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'SENECA' STRAWBERRY

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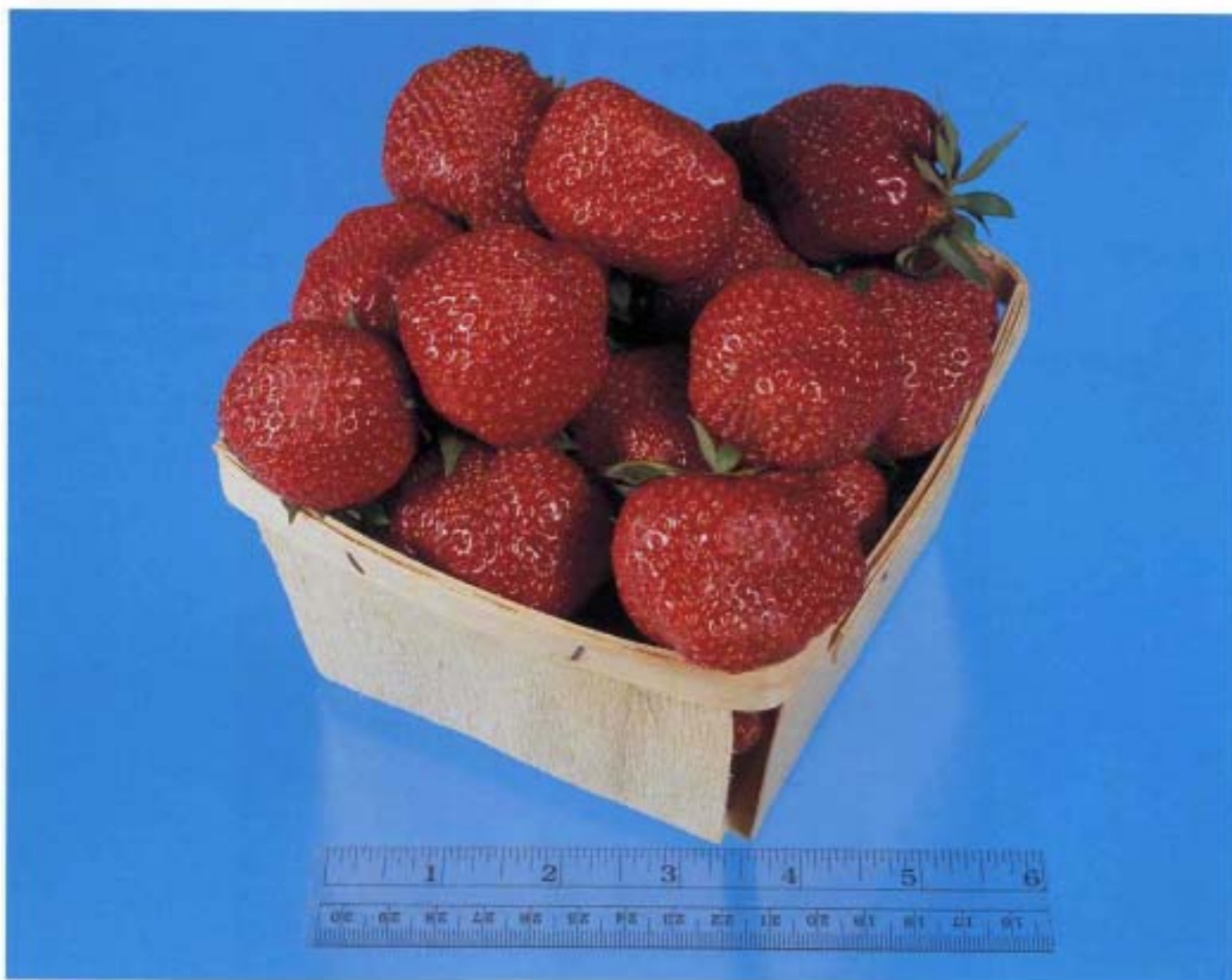


Figure 1. One quart basket of NY 1529 shown with scale in inches and millimeters. Note large size, glossy color, and attractive appearance and shape.

INTRODUCTION

This new strawberry cultivar is exceptional in combining large potential yield, large potential fruit size, extreme fruit firmness, and good fruit quality. It appears to be adapted widely in the Great Lakes region of the United States. (Figure1).

