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Delbert D. Hemphill Jr., W.A. Sheets, and Lloyd W. Martin

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Abstract

Table or dessert grape varieties have been tested at the North Willamette Research and Extension Center (NWREC) since 1968. This planting included many seedless varieties from breeding programs across the country. In 1987, we established a planting devoted exclusively to seedless grapes, including many recent releases from breeding programs. Grapes of *Vitis vinifera*, *Vitis labrusca*, and hybrids of these and other *Vitis* species were planted on a deep, fertile soil typical of the Willamette Valley floor. Variety characteristics, including relative fruit maturity, disease susceptibility, and hardiness are listed.

Authors

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Disclaimer

The use of either generic chemical or trade names does not constitute an endorsement by the Oregon State University Agricultural Experiment Station or Cooperative Extension Service. Always check with your Extension Service or pesticide consultant for current pesticide registrations and restrictions on application.

SEEDLESS TABLE GRAPES FOR THE WILLAMETTE VALLEY

Delbert D. Hemphill, Jr., W. Arden Sheets, and Lloyd W. Martin

Interest in table or dessert grapes has increased greatly in recent years as consumers have sought alternatives to the limited range of types available in the supermarket. Gardeners seek information on varieties adapted to the climate of the Willamette Valley, with the intention of growing their own grapes for table, juice, or raisin production. Farmers have expressed interest in plantings for direct marketing or desire to grow grapes with different flavor characteristics and ripening times that might find a place in local markets.

The North Willamette Research and Extension Center (NWREC) established a vineyard in 1968, with both seeded and seedless varieties of European (*Vitis vinifera*), American (*Vitis labrusca* and other species), and hybrid types. Observations from this trial were published in 1976 as Agricultural Experiment Station Circular of Information 655, authored by W. A. Sheets. This publication is now out of print.

In response to increased interest in seedless grape varieties for table and raisin use, we established a second planting at NWREC in 1987, devoted exclusively to seedless grapes. Since Oregon State University does not have a grape breeding project, varieties were collected from states with active breeding programs, primarily California, New York, and Arkansas. We were particularly interested in early-ripening varieties that would mature before the onset of the fall rainy season.

The objective of this publication is to help the potential grower identify varieties of *Vitis vinifera*, *V. labrusca*, and hybrids of these and other species, that produce acceptable quality fruit when grown in the Willamette Valley.

Both the well-adapted varieties, and all others tested, are listed for the sake of completeness.

Establishment Procedure

Most varieties were planted in the spring of 1987 with plants rooted from hardwood cuttings taken the previous winter. Plants were set five feet apart in rows 10 feet apart, with three plants per cultivar. An eight-foot gap was left in the row at the boundary between varieties. The planting is on level, valley-floor soil at about 100 feet elevation. The soil is a Willamette silt loam, moderately well-drained, with about 3 percent organic matter and a pH of 5.5. All varieties planted in 1987 through 1989 are included in Table 1.

Insect, Disease, and Weed Control

Aside from honeybees and yellow-jackets feeding on ripening fruit, insects have not been a problem and no insecticides have been used. The major potential disease problems are powdery mildew (*Uncinula necator*) and bunch rot (*Botrytis cinerea*). Acceptable control of powdery mildew was obtained with two applications of triadimefon. No controls were used for bunch rot; rot did not develop until the advent of fall rains.

Chemical herbicides such as simazine, diuron, and dichlobenil were used to control all weeds in a three-foot wide strip beneath the trellis. After good weed control was established, a single annual application of any one of these herbicides in early spring was sufficient for control of most weeds. Occasional hand-hoeing was necessary for blackberry and other perennials. A

strip of fine fescue turf grass is maintained between the rows by regular mowing.

The greatest pest problem has been birds, both migratory starlings and resident robins and other species. No attempt was made to control birds.

Irrigation

The planting was sprinkler-irrigated several times during the first two summers after establishment. From 1989 on, no irrigation has been used. The turf appeared to compete for available water and may have helped in controlling grapevine vigor and hastening fruit maturation.

Fertilizer

Prior to planting, a 10N-8.7P-16.7K fertilizer was applied at 1000 pounds per acre. Since then, maintenance applications of 50 pounds nitrogen per acre, as urea or ammonium nitrate, have been made in May. This has been more than adequate to obtain good vine vigor, but is somewhat limiting for the grass sod.

