quality. Blind hedonic sensory evaluations were conducted between 54 and 76 d after harvest using previously described methods (Hampson et al., 2000), over five to six harvest years against commercial cultivars. In these tests, the texture and flavor of Sabina were liked more than 'Royal Gala' but less than 'Fuji'. In appearance, it scored higher than 'Fuji' but lower than 'Royal Gala'. In separate blind panels, 12 trained judges evaluated specific texture and flavor attributes relative to 'Fuji' after short-term cold storage. Attribute intensity was rated between 48 and 91 d after harvest of Sabina fruit, depending on the year. Sabina was rated less firm or juicy than 'Fuji', but sweeter and more flavorful (Fig. 2). The sourness was similar to 'Fuji' after this length of storage, but at harvest, the fruit is distinctly tarter to the taste than 'Fuji'. Sabina retains texture and eating quality for three to four months at 1 °C, and the skin does not become greasy.

Shelf life was tested by removing fruit from air storage, leaving it at 20 °C for one week, measuring firmness, and then subjecting the fruit to hedonic sensory panels as previously described (Hampson et al., 2000). The appearance, texture, and flavor of Sabina were all liked more than 'Delicious' (*t* test for difference between means, 5% error level) over four years of testing. Over six years of such tests against 'Fuji', Sabina scored higher for appearance, lower for texture, and equal for flavor liking. The loss in firmness over the 7-d period averaged 5 N.

Use. Sabina is a dessert apple, suited for home growing or direct sales, and has promise for fresh-cut slices. It has medium-term air storage life.

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[1]To whom correspondence should be addressed. e-mail hampsonc@agr.gc.ca.

[2]Retired.

Fig. 1. Fruit of 'SPA343' (Sabina). The scale bar represents 2.0 cm.

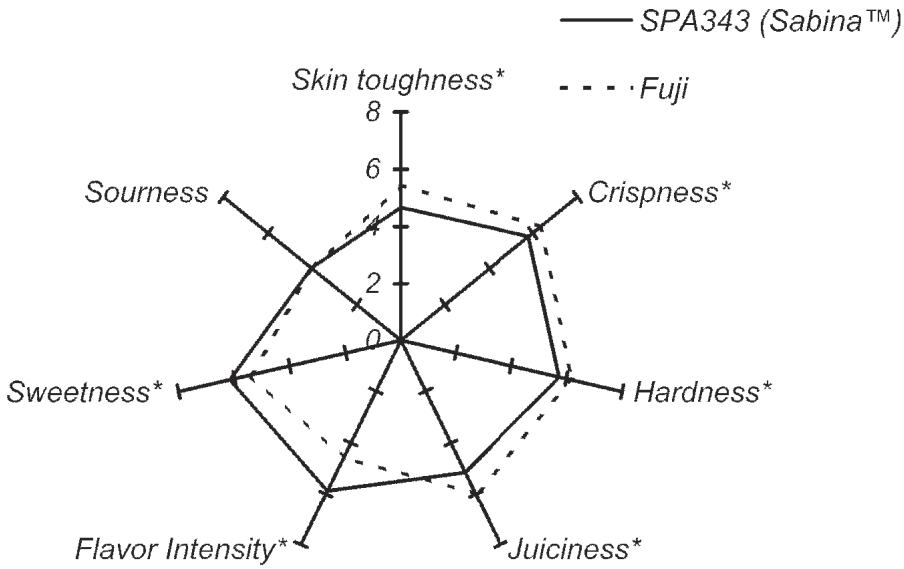

Fig. 2. Intensity of selected attributes of 'SPA343' (Sabina) fruit relative to 'Fuji', each rated on a 0 (low) to 9 (high) scale. Twelve trained judges drawn from a larger pool rated the fruit in each panel. The values are means weighted inversely to the error mean square of the analysis of variance for that taste panel. Data are from nine taste panels over six years. An asterisk (*) denotes that the difference between means is significant at the 5% level by *t* test.

Table 1. Change in lightness (L-value) of apple slices over 5 d of storage at 5 °C after slicing and washing in clear water.