ORIGIN

This new cultivar was developed by the small fruits breeding program of the Department of Horticultural Sciences, Cornell University, Geneva, NY, 14456. It was selected in 1976 from 243 progeny of a cross between NY 1261 x 'Holiday' (see figure 2). The cross was made in 1974. As a selection, it was tested as NY 1529. It was tested for many years in second test plots, and was evaluated in replicated yield trials in 1981 and 1982. It was further evaluated at numerous sites throughout the Great Lakes States by cooperative testers. In the fall of 1991, NY 1529 was publicly released as 'Seneca'.

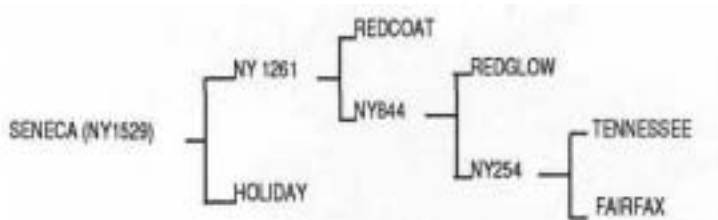


Figure 2. The pedigree of 'Seneca' (NY 1529).



Figure 4. Plot of NY 1529 with moderate vigor and runnering, a desirable plant habit for production in the Northeast.



Figure 3. Fruit shown ripening in a field planting. Note fruit size in comparison to the quarter, and fruit ripening over a long period.

Table 5. Mean subjective fruit appearance scores. Berries were rated 1 to 9 with '9' being the most attractive. Each plot at each harvest (replicate) was scored independently. Means followed by the same letter are not significantly different, based on Waller and Duncan's BSD test, K= 100.

Genotype	Replicates	Mean Score
NY 1333	5	7.6 A
Lester	7	7.3 AB
Jewel	5	6.8 ABC
NY 1524	6	6.5 ABCD
NY 1530	6	6.3 ABCD
MDUS 4355	6	6.3 ABCDE
Honeoye	7	6.3 ABCDE
'Seneca'	5	6.2 ABCDEF
MDUS 4380	6	6.2 BCDEF
Scott	8	6.1 BCDEF
NY 1368	5	6.0 BCDEF
NY 1560	4	5.8 CDEF
Raritan	7	5.7 CDEFG
Allstar	4	5.5 CDEFG
Canoga	4	5.5 CDEFG
Holiday	8	5.5 CDEFG
NY 1431	5	5.4 CDEFG
NY 1530	3	5.3 CDEFG
NY 1482	4	5.3 DEFG
NY 1402	5	5.0 EFG
NY 1406	9	4.9 FG
MDUS 4774	5	4.8 FG
EarlIdawn	8	4.6 G
MDUS 4426	5	4.2 G
MDUS 4579	5	4.0 G
Midland	7	4.0 G
Sparkle	5	3.4 G
NY 1570	2	3.0 GH
Catskill	7	1.9 H

Table 6. Mean subjective flavor scores. Berries were rated 1 to 9 with '9' being best flavor. Each plot at each harvest (replicate) was scored independently. Means followed by the same letter are not significantly different, based on Waller and Duncan's BSD test, K = 100.

Treatment	Replicates	Mean Score
Lester	7	6.3 A
NY 1570	2	6.0 AB
'Seneca'	5	6.0 AB
Jewel	5	5.8 AB
Holiday	8	5.8 AB
NY 1368	5	5.6 AB
NY 1560	4	5.5 AB
Sparkle	5	5.4 AB
NY 1524	6	5.3 AB
Raritan	7	5.3 AB
Honeoye	7	5.1 AB
Allstar	4	5.0 AB
Canoga	4	5.0 AB
MDUS 4380	6	5.0 AB
Scott	8	4.9 AB
NY 1530	6	4.8 AB
MDUS 4355	6	4.8 AB
MDUS 4426	5	4.8 AB
NY 1333	5	4.8 AB
NY 1431	5	4.8 AB
NY 1580	3	4.7 AB
MDUS 4774	5	4.6 B
NY 1402	5	4.6 B
Midland	7	4.4 B
NY 1406	9	4.2 B
NY 1482	4	4.0 B
Catskill	7	4.0 B
MDUS 4579	5	3.8 B
EarlIdawn	8	3.8 B

