'Neptune' Seedless Grape

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'Neptune' is the sixth in a series of seedless table grapes (*Vitis* sp.) released from the Univ. of Arkansas. Previous table grape cultivars released from the Arkansas program include 'Venus' (Moore and Brown, 1977), 'Reliance' (Moore, 1983), 'Mars' (Moore, 1985), 'Saturn' (Moore et al., 1989), and 'Jupiter' (Clark and Moore, 1999). 'Neptune' is the first white grape (skin lacking visible anthocyanin pigmentation) cultivar released from the program. 'Neptune' has very attractive berries, large clusters, fruity flavor, non-slip skin texture, and high soluble solids content, all desirable traits for an Arkansas table grape cultivar. 'Neptune' will provide a white grape cultivar for Arkansas and other eastern growers who wish to diversify fruit color in table grape production, for a very limited number of white table grapes are available currently.

Origin

'Neptune' resulted from a cross of Ark. 1562 x Ark. 1704 made in 1985 (Fig. 1). It is a hybrid of *V. labrusca* L. and *V. vinifera* L., although other *Vitis* species may be included four or five generations removed. The source of seedlessness was the New York–developed cultivar Lakemont (Clark, 1997). The original 'Neptune' vine was selected in 1988 in a seedling vineyard at the Univ. of Arkansas Fruit Substation, Clarksville, and was tested as selection Ark. 2083.

A three-vine plot trained to a four-arm Kniffin system and cane pruned (with an average of 35 to 40 buds retained per vine on mature vines) was established in 1989 at Clarksville, and data were collected from this plot from 1990 through 1998. Trials consisting of four replications of three-vine plots trained to a bilateral cordon were established in 1995 at Clarksville [west-central Arkansas, lat. 35°31'58"N, long. 93°24'12"W, U.S. Dept. of Agriculture (USDA) hardiness zone 7a, soil type Linker fine sandy loam (Typic

Hapludults)] and at Fayetteville [northwest Arkansas, lat. 36°5'47"N, long. 94°10'29"W, USDA hardiness zone 6b, soil type Captina silt loam (Typic Fragiudults)]. Both replicated plantings were arranged in a randomized complete-block design. Mature vines were spur-pruned utilizing three- to five-node spurs on the cordon-trained vines. Vines in all plantings were spaced 2.4 m apart with rows spaced 3.1 m and were trickle irrigated, had fungicides and insecticides applied according to a commercial pest control program, received annual preemergent and postemergence herbicide applications, and were fertilized annually with nitrogen (100 g/vine). Analysis of variance was computed on data from the 1997 and 1998 replicated trials, and means were separated by multiple *t* tests.

Description and performance

Fruit of 'Neptune' is yellow-green at maturity. Berry shape is elliptic to slightly ovate (Fig. 2). Berry weight averaged 2.5 g over 8 years of evaluation, larger than 'Reliance', similar to 'Mars', and smaller than 'Venus' (Table 1). In replicated trials, 'Neptune' berry weights ranged from 2.9 to 4.3 g (Table 2). No evaluations of gibberellic acid or girdling effects on berry weight of 'Neptune' were conducted. The pulp of 'Neptune' adheres to the skin of the berries and the texture was rated highly in annual evaluations (data not shown). 'Neptune' is stenospermocarpic. Berries are seedless and the few seed traces observed were very small and soft and not noticeable in the eating of the fruit. No skin cracking has been observed on 'Neptune' in any year of evaluation, although severe fruit cracking was seen on 'Reliance' and other crack-susceptible genotypes. This is a major attribute of 'Neptune', in that fruit cracking of white or green-fruited table grape genotypes can be very severe in Arkansas. Skin of 'Neptune' is moderately thick and similar to that of 'Venus'. Flavor of 'Neptune' is fruity, but not foxy as is characteristic of *V. labrusca* culti-

Fig. 1. Pedigree of 'Neptune' seedless grape.

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Fig. 2. Cluster of 'Neptune' seedless grape.

Table 1. Plant and fruit characteristics of four table grape cultivars grown at the Univ. of Arkansas Fruit Substation, Clarksville.