	L-Value[z]		
Cultivar	Day 0[y]	Day 5[y]	Change in L-Value[y]
SPA343 (Sabina)	82.2 dc	79.9 a	2.3 f
Ambrosia	81.0 e	78.5 c	2.5 f
Spartan	82.8 c	78.6 c	4.2 e
Fuji	80.1 f	74.6 e	5.6 d
Delicious, Starkrimson	82.0 d	74.3 e	7.7 c
Gala, Royal	96.9 a	79.1 b	17.8 b
McIntosh	95.8 b	75.7 d	20.1 a

[z]Determined using a Model CR-200 chromameter (Minolta, Osaka, Japan).
[y]Values within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Tree

Vigor. Trees of 'SPA343' are moderate to low in vigor. Mean (± standard error [SE]) trunk cross-sectional area of trees on M.9 rootstock seven year after planting was 12.0 ± 1.0 cm^2 (n = 7), less than nearby trees of 'Golden Delicious' (18.2 ± 1.2 cm^2, n = 8) and 'Imperial Gala' (16.6 ± 1.0 cm^2, n = 8).

Shape. The crown is rounded and spreading.

Bearing habit. 'SPA343' bears chiefly on spurs and short shoots. It is regular-bearing, easy to train, and has good precocity and negligible preharvest fruit drop.

Branch angle. Branch angles are mostly near 90°. Spurs are abundant and there is little bare wood.

Productivity. The productivity of commercially thinned trees of 'SPA343' on M.9 was less than nearby trees of highly productive cultivars such as 'Imperial Gala' or 'Golden Delicious'. After five cropping years, cumulative yield (mean ± SE) was 31.5 ± 4.9 kg per tree for 'SPA343' (n = 7), 80.6 ± 3.3 for 'Golden Delicious' (n = 8), 64.4 ± 3.4 for 'Imperial Gala' (n = 8), and 36.1 ± 1.4 for 'Spartan' (n = 8). These yield figures exclude dropped fruit, which was significant only for 'Spartan'. Corresponding yield efficiency figures (to adjust yield for tree size differences) were 3.0 ± 0.3 $kg.cm^{-2}$ of trunk cross sectional area for 'SPA343', 4.5 ± 0.2 for 'Golden Delicious', 3.9 ± 0.08 for 'Imperial Gala', and 2.6 ± 0.1 for 'Spartan'. 'SPA343' should be tested with a more vigorous rootstock to see if productivity can be improved, because fruit set is very high.

Thinning. 'SPA343' requires moderate to heavy thinning, because it is prone to overset. Thinning is essential to achieve commercially acceptable fruit size and, for this reason, yield suffers. Our recommendation is to thin to single king fruits 15 to 20 cm apart.

Hardiness. Early winter (late November) hardiness of one-year-old twigs was assessed in controlled freeze tests in a single year, according to procedures previously published (Quamme, 1976). 'SPA343' was similar to 'Golden Delicious' and significantly less hardy than 'Spartan', so was rated as moderately winter tender, and is not recommended for areas where 'Golden Delicious' suffers winter injury.

Disease resistance. 'SPA343' is partially resistant to apple scab (incited by *Venturia inaequalis* [Cke.] Wint.). In unsprayed research plots at Agassiz, B.C., a site with severe annual scab epidemics, leaf scab ratings were one (necrotic flecks, no sporulation) or sometimes 2 (sporulating lesions on fewer than 25% of leaves) for 'SPA343' compared with four or higher (sporulating lesions on 40–100% of leaves) for 'Royal Gala' (n = 5 trees each). Powdery mildew (incited by *Podosphaera leucotricha* [Ell. & Ev.] Salm.) incidence is low under conventional management. No natural outbreaks of fire blight (incited by *Erwinia amylovora* [Burr.] Winslow) affected 'SPA343' during its 25 years in the research test orchards. Inoculation of shoot tips with mixed virulent strains of *E. amylovora* in a single test in the greenhouse suggested that the cultivar is as susceptible to fire blight as 'Gala'. Further testing is needed to better characterize the resistance to fire blight.

Leaves

Leaf measurements were done on fully expanded leaves from the midshoot portion of the current season's growth.

Size. Leaf blade size is 102 × 52 mm, with a length:width ratio of 2:1. Petiole length averages 26 mm.

Margins and tips. The apex is acuminate and the margins serrate.

Color. On the adaxial side, the color is 147B; anthocyanin coloration of veins is strong.

Availability

Wood from propagations of 'SPA343' was tested at the Center for Plant Health in Sidney, B.C., and infection with chlorotic leaf spot was detected. 'SPA343' underwent successful heat therapy and certified propagation wood is now available. 'SPA343' is being protected in Canada and the United States. Commercialization rights have been granted to the okanagan Plant Improvement Company (PICO, Box 6000, Summerland, B.C., Canada, V0H 1Z0; 250-494-5164). Information on the availability of propagation wood and inquiries regarding nursery licensing or acquisition of trees outside of Canada should be addressed to PICO.

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