Training and Pruning

The trellis consists of 8-foot-long, five-inch diameter, posts set every 18 feet in the row and marking the boundary between varieties. Heavy (No. 9) galvanized wire was attached to the top of the posts, about six feet above ground, and at the four-foot level. A steel T-type fencepost was set at each plant; the wires were also secured to these posts.

A single shoot (trunk) was vertically trained to the fencepost in the first and second years of establishment. The shoot was topped a few inches below the top wire and side shoots were secured to the trellis wires with

plastic tie tape. Side shoots were pruned back to two to three bud spurs after the second winter. These shoots were then used to establish the four-arm (cane) Kniffen system of pruning (Figure 1).

Since the second winter, dormant pruning has consisted of removing all current-season growth except for four well-exposed canes, each having about 10 buds. Also, a short renewal spur of one to two buds is left near the base of each cane to provide well-placed canes for training the following year. This system is standard for all varieties, although some might have responded more favorably to a different trellising method or to a greater or lesser number of retained buds.

Most of the varieties evaluated have great vine vigor at this site. Summer training and pruning was necessary to provide exposure of the fruiting area to sun, to increase air movement, and to keep canes out of the sodded row middles. Bailing twine secured to the top of the posts is used to support canes arising from the lower two arms. Hedging is done in mid-summer, taking care to leave at least 10 leaves, on average, beyond the fruit clusters.

Evaluation of Fruit Maturity

Grape maturity is often estimated by measuring the soluble solids content of the juice with a refractometer or hydrometer. These measures are accurate indicators of sugar content but not of perceived sweetness. The taste sensation of "sweetness" is a complex function of sugar content, pH, total acid content, and other flavor components and varies among individual tasters. Rather than report soluble solids at various dates, we have given a subjective maturity rating, based on our combined judgment as to when the grapes had the right balance

of sugars, acids, and other flavor components for good dessert quality.

Cold Hardiness

The relatively mild winters of the Willamette Valley have not provided many tests of winter hardiness. However, experience from other growing areas has indicated that many seedless varieties of *Vitis vinifera*, or hybrids of *vinifera* and native American species, are less cold hardy than varieties derived from native species.

The freeze event of December, 1990 provided an unusual test of grape bud survival, but did little damage to vine trunks. The minimum temperature reached 0°F (-18°C) on December 21 and did not exceed 10°F for a six-day period. The maximum temperature also remained below freezing during this period. Most seedless varieties experienced significant loss of primary buds, those most responsible for fruit production.

Table 2 lists the relative hardiness of most varieties in the trial and includes many seeded varieties from other grape plantings at NWREC for comparison. The reader should be cautioned that these observations are based on only a single freeze and may not reflect varietal performance under different climatic conditions.

Mildew Susceptibility

In 1991, no attempt was made to control mildew in order to obtain some observations on relative susceptibility to this important disease. Powdery mildew attacks foliage, fruit, and canes, but is of most concern when the fruit is infected. Mildewed berries are prone to splitting, tend to develop a tough skin, and fail to size and accumulate sugar normally. In severe cases, the immature berries will dry out and fall from the cluster.

Native American varieties are generally considered to be nearly resistant to powdery mildew, *vinifera* varieties very susceptible, and hybrid varieties intermediate in susceptibility.

Mildew pressure was severe in 1991, resulting in complete crop loss in some varieties. Relative susceptibility to mildew is listed in Table 2. Seeded varieties from other plantings are included for comparison. Among the seedless varieties, Canadice and Einset, both hybrids, compared favorably with native American seeded varieties in resistance to mildew infection of the fruit.

As with the hardiness ratings, the mildew susceptibility ratings are based on observations in a single season. Relative performance of varieties may differ somewhat in other seasons with different disease pressure.

Figure 1. Four-cane Kniffen training system.

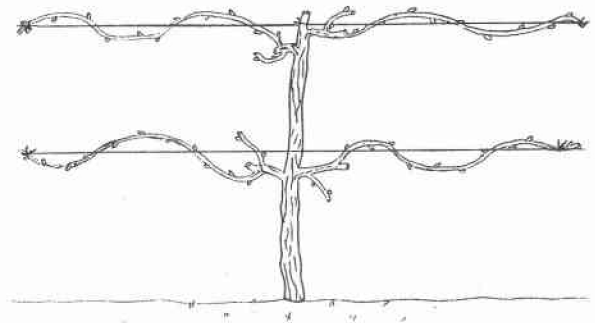


Table 1. Origin, parentage, and description of seedless table grapes evaluated at the North Willamette Research and Extension Center, 1987-1991.

