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A Comparison of Table Grape Selections Bred at Summerland, British Columbia

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Abstract

Several crosses were made between 1977 and 1980 at the Agriculture and Agri-Food Canada Research Center, Summerland, British Columbia to fulfill demand for reliably winter-hardy, high-quality table grapes. By 1986, at least nine were identified as being superior and worthy of second test status. Five of these were white seedless types [Selections 433, 495 ('Skookum Seedless'), 497, 535 ('Sooke Seedless'), 537); also selected were one seedless pink (Selection 434), one seeded white (Selection 494) and one seeded pink (Selection 651). In many cases, these selections proved equal or superior to standard cultivars to which they were compared; these were: 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (white seedless); 'Einset Seedless' (pink seedless); 'Seneca' (seeded white), and; 'Festivee' (pink seeded).

Introduction

The Agriculture and Agri-Food Canada Research Center in Summerland, B.C. had an active grape breeding program between 1966 and 1997. Winegrape cultivars released were 'Sovereign Rose' (3), 'Sovereign Opal' (6), and 'Sovereign Tiara' (5). These cultivars achieved very limited local commercial success. However, the program was strongly oriented towards the breeding of winter-hardy, early-maturing, seedless table grapes. Among the first of these were the sister seedlings 'Sovereign Coronation' (2) and 'Simone' (4). Both cultivars have medium-sized berries (1.6 to 1.9 g) and clusters (215 g). Maturation date at Summerland is around 20 September. The berries are somewhat slipskin and can have a *labrusca* (foxy) flavor character. Nonetheless, the vines are vigorous, winter-hardy, and disease-resistant. Growth regulators will improve berry size, but they may also delay fruit maturity (9). 'Sovereign Coronation' has become very popular in both BC and Ontario and several hundred ha are reported to be planted. More recently, two seedless white grapes, 'Skookum Seedless' and 'Sooke Seedless' (7,8) were introduced, but they have yet to be planted widely.

There continues to be a considerable demand for winter-hardy seedless white table grapes. Many of the selections from the 1977-80 crosses made at Summerland appear to fulfill these demands. The crosses derive their seedless character from 'Romulus' ['Ontario' *X* 'Sultanina'], and Summerland Selections 362 and 364 [both 'Patricia' *X* 'Himrod']. Large berry size is derived from Vineland 37034 ['Seneca' *X* 'Golden Muscat'], Vineland 37022 ['Golden Muscat' *X* 'Seneca'], 'New York Muscat' ['Muscat Hamburg' X 'Hubbard'], Summerland Selection 83 ['Bath' X 'Pearl of Csaba'], 'Pearl of Csaba', and 'Dattier'.

Materials and Methods

Crosses evaluated in these trials were selected as Summerland Selections 433 to 666 in 1984 from crosses made in 1977 under the direction of L.G. Denby. Data were gathered at Summerland (Table 1) on vine

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performance and fruit composition on the original seedlings (1984-91; planted 1980, "Y"-shaped divided canopy, 1.8 X 3.0 vine X row spacing), from an additional two, five-vine plots (1988-93; planted 1986, bilateral cordon training, 1.8 X 3.0 vine X row spacing), and from six, five-vine plots within a randomized cultivar trial (1993-95; planted 1990, bilateral cordon training).

In 1990, a completely randomized experiment with six, five-vine replicates was established within the existing selection evaluation vineyard, that contained 74 (of 169) vacant post-length plots available for planting. Existing five-vine plots (planted 1986) of the selections designated for testing were incorporated into the replicated trial. The basic criteria for inclusion were evidence of sustainable yields, maturity dates prior to 1 October, and non-slipskin character to the berries. The trial included the nine best of the Summerland selections (Selections 433, 434, 494, 495, 497, 535, 537, 651, 666) along with seven similar commercial cultivars [white seedless ('Himrod', 'Interlaken', 'Lakemont', and 'Romulus'); red seedless ('Einset Seedless'); white seeded ('Seneca'); red seeded ('Festivee')] for comparison. Vines were own-rooted, spaced 1.6 m X 3.0 m (vine X row), trained to a 1.8 m high bilateral cordon, pruned to sufficient five-node downward-oriented spurs to provide 18 to 20 shoots/m row, and maintained under clean cultivation.