Table 7. Relative performance of NY 1529 at numerous test sites throughout the Great Lakes region (Thanks is given to collaborative testers for this data). 1 = poor, 3 = average, 5 = best

Test site	Yield	Flavor	Size	Appearance	Firmness
Montreal, Quebec	3	3	3	3	5
MN	4	2	3	3	5
WS	3	4	3	4	-
MA	5	3	4	4	4
NY	4	4	5	5	4
OH	5	4	4	4	4
PA	5	3	4	4	3
Average Score:	4.1	3.3	3.7	4.4	4.2

Table 8. Summary of results from 1981 and 1982 taste panel evaluations of frozen fruit.

1. Consistently rated 'very good'	MDUS 4774 Holiday Honeoye MDUS 4355 NY 1406
2. Consistently rated 'good'	Scott 'Seneca' Jewel
3. Marginally 'acceptable'	NY 1580 Sparkle Lester NY 1570 NY 1482 NY 1524 NY 1402 Midland
4. 'Unacceptable'	Canoga Allstar Raritan NY 1333 NY 1560 MDUS 4579 NY 1530 NY 1368 MDUS 4426 NY 1431 MDUS 4380 EarlIdawn Catskill

Table9. Overall (averaged) ranking, (based upon rankings for yield, size, attractiveness, skin, flesh, fresh flavor, frozen quality). The number '1' denotes highest or 'best' ranking of all cultivars tested. Number '29' denotes lowest or 'worst' ranking.

Overall ranking	Cultivar/ selection	Yield ¹ rank	Yield ² rank	Size ³ ranking	Attractiveness ⁴ ranking	Skin ⁵ ranking	Texture ⁶ ranking	Flavor ⁷ ranking	Quality ⁸ ranking
1	'Seneca'	9	2	2	8	2	2	3	9
2	Holiday	11	8	13	16	8	9	5	1
3	Jewel	3	22	18	3	3	16	4	9
4	NY 1524	21	15	8	4	1	5	9	19
5	Canoga	6	1	1	15	10	10	13	29
6	NY 1530	4	9	19	5	4	6	16	29
7	Scott	7	12	16	10	11	14	15	9
8	NY 1406	5	3	17	21	15	15	25	1
9	MDUS 4359	18	20	11	2	12	23	1	19
10	Honeoye	19	4	20	7	23	21	11	1
11	NY 1580	25	6	10	18	9	7	21	19
12	Allstar	14	19	7	14	13	12	12	29
13	NY 1482	2	14	6	19	18	19	26	19
14	NY 1368	16	18	15	11	6	25	6	29
15	MDUS 4579	15	13	12	25	7	3	28	29
16	MDUS 4426	17	24	5	24	5	11	18	29
17	NY 1333	27	23	3	1	14	18	19	29
18	MDUS 4355	22	26	24	6	16	22	17	1
19	MDUS 4774	28	28	14	22	17	4	22	1
20	Raritan	12	5	22	13	22	26	10	29
21	NY 1560	23	21	21	12	19	8	7	29
22	NY 1570	29	29	4	28	28	1	2	19
23	NY 1431	20	11	9	17	21	13	20	29
24	Sparkle	8	10	28	27	25	28	8	19
25	NY 1402	24	17	25	20	20	17	23	19
26	MDUS 4380	26	27	23	9	24	20	14	29
27	Catskill	1	7	27	29	29	29	27	29
28	Midland	10	25	26	25	27	24	24	19
29	Earlidawn	13	16	29	23	26	27	29	29

¹ Yield based on 3 replicates, 15-ft. plots. 8 harvest dates, 1981.

² Yield based on 3 replicates, 15-ft plots, 8 harvest dates, 1982.

³ Size = total yield divided by total number of fruit.

⁴ Attractiveness evaluated subjectively, scored 1-9, 4-8 reps.

⁵ Skin toughness evaluated subjectively, scored 1-9, 4-8 reps.

⁶ Texture evaluated using Instron Instrument, 12 fruit per mean, 4-8 reps.