Variety	Origin	Parentage	Type ^z	Season ^y	Color	Slipskin ^x
Beauty	CA	Scolorkerteck kiralynoje x Black Kishmish	V	E	Blue	No
Bronx	NY	(Goff x Iona) x Sultanina	L	M	Red	No
Canadice	NY	Bath x Himrod	L	E	Red	No
Centennial	CA	Gold x Q25-6	V	E	White	No
Challenger	MO	Unknown, NY material?	L	ME	Red	No
Concord Seedless	?	Sport of Concord?	L	M	Blue	Yes
Dawn	CA	Gold x Perlette	V	M	White	No
Delight	CA	Scolorkerteck kiralynoje x Sultanina	V	M	White	No
Dora Jones	?	Unknown, NY material?	L	ME	White	No
Einset	NY	Fredonia x Canner	L	E	Red	Yes
Emerald	CA	Emperor x Pirovano 75	V	VL	Green	No
Fiesta	CA	Complex, includes Calmeria, Red Malaga, Sultanina	V	L	White	No
Flame	CA	Complex, includes Cardinal, Sultanina, Red Malaga	V	ME	Red	No
Fresno	CA	Complex, includes Calmeria, Sultanina, Red Malaga	V	ME	White	No
Glenora	NY	Ontario x Russian Seedless	L	M	Blue	No
Himrod	NY	Ontario x Sultanina	L	E	White	No
Interlaken	NY	Ontario x Sultanina	L	E	White	No
Lakemont	NY	Ontario x Sultanina	L	L	White	No
Mars	AR	Island Belle x Ark. 1339	L	E	Blue	Yes
NY 36095	NY	Ontario x Sultanina	L	ME	White	No
NY 36289	NY	(Hubbard x self) x Interlaken	L	ME	White	No
NY 36661	NY	Bell x Interlaken	L	ME	White	No
NY 47616	NY	Bath x (Fredonia x Black Monukka)	L	E	Blue	Yes
NY 65.479.1	NY	(Muscat Hamburg x Hubbard) x (Ontario x Black Monukka)	L	M	Blue	Yes
NY 65.483.2	NY	(NY 10782 x Muscat Hamburg) x Suffolk Red	L	ME	Blue	Yes
Nancy	?	Unknown, NY material?	L	ME	White	No
Patio Green	?	Unknown, NY material?	L	M	White	No
Perlette	CA	Scolorkerteck kiralynoje x Sultanina	V	E	White	No
Reliance	AR	Ontario x Suffolk Red	L	E	Red	No
Remaily	NY	Lady Patricia x (Ontario x Russian Seedless)	L	L	White	No
Ruby Seedless	CA	Emperor x Pirovano 75	V	VL	Red	No
Sovereign Coronation	BC	Unknown	L	E	Blue	Yes
Suffolk Red	NY	Fredonia x Russian Seedless	L	M	Red	No
Thompson (Sultanina)	?	From Asia minor	V	L	White	No
Thornton	?	Unknown, NY material?	L	ME	White	No
V52131	ON	Seibel 8357 x Bronx	L	ML	Blue	No
Vanessa	ON	Seneca x (Bath x Interlaken)	L	ML	Blue	No
Venus	AR	Alden x NY 46000	L	ME	Blue	Yes

^zV = *vinifera* or European type; L = *labrusca* or American types. Many of the cultivars are hybrids but tend to resemble one species more closely than the other.

^yVE = very early - ripe by September 1 in most years.

E = early - ripe by September 10 in most years.

M = medium - ripe by September 20 in most years.

ML = medium late - ripe by September 30 in most years.

L = late - ripens in October.

VL = very late - usually does not ripen fully in Willamette Valley.

^xSlipskin refers to a non-adherent, tough skin that separates readily from the pulp. Example: Concord. Thompson Seedless is an example of a non-slipskin type.

^zFoxy refers to the Concord-like flavor characteristic of most *labrusca* grapes and many hybrids.