Characteristic	Neptune	Mars	Reliance	Venus
Date				
Budbreak ^z	25 Mar.	29 Mar.	---	25 Mar.
Harvest ^y	04 Aug.	07 Aug.	28 July	18 July
Berry				
Wt (g) ^{y, x}	2.5	2.8	2.3	2.9
Flavor ^{y, w}	8.0	8.2	9.4	7.9
Soluble solids (%) ^y	19.7	17.8	22.3	17.5
Cluster				
Wt (g) ^{y, x}	345.2	220.6	294.5	193.1
Fill ^{y, v}	9.3	7.7	8.3	7.4
Plant				
Crop ^{y, w}	7.3	7.5	8.0	6.8
Health ^{y, w}	7.6	8.9	8.9	7.1
Vigor ^{y, w}	7.1	9.0	8.1	7.1
Pruning wt/vine (kg) ^{z, u}	0.5	1.9	---	0.7

^zMeans of 2 years, 1997 and 1998, recorded on 12 vines planted in 1995 and trained to a bilateral cordon system.

^yMeans for 7 (cluster weight, cluster fill), 8 (berry weight, soluble solids, crop, health, vigor), or 9 (date of harvest, berry flavor) years; data from three-vine plots, trained to a four-arm Kniffin system.

^xBerry weight each year based on an average for 25 berries, and cluster weight the average for five clusters per three-vine plot of vines trained to a four-arm Kniffin system.

^wRating scale of 1 to 10 where 10 = best.

^vCluster fill rating of 1 to 10 where 10 = very tight cluster.

^uVines were balanced pruned to a 30 + 10 formula, with 30 buds left on the vine for the first 0.45 kg of pruning wood and 10 buds for each subsequent 0.45 kg.

vars. Flavor rating averaged 8 (on a scale of 1 to 10 with 10 = best) over 9 years of observation (Table 1). Soluble solids concentration of 'Neptune' averaged 19.7% over 8 years, higher than that of 'Venus' and 'Mars' but not as high as that of 'Reliance'. In replicated trials, soluble solids content of 'Neptune' exceeded 22% in both years at Clarksville but was lower at Fayetteville (Table 2). No postharvest or processing evaluations have been conducted on 'Neptune'.

Clusters of 'Neptune' are conical, often have a small shoulder, and are very attractive (Fig. 2). Cluster weight averaged 345.2 g over 7 years (Table 1) and ranged from 200.0 to 610.0 g in replicated trials, larger than that of 'Venus' or 'Mars' in all comparisons (Table 2). Cluster fill rating averaged 9.3 for 'Neptune', which was higher than that of other cultivars (Table 1). Shatter of berries from the clusters at maturity has not been observed and the clusters hung well on the vines after achieving full maturity.

Yields of 'Neptune' were usually lower than those for 'Venus' and 'Mars' at Clarksville, but similar or higher than those of the same cultivars at Fayetteville (Table 2). Higher yields might be achieved on older vines of 'Neptune' (the vines in the yield comparisons were 3 or 4 years old), and, because 'Neptune' does not exhibit high vigor, vine spacings closer than 2.4 m within the row might increase the total yield for this cultivar. Crop ratings for 'Neptune' were consistent during the 8-year evaluation period, and in only 2 of the 8 years was a crop rating (at the time of fruit maturity) of <7 recorded. A rating of 5 was given in 1992 following a midwinter low of -12.2 °C and a late-spring freeze of -5.6 °C near budbreak, and a rating of 2 was given in 1996 following a midwinter low of -17.2 °C and a late spring freeze of -12.2 °C, again near budbreak. 'Neptune' vines have not been evaluated for the effects of flower cluster thinning. However, this practice is not encouraged because of natural cluster fill of 'Neptune', where flower cluster thinning could lead to excessive tightness of the clusters.

'Neptune's average maturity or harvest date was 4 Aug. at Clarksville, and it is considered a midseason cultivar. 'Neptune' ripened 17 d later than 'Venus', 7 d later than 'Reliance', and 3 d earlier than 'Mars' (Table 1). Budbreak of 'Neptune' is similar to that of 'Venus' and 4 d earlier than that of 'Mars' (Table 1).