⁷ Flavor evaluated subjectively, scored 1-9, 4-8 reps.

⁸ Frozen quality evaluated by replicated blind taste panels, 1 = very good, 9 = good, 19 = acceptable, 29 = unacceptable.

DESCRIPTION

Fruit are large and attractive (see figures 1 and 3), firm, and flavorful. The primary berries of 'Seneca' are blunt conic in shape with very broad-shoulders, while the smaller fruit are near globose in shape. Seeds are mostly dull-yellow and may be dark red on the dark side of the fruit, are slightly sunken to even with the skin, and are more often even towards the fruit tip. The calyx is even to sunken, not reflexed. Sepals rest on top of fruit and tend to lay flatter as fruit mature. Sepal tips may turn upward until fruit mature. Skin has moderate toughness, flesh is very firm. Exterior color is medium red and glossy. Internal flesh is a very light red transparent color. Fruit flavor is good, slightly acid with a mild 'Holiday' aromatic quality. 'Seneca' matures in late mid-season, with 'Allstar' and 'Jewel'. 'Seneca' plants have moderate vigor and a runnering growth habit (see figure 4), leaves are medium green in color, and foliage is open and not cupped (see figure 5).

PERFORMANCE AND RECOMMENDATION

This new cultivar is particularly well-suited for use by commercial fruit growers in the Great Lakes region of the United States, because of its high yield potential (Table 1), its tough skin (Table 2) and firm flesh (Table 3) which are needed for shipping,

its large fruit size (Table 4) which is needed for efficient hand harvest, and its attractive (Table 5) and pleasant flavored (Table 6) fruit which should market well. Cooperative testers in many Great Lakes states report superior performance (Table 7), indicating good hardiness. In addition, taste panels have found this cultivar to be superior to most other cultivars tested in terms of frozen fruit quality (Table 8). When 29 cultivars and selections adapted to the Great Lakes climate were ranked for 8 characteristics, this cultivar was found to make the highest mean ranking for all characters (Table 9). The firmness of the fruit make 'Seneca' well suited for shipping. 'Seneca' has no known resistance to any root diseases, and seems to be particularly susceptible to Black Root Rot disease. Therefore it should not be planted into soils known to be infested by such root disease organisms.

AVAILABILITY

Cornell University has applied for a patent on 'Seneca'. Plants of 'Seneca' are available from the New York State Fruit Testing Cooperative Association, Inc., Hedrick Hall, Geneva, New York 14456, as well as from various commercial nurseries in the Northeast. Licenses to sell plants of 'Seneca' are free, and may be obtained from the Cornell Research Foundation, East Hill Plaza, Ithaca, New York 14850.



Figure 5. Foliage shown in afield planting. Note open canopy, leaves not cupped.

Table 1. Mean fruit yield of 29 strawberry genotypes in 1981 (established under adverse growing conditions) and in 1982 (Established under favorable conditions). Means followed by the same letter are not significantly different, based on Waller and Duncan's BSD test, K = 100.

Genotype	Yield 1981 (g/4.5 m) ¹	Yield 1982 (g/4.5 m) ¹
Allstar	3197 abc	6592 efghi
Canoga	4321 ab	10876 a
Catskill	5268 a	9830 abcd
Earlidawn	3322 abc	7133 cdefghi
Holiday	3394 abc	9750 abcd
Honeoye	2760 abc	10396 ab
Lester	2762 abc	6481 efghi
MDUS 4355	2594 abc	5131 hij
MDUS 4380	2272 abc	5038 ij
MDUS 4426	2883 abc	5422 ghij
MDUS 4579	3150 abc	8177 abcdefg
MDUS 4774	2069 bc	4599 ij
Midland	3479 abc	5149 hij
Jewel	5166 ab	6407 efghi
NY 1333	2113 abc	6064 fghi
NY 1368	3148 abc	6841 efghi
NY 1402	2450 abc	7089 defghi
NY 1406	4616 ab	10748 a
NY 1431	2744 abc	8359 abodef
NY 1482	5171 ab	7874 bcdefgh
NY 1524	2822 abc	7234 cdefghi
'Seneca'	3542 abc	10824 a
NY 1530	5010 ab	9674 abcd
NY 1560	2458 abc	6418 efghi
NY 1570	1125 c	2749 j
NY 1580	2309 abc	9834 abcd
Raritan	3383 abc	9933 abc
Scott	4270 abc	8347 abcdef
Sparkle	3942 abc	8943 abcde

¹ To convert to lb/A multiply by 1.6

Table 2. Mean subjective fruit skin toughness scores. Skin toughness was subjectively determined by rubbing the skin of several berries in the hand from each replicate of each genotype. Each plot at each harvest (replicate) was scored independently. Each genotype was rated 1 to 9 with '9' being most resistant to skin abrasion.