Table 1.

(continued)

Remarks
Large, long clusters with small, crisp, neutral-flavored berries. Very large clusters possible with cluster thinning.
Medium, scraggly bunches; soft, mealy-textured berry. Tends to alternate bearing and berries crack in rain.
Medium, compact, well-filled cluster; small to medium berry with spicy flavor. Low vigor, tends to overbear.
Large, loose cluster; large, oval berry with mild Muscat flavor. Tends to crack and rot during wet autumn.
Medium, scraggly cluster; teardrop-shaped berry; some seeds. Can be flat-tasting with unappealing texture.
Small cluster; Concord flavor with smaller berry and cluster.
Large, well-filled clusters; medium-large, crisp berry. Less prone to cracking and bunch rot than Centennial.
Medium cluster; small to medium berry with slight Muscat flavor. Low vigor with short-jointed canes. Less cracking and rot than its sibling Perlette.
Small cluster; small, slightly oval berry; neutral to slightly foxy flavor; like Himrod.
Small to medium cluster; small to medium berry; crisp and spicy.
Medium cluster with small to medium berry; berries soft and high acid. Remains green at maturity.
Variable cluster size; small, crisp berry. Very susceptible to mildew.
Large, loose cluster with good resistance to bunch rot; medium berry with excellent texture. Vines very vigorous, can be excessive.
Medium cluster; medium berry; crisp, spicy. Mediocre set.
Cluster and berry size variable. Berries crisp with tender skin; tendency to crack in wet weather.
Large, loose cluster with small to medium, tender berries. Variable set. Slightly foxy. Clusters can be large and uniform with girdling or gibberellin.
Medium cluster with medium berry. Slightly foxy. Firmer berry and smaller, better-filled cluster than Himrod.
Large, well-filled cluster; medium berry. Retains green color at maturity. Higher acid than Interlaken.
Large, loose cluster; large berry with a few seed traces; foxy flavor. Few clusters per vine.
Small cluster; small berry with pink blush, neutral flavor.
Small to medium cluster; medium to large berry; flavor like Niagara.
Very small berry and cluster. Flavor like Interlaken.
Small cluster and berry; like Concord Seedless but sweeter, less foxy. Few clusters per vine. Low vigor.
Medium, tight cluster; medium berry; fairly crisp for slipskin; non-foxy.
Medium cluster; medium-small berry. Like NY Muscat in flavor and color.
Long, loose cluster; resembles Himrod.
Loose cluster; small berry; neutral flavor.
Medium, scraggly cluster; poor set; small to medium berry, very crisp. Very mildew susceptible.
Medium berry and cluster; occasional seeds; flavor varies from foxy to an excellent fruitiness; firm berries.
Large cluster, berry; pink blush; firm texture; heavy crop. Can taste flat; tends to crack in wet weather.
Large, loose cluster; medium-large berry with neutral flavor. Tends to crack and rot in wet weather.
Small cluster; medium berry; foxy.
Large, loose cluster with medium to large berry of good texture. Poor color development except in full sun.
Medium cluster; medium, oval berry; crisp, neutral flavor.
Medium cluster; medium berry; resembles Interlaken.
Long, scraggly cluster can improve with thinning; resembles Glenora; tart flavor makes it a good pie grape.
Medium cluster, berry; crisp for slipskin; neutral flavor. Yield decline with age due to few canes near trunk.
Medium cluster; large, soft berry; some hard seeds; foxy, fruity, to slightly Muscat in flavor.

Table 2. Relative mildew susceptibility, primary bud cold hardiness, and overall rating of grape varieties at the North Willamette Research and Extension Center, 1990-1991.

