'Valley Pearl' Table Grape

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Additional index words. cultivar, fruit breeding, *Vitis vinifera*

'Valley Pearl' is an early to midseason, white seedless table grape (*Vitis vinifera* L.) suitable for commercial table grape production where *V. vinifera* can be grown. The significant characteristics of 'Valley Pearl' are its high and consistent fruit production on spur pruned vines and large round berries. The taste is neutral to very light muscat flavor when fully ripe.

Origin

'Valley Pearl' originated from a cross of two Agricultural Research Service (ARS) table grape selections, A60-42 and C77-79, performed in 1996 (Fig. 1). The seedless female parent A60-42 has white round berries with firm flesh, good skin, and slight muscat flavor. The male parent C77-79 is seedless with white round to ovate berries, medium skin, and medium flesh firmness. The seedless × seedless cross provided 494 ovules from which 42 embryos were obtained through embryo rescue procedures (Emershad and Ramming 1984; Emershad et al., 1989). The original seedling was planted in 1997 in cooperation with California State University, Fresno (CSUF), and selected as A85-40 in 1999 by D.W. Ramming and R. Tarailo. 'Valley Pearl' has been tested at CSUF (lat. 36°48'59''N, long. 119°43'40''W), and USDA/ARS Parlier (lat. 36°35'39''N, long. 119°31'8''W) in Fresno County, CA and Coachella Valley Agricultural Research Station at Oasis, CA, in Riverside County, CA (lat. 33°31'19''N, long. 116°9'5''W). A U.S. Plant Patent (PP23, 422) was awarded to 'Valley Pearl' on 26 Feb. 2013.

Description and Performance

A production trial began in 2005 at the ARS San Joaquin Valley Agricultural

Sciences Center in Parlier, CA. The plot was established on Hanford fine sandy loam soil and consisted of 27 own-rooted vines. Vines were trained to a quadrilateral cordon, pruned to 28 two-bud spurs and spaced 3.7 m (between rows) × 2.4 m (within row) on a three cross arm 'T' trellis, providing a vineyard density of 1121 vines/ha. Data were taken on 'Valley Pearl', 'Perlette', and 'Thompson Seedless' from 2006 to 2011 in Parlier. Fruit evaluation data collected annually included number of clusters per vine, vine yield, cluster and berry weights, berry lengths, and berry diameters. Vines of each cultivar were manipulated with best known cultural treatments [pruning, gibberellic acid (GA) sprays, trunk girdling, cluster thinning, and trimming] meant to maximize berry size and fruit quality while ensuring adequate crop yield. Berry weights, lengths, and diameters were based on 50 berry samples collected randomly from each vine. Similarly, juice soluble solids and titratable acidity were also determined using the randomly collected 50 berry samples. Means reported for various treatments were based on five replicate vines during each harvest year.

Standard cultural practices for table grape culture were used including annual dormant pruning, weed control using mechanical and chemical methods, and drip irrigation. Standard commercial crop care products were applied to control grape powdery mildew, caused by *Erysiphe necator* Schw. [syn. *Uncinula necator* (Schw.) Burr]. No formal program of nutrition management was practiced in the vineyard during the study. However, CAN-17 was applied annually in the drip line during rapid shoot growth of early spring, before bloom, to provide ≈25 kg N/ha to replace the nitrogen lost due to crop removal (Peacock et al., 1998).

Treatments used to increase berry size differed with evaluated cultivars. 'Perlette' clusters were first brushed to remove excess berries, followed by two sizing sprays of 40 ppm GA applied just after berry set. 'Perlette' trunks were girdled (4.76 mm blade gap) soon after GA applications. Berry size for 'Valley Pearl' was increased through a single 40 ppm GA berry sizing spray and tipping the lower halves of its conical clusters. 'Thompson Seedless' berries were thinned with two applications of 15 ppm GA at bloom followed by a 20 ppm GA "bump" spray between full bloom and

berry set. At berry set, 'Thompson Seedless' then received two 60 ppm GA sprays followed by trunk girdling (4.76 mm blade gap) and cluster tipping.

Vine characteristics. 'Valley