Treatment	Replicates	Mean Score
NY 1524	6	7.7 A
'Seneca'	5	7.6 AB
Jewel	5	7.4 AB
NY 1530	6	7.2 ABC
MDUS 4426	5	7.0 ASCD
NY 1368	5	6.8 ABCDE
MDUS 4579	5	6.8 ABCDE
Holiday	8	6.8 ABCDE
NY 1580	3	6.7 ABCDEF
Canoga	4	6.5 ABCDEF
Scott	8	6.5 BCDEF
Lester	7	6.3 BCDEF
Allstar	4	6.2 BCDEFG
NY 1333	5	6.0 CDEFG
NY 1406	9	5.9 DEFG
MDUS 4335	6	5.8 DEFG
MDUS 4774	5	5.6 EFGH
NY 1482	4	5.5 EFGHI
NY 1560	4	5.3 EFGHI
NY 1402	5	5.2 FGHI
NY 1431	5	5.2 FGHI
Raritan	7	5.0 GHI
Honeoye	7	4.5 HIJ
MDUS 4380	6	4.3 IJK
Sparkle	5	3.8 JK
Earlidawn	8	3.7 JK
Midland	7	3.0 K
NY 1570	1	2.0 KL
Catskill	7	1.1 L

Table 3. Mean Instron measurements from 1982 (firmest fruit listed first). Each genotype mean score reflects the force required for the Instron probe to penetrate the flesh of undamaged berries. Twelve berries were tested of each genotype on the same day of harvest for each harvest date. Means followed by the same letter are not significantly different, based on Waller and Duncan's BSD test, K = 100.

Genotype	Mean puncture force (daltons)
NY 1570	65.8 A
'Seneca'	62.7 A
MDUS 4579	57.6 A
MDUS 4774	56.4 A
NY 1524	53.9 AB
NY 1530	46.9 BC
NY 1580	46.7 BC
NY 1560	46.1 BC
Holiday	45.7 CD
Canoga	44.7 CDE
MDUS 4426	44.2 CDE
Allstar	39.3 CDEF
NY 1431	38.3
Scott	37.6
NY 1406	35.9
Jewel	33.5
NY 1402	32.5
NY 1333	30.8
NY 1482	30.1
MDUS 4380	30.0
Honeoye	28.8
MDUS 4355	28.7
Lester	28.6
Midland	27.1
NY 1368	27.1
Raritan	25.9
Earlidawn	25.6
Sparkle	22.0
Catskill	19.9

Table 4. Mean berry weight of 29 strawberry genotypes based upon 1982 field trials. Mean berry weight was determined by dividing total yield per plot by total number of berries per plot. Means followed by the same letter are not significantly different based on Waller and Duncan's BSD test, K = 100.

Genotype	Grams/berry
NY 1524	14.4 A
Canoga	13.7 AB
Allstar	13.6 AB
NY 1333	13.5 ABC
MDUS 4426	13.4 ABC
NY 1431	12.6 ABCD
NY 1482	12.5 ABCD
'Seneca'	11.8 BCDE
NY 1570	11.5 CDEF
Jewel	11.3
Lester	11.2
NY 1580	11.2
NY 1406	10.9
NY 1368	10.8
Holiday	10.7
NY 1560	10.5
MDUS 4579	10.2
Honeoye	10.0
MDUS 4380	10.0
NY 1402	10.0
MDUS 4774	9.7
Raritan	9.3
Scott	9.1
MDUS 4355	9.0
Catskill	8.9
NY 1530	8.8
Midland	8.7
Sparkle	8.6
Earlidawn	8.3