Yield per vine and clusters per vine data were gathered annually from 1993 to 1996 inclusive from each individual vine. Cluster weight was calculated from these data. Random 100-berry samples for eventual determination of berry weight and composition were collected from each five-vine plot at harvest, and berries per cluster were calculated from cluster weight and berry weight data.

Berry samples were processed using an Acme commercial juicer. Juice was allowed to settle and the solids were aspirated off the surface of the sample by vacuum. Soluble solids (°Brix) was measured using a temperature-compensated refractometer (AO Scientific Instruments, Buffalo, NY). Titratable acidity (TA) was measured using a Brinkmann 672 titrator ensemble (Metrohm Ltd., CH-9110, Herisau, Switzerland), while pH was measured using a Fisher Accumet pH meter (model 825, Fisher Scientific, Vancouver, BC).

Results and Discussion

The best of the prospective table grape selections are the following. Data from the original test block (1984-89) are found in Table 1. These data are based on vines spaced 1.8 m x 3.0 m and trained to a modified lyre ("Y"-shaped) trellis. The mean data for 1993 to 1996 are in Table 2.

Seedless white selections

Summerland Selection 433. 'New York Muscat' *X* Summerland Selection 347. Crossed 1977; selected 1984. Growth is moderately-vigorous (1.1 kg/vine) and procumbent. Yields exceeded those of cultivars such as 'Himrod', 'Lakemont', and 'Romulus' in the replicated trial (Table 2). Moderately large clusters (mean 200 g) are conical and moderately loose, and equal to or larger than 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Berries are moderately large (mean 2.3 g), round, green-skinned, mild *labrusca* flavor, and seedless. Berries are considerably larger than those of 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2).

'Skookum Seedless' (Summerland Selection 495). Vineland 37034 *X* 'Romulus'. Crossed 1977; selected 1984. Growth is moderately-vigorous and procumbent. Initial data suggested that this selection was capable of sustaining high yields along with high soluble solids and moderate TA (Table 1). Yields are equal to those of cultivars such as 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Large clusters (300 to

Table 1. Vine performance of several table grape selections, Summerland, B.C., 1984-1989.

Harvest date	Yield (kg/vine)	°Brix	Titratable acidity (g/L)	pH
Seedless white selections				
Summerland Selection 495 ('Skookum Seedless')				
16 Oct 84	2.4	21.8	13.4	3.16
16 Sept 85	NA	22.2	10.4	3.20
22 Sept 86	11.8	19.7	11.0	3.24
14 Sept 87	15.0	19.4	8.8	3.23
13 Sept 88	6.1	20.0	10.0	3.82
19 Sept 89	6.8	17.6	14.8	2.77
Summerland Selection 497				
16 Oct 84	0.9	23.0	13.2	3.08
16 Oct 85	5.6	20.6	9.7	3.20
22 Oct 86	4.4	19.4	10.5	3.27
14 Sept 87	4.4	18.1	7.9	3.23
13 Sept 88	NA	18.9	9.3	3.62
19 Sept 89	6.5	22.6	7.7	3.34
Summerland Selection 535 ('Sooke Seedless')				
02 Oct 84	0.6	28.8	12.6	3.16
07 Sept 85	0.9	24.5	15.7	3.19
22 Sept 86	7.1	23.5	10.2	3.39
14 Sept 87	11.6	20.8	6.8	3.64
23 Sept 88	4.5	24.2	12.2	3.20
02 Oct 89	4.1	30.7	10.3	3.30