Variety	Mildew ^z	Hardiness ^y	Overall rating ^x
<i>Seedless Table Grapes</i>			
Beauty	4	4	4
Bronx	4	3	5
Canadice	1	1	1
Centennial	4	2	2
Challenger	2	3	2
Concord Seedless	1	1	4
Dawn	4	3	3
Delight	5	4	3
Dora Jones	4	ND	ND
Einset	1	1	2
Emerald	5	3	5
Fiesta	5	5	5
Flame	5	4	1
Fresno	5	3	2
Glenora	3	2	3
Himrod	3	2	3
Interlaken	4	2	3
Lakemont	3	2	4
Mars	2	1	2
Nancy	2	ND	ND
NY 36095	2	ND	ND
NY 36289	2	ND	ND
NY 36661	3	2	3
NY 47616	2	2	2
NY 65.479.1	3	ND	2
NY 65.483.2	2	ND	2
Patio Green	2	ND	ND
Perlette	5	4	5
Reliance	2	2	2
Remaily	2	1	3
Ruby	5	4	5
Sovereign Coronation	2	1	2
Suffolk Red	3	2	4
Thompson	5	4	5
Thornton	3	2	3
V52131	2	1	3
Vanessa	3	1	2
Venus	3	2	3

^zSusceptibility to powdery mildew on a five point scale with 5 = most susceptible (nearly 100% crop loss), 1 = least susceptible (no significant damage to fruit).

^yPrimary bud loss in December, 1990, freeze. Five point scale with 5 = greater than 80% loss, 4 = 60-79% loss, 3 = 40-59% loss, 2 = 20-39% loss, 1 = less than 20% loss.

^xFive point scale with 1 = most suited to the Willamette Valley. Includes disease susceptibility, hardiness, cluster appearance and berry quality.

ND: Not determined; insufficient observation.

Table 2.
(continued).

Variety	Mildew	Hardiness	Overall rating
<i>Seeded American and Hybrid Grapes</i>			
Alwood	2	1	3
Aurore	2	2	5
Blue Star	1	1	2
Buffalo	2	1	2
Caco	1	1	4
Campbell Early	1	1	3
Cardinal	5	4	4
Cayuga White	1	1	2
Concord	1	1	4
Diamond	1	1	4
Edelweiss	2	1	3
Elizabeth	2	1	3
Fredonia	1	1	3
Golden Muscat	2	1	2
Kendaia	2	1	2
Lady Patricia	4	2	4
Lucille	2	1	5
Monticello	1	3	4
Moored	1	1	3
Niagara	1	1	4
NY 30454	4	2	2
NY Muscat	3	2	2
Ontario	2	1	4
Portland	2	1	3
Price	3	1	3
Rosea Belle	1	1	2
Schuyler	3	1	3
Seneca	5	1	2
Seyval	2	1	2
Swenson Red	3	1	2
Utah Giant	5	3	4
VanBuren	1	1	2
Verdelet	1	2	4
Worden	2	1	3
<i>Seeded Vinifera Wine Grapes</i>			
Chardonnay	4	3	3
Gamay (Napa)	3	5	5
Gewürztraminer	3	5	3
Grenache	3	5	5
Muscat blanc	5	5	5
Pinot blanc	5	4	3
Pinot noir	5	4	3
Riesling	5	2	3
Sauvignon blanc	4	3	3
Semillon	4	2	4
Sylvaner	4	4	4
Zinfandel	5	5	5

Adaptation to the Willamette Valley

An overall score for each variety, based on suitability for growing in the Willamette Valley, is found in Table 2. The major factors considered were earliness, fruit set, hardiness, flavor, and berry size. For those who wish to grow grapes without spraying for powdery mildew, the best choices among seedless table grapes are Canadice, Einset, Mars, and Sovereign Coronation. The grower willing to implement a regular spray program for mildew control should also consider Centennial, Dawn, Delight, Flame, and Reliance. These varieties have outstanding fruit quality but are susceptible to powdery mildew. The varieties Himrod, Interlaken, and Thornton are very similar in maturity (early), cluster type, flavor, and are moderately resistant to powdery mildew. However, they often have poorly formed clusters and poor fruit set. The NY numbered lines 47616, 65.479.1, and 65.483.2, also appear to be well-adapted to the Willamette Valley, but obtaining cuttings or rooted plants may be a problem.

Plant Variety Protection Act

Most newly released grape varieties are protected by the Plant Variety Protection Act. Propagation and sale of these varieties without a license and payment of royalties is prohibited. Release of many numbered lines from breeding programs is also prohibited. The North Willamette Research and Extension Center is not licensed to propagate patented varieties and does not sell cuttings of these varieties to the public. Varieties and lines in the planting which are known to be protected include Centennial, Dawn, Einset, Mars, Reliance, and the NY lines 47616, 65.479.1, and 65.483.2. Most of these varieties are available from licensed nurseries in the area.