Vines of 'Neptune' have medium vigor, and the average vigor rating was 7.1 vs. 7.1 for 'Venus', 8.1 for 'Reliance', and 9.0 for 'Mars' (Table 1). Pruning weight for 'Neptune' was lower than for 'Venus' or 'Mars' (Table 2). Growth habit of 'Neptune' is semi-upright, and not as procumbent as most of the other Arkansas-developed cultivars. 'Neptune' shoots mature at the same time as 'Venus' shoots but not as early as 'Mars' shoots. Minimum winter temperature experienced at Clarksville from 1990 through 1998 was -17.2 °C, occurring both in Feb. 1996 and Jan. 1997. The crop rating of 2 in 1996 was probably the result of spring freeze injury (see above) rather

Table 2. Yield, berry and cluster weights, and soluble solids for three table grape cultivars grown at two locations in Arkansas. Data were collected from four, three-vine plots planted in 1995 and trained to a bilateral cordon system.

Cultivar	1997				1998			
	Yield (t·ha ⁻¹)	Wt (g)		Soluble solids (%)	Yield (t·ha ⁻¹)	Wt (g)		Soluble solids (%)
		Cluster	Berry			Cluster	Berry	
Clarksville								
Neptune	10.9 b ^z	241 a	3.3 b	22.3 a	12.9 b	200 a	2.9 b	22.6 a
Mars	9.8 b	77 c	3.9 a	18.7 b	26.7 a	144 b	3.5 a	19.2 b
Venus	18.5 a	185 b	3.4 b	16.6 c	25.9 a	163 b	3.3 a	18.0 c
Fayetteville ^y								
Neptune	7.4 a	610 a	4.3 a	19.8 a	10.0 a	336 a	3.9 a	15.7 a
Mars	3.6 a	199 b	3.5 a	15.6 b	6.1 b	163 b	3.5 a	14.2 bc
Venus	3.3 a	248 b	3.6 a	16.1 b	3.3 b	167 b	3.6 a	14.0 c

^zMean separation within columns and locations by *t* test ($P \leq 0.05$).

^yYield was reduced due to frost damage to buds and emerging shoots in Fayetteville in 1997; 1998 yield on 'Venus' reduced $\approx 22\%$ from green June beetle feeding damage.

than midwinter injury. A crop rating of 10 was recorded in 1997 following the same midwinter low, indicating no crop reduction when vines were exposed to -17.2 °C. Overall, hardness of 'Neptune' appears similar to that of 'Venus' but not as great as that of 'Mars' or 'Reliance'.

'Neptune' has shown moderate resistance to the diseases black rot [*Guignardia bidwelli* (Ellis) Viala & Ravaz] and anthracnose [*Elsinoë ampelina* (de Bary) Shear] under field conditions, and these diseases have not been observed on this cultivar under the fungicide program utilized during evaluation. Slight to

moderate infections of powdery mildew [*Uncinulata necator* (Schw.) Burr.] on leaves were observed in 2 of the 8 years of evaluation, but no berry cracking resulted. Downy mildew [*Plasmopara viticola* (Berk. & Curt.) Berl. & de Toni] was observed on 'Neptune' in 2 of the 8 years, and susceptibility to downy mildew appears similar to that of 'Venus'. However, downy mildew has not been a concern with the utilization of a commercial fungicide program. Overall, health ratings for 'Neptune' were good during the 8 years of evaluation, similar to those of 'Venus' (Table 1).

The outstanding characteristics of 'Neptune' are its attractive, yellow-green berries, excellent clusters, fruity flavor, high soluble solids content, and resistance to fruit cracking. 'Neptune' is recommended for trial where other eastern U.S. table grape cultivars are adapted.

Availability

An application for a U.S. plant patent has been filed for 'Neptune'. A list of nurseries licensed to propagate and sell 'Neptune' can be obtained from J.R.C., 316 Plant Science, Dept. of Horticulture, Univ. of Arkansas, Fayetteville, AR 72701.

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