Table 1. *continued*

Summerland Selection 537				
17 Oct 84	0.8	25.6	14.4	3.16
16 Sept 85	5.9	23.0	8.5	3.25
22 Sept 86	12.3	21.4	10.5	3.35
14 Sept 87	7.8	22.7	11.1	3.25
26 Sept 89	15.0	21.4	10.6	3.22
Summerland Slection 666				
25 Aug 88	NA	16.3	6.9	4.11
29 Aug 89	NA	19.4	5.9	3.06
Seeded white selection: Summerland Selection 494				
02 Oct 84	0.8	18.5	10.7	3.02
16 Sept 85	16.6	16.0	8.3	3.24
09 Sept 86	18.9	15.5	8.3	3.10
09 Sept 87	5.0	19.1	7.6	3.30
23 Sept 88	4.3	17.5	9.2	3.79
10 Oct 89	19.9	19.4	8.0	3.30
Seedless pink selection: Summerland Selection 434				
02 Oct 84	0.5	16.6	10.2	3.15
21 Sept 85	7.8	16.4	10.7	3.27
22 Sept 86	17.4	16.3	5.9	3.47
08 Sept 87	1.6	15.8	6.4	3.24
13 Sept 88	3.2	18.0	4.8	3.88
21 Sept 89	13.9	19.8	5.2	3.40
Seeded pink selection: Summerland Selection 651				
23 Sept 85	3.9	19.0	14.8	2.98
23 Sept 88	5.8	16.3	7.4	3.64
02 Oct 89	7.7	19.7	8.4	3.40

600 g (ranges not shown); mean 242 g) are triangular and moderately loose, and equal to or larger than 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Berries are large (2.5 to 3.1 g (ranges not shown); mean 3.0 g), ovoid, green-skinned, mild *labrusca* flavor, and seedless. Berries are considerably larger than those of 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). 'Skookum Seedless' was rated very high in terms of visual attractiveness (1). This cultivar was released in 1997 (7).

Summerland Selection 497. Vineland 37034 *X* 'Romulus'. Crossed 1977; selected 1984. Growth is moderately vigorous and procumbent. Yields were moderate throughout its initial testing period (Table 1), and were less than established commercial cultivars such as 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' in the replicated trial (Table 2). Clusters are medium to small (109 g), triangular, and moderately-tight; they have been smaller than 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Berries are round, medium-sized (1.6 g), green-skinned, crisp (i.e. similar in texture to traditional *Vitis vinifera* cultivars such as 'Thompson Seedless'), neutral to light fruity flavored, and seedless. This selection may suffer from poor berry set in some seasons; flower cluster thinning appears to overcome this problem. It is relatively winter-hardy, and suffered only 14% primary bud damage in the very severe 1988-89 winter.

'Sooke Seedless' (Summerland Selection 535). Vineland 37022 *X* 'Romulus'. Crossed 1977; selected 1984. Growth is moderate in vigor and procumbent. Initial data suggested that this cultivar could sustain high yields along with very high soluble solids (23.5 to 30.7 °Brix) (Table 1). Yields consistently exceeded those of 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' in the replicated trial (Table 2). Clusters are medium-sized (100 to 200 g; mean 194 g), triangular, and tight, and about equal in mass to 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Berries are round, medium sized (1.6 to 2.4 g; mean 1.83 g), green-skinned, crisp, light fruity in flavor, and seedless. 'Sooke Seedless' was rated highest in flavor and texture 'liking' among a collection of 12 selections and commercial table grape cultivars (1). This cultivar was released in 1997 (7).

Summerland Selection 537. Vineland 37022 *X* 'Romulus'. Crossed 1977; selected 1984. Vigor is moderate, and growth habit is procumbent. As with its sister seedling, 'Sooke Seedless', Selection 537 gave early indication of sustaining high yields along with high soluble solids (Table 1). Yield has, however, been less than 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Clusters are medium to medium-large (100 to 300 g; mean 126 g), cylindrical, shouldered, moderately-loose, and somewhat smaller than 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Berries are slightly ovoid, large (2.9 g), green-skinned, moderately crisp, with a light fruity flavor; seedless.

Selection 666. 'Pearl of Csaba' *X* Summerland Selection 364. Crossed 1977; selected 1988. Attention was initially paid to this selection due to its very early harvest date (Table 1). Vigor is moderate, and growth habit is procumbent. Clusters are medium-sized (130 g), shouldered, moderately tight, and somewhat smaller than 'Himrod', 'Interlaken', 'Lakemont', and 'Romulus' (Table 2). Berries are small to medium (1.40 g), ovoid, green-skinned, moderately crisp, with a light fruity flavor. Selection 666 is essentially seedless but with some traces of vestigial seeds. It has attracted attention in local markets due to its very early harvest (31 August in Summerland).

Seeded white selection

Summerland Selection 494. Vineland 37034 *X* 'Romulus'. Crossed 1977; selected 1984. Growth is vigorous and procumbent.

Table 2. Vine performance of several table grape selections and standards, Summerland, B.C., 1993-1996.

Selection	Mean harvest date	Vine size (kg/vine)	Yield (t/ha)	Clusters/ vine	Cluster wt. (g)	Berries/ cluster	Berry wt. (g)	Brix	TA (g/L)	pH
Seedless white selections and similar commercial cultivars included for comparison										
433	19 Sept.	1.09 ab	21.0 a	65 a	200.1 cd	87 def	2.26 f	17.4 h	7.9	3.11 de
495	19 Sept.	0.57 cd	15.2 ab	32 d-g	241.9 bc	81 efg	3.00 d	19.6 f	8.3 cd	3.09 e
497	19 Sept.	0.92 bc	7.4 c	33 d-g	109.2 h	68 gh	1.59 h	21.3 de	7.6 de	3.15 cd
535	3 Oct.	1.11 a	15.9 ab	41 c-f	193.5	105 abc	1.83 h	25.3 a	9.6 ab	3.21 b
537	27 Sept.	0.85 bc	10.5 bc	41 c-f	125.8 gh	43 j	2.88 d	19.9 f	9.9 a	3.16 bcd
666	31 Aug.	0.68 cd	11.8 bc	50 abc	130.0 gh	93 cde	1.40 j	21.0 e	5.3 i	3.29 a
'Himrod'	31 Aug.	NA	11.7 bc	44 b-e	146.7 e-h	84 efg	1.78 gh	19.9 f	6.6 fgh	3.03 f
'Interlaken'	12 Sept.	NA	14.0 abc	40 c-f	191.0 c-f	113 ab	1.70 gh	22.5 bc	7.0 efg	3.21 b
'Lakemont'	3 Oct.	0.77 bc	12.3 bc	26 fg	208.5 cd	120 a	1.71 gh	21.0 e	7.5 de	3.10 ef
'Romulus'	3 Oct.	0.77 bc	12.5 bc	35 c-g	182.7 def	102 bcd	1.78 gh	21.6 de	8.8 bc	2.94 g
Seeded white selections and similar commercial cultivars included for comparison										
494	3 Oct.	0.92 bc	19.7 a	27 fg	389.4 a	110 ab	3.48 c	18.4 g	8.2 cd	3.19 bc
'Seneca'	12 sept.	0.33 d	10.6 bc	28 efg	171.0 d-g	64 hi	2.63 e	22.1 cd	6.4 gh	3.30 a
Seedless pink selections and similar cultivars included for comparison										
434	19 Sept.	0.87 bc	14.2 abc	58 ab	111.3 h	50 ij	2.26 f	19.2f	6.0 hi	3.20 bc
'Einset'	12 Sept.	NA	7.2 c	28 d-g	139.0 fgh	63 hi	2.20 f	23.2 b	6.0 hi	3.13 de
Seeded pink selections and similar commercial cultivars included for comparison										
651	3 Oct.	0.74 bc	19.9 a	45 bcd	271.7 b	76 fgh	3.67 b	16.8 h	7.4 def	3.28 a
'Festivee'	3 Oct.	0.56 cd	19.5 a	51 abc	190.0 c-f	42 j	4.51 a	19.9 f	8.8 bc	3.17 bc

[1]Means followed by different lowercase letters are significant at $p \leq 0.05$, Duncan's multiple range test.

Its very high yields (Table 1) and massive clusters initially attracted sufficient attention to elevate this selection to second-test status. Yield consistently exceeded 'Seneca' in the replicated trial (Table 2). Selection 494 produces very large clusters (300 to 1000 g; mean 389 g) which are triangular, shouldered, moderately tight, and considerably larger than 'Seneca' (Table 2). Berries are ovoid, large (3.5 g), green-skinned, crisp, light fruity flavor, and seeded. This selection was rated highest in terms of visual 'liking', but skins can be astringent (1). Winter-hardiness is moderate (18% primary bud injury in 1988-89).

Seedless pink selection

Summerland Selection 434. 'New York Muscat' *X* Summerland Selection 362. Crossed 1977; selected 1984. Vine has moderate vigor, procumbent growth habit, and is very winter hardy (0 to 8% primary bud damage in 1988-89). Despite some inconsistency in initial observations (Table 1), yields exceeded 'Einset Seedless' in the replicated trial (Table 2). Clusters are medium-sized (111 g), cylindrical, loose, and about equal in mass to 'Einset Seedless' (Table 2). Berries are round, medium-sized (2.3 g), pink-skinned, moderately-crisp, fruity flavor, and seedless. In some years, the "hen-and-chicken" syndrome will appear whereby some berries do not size; flower cluster thinning appears to overcome this problem.

Seeded pink selection

Summerland Selection 651. 'Dattier' *X* Summerland Selection 83. Crossed 1980; selected 1985. Growth is moderately vigorous and somewhat erect. Yields initially did not exceed 10 t/ha (Table 1) but those in the replicated block were equal to 'Festivee' (Table 2). Clusters are large (200 to 300 g; mean 272 g), triangular to blocky, moderately tight, and heavier than 'Festivee' (Table 2). Berries are ovoid, large (3.7 g), red-skinned, crisp, with a slight grassy flavor; seeded. This selection was rated extremely high for visual and overall 'liking' among 12 selections and commercial cultivars (1). Unfortunately, Selection 651 is not without its shortcomings: 1. Berries have a tendency to crack in moist seasons due to over-expansion of the large berries; 2. This selection is quite winter tender, and suffered between 56 and 84 % primary bud damage in the 1988-89 winter; 3. Selection 651 is quite susceptible to powdery mildew.

Cultural practices. **Pruning and training:** Many of these experimental selections have some *Vitis labrusca* in their backgrounds. As a consequence of this genetic background, growth habit is usually procumbent and nodes nearest to the base of the canes sometimes are low in fruitfulness. These features are easily accommodated through a high bilateral cordon system such as the Hudson River Umbrella, and the retention of five-node spurs. Cane systems such as Umbrella Kniffin are also suitable. Where vigor is high, Geneva Double Curtain training is appropriate, and in some cases, necessary.

Special cultural practices: Local research (Denby, unpubl.) demonstrated the positive effects of both cane girdling and cluster thinning on berry size, fruit composition, and cluster appearance of several of these selections. Growth regulators such as gibberellic acid and phenylureas increased berry size of 'Skookum Seedless' and 'Sooke Seedless', but in some cases, fruit maturity was delayed (9).

Availability of cuttings. Plants of most of these new selections are available from specific licensed nurseries, but prospective growers can root their own cuttings (up to 10 m of propagating wood) from wood acquired from the Research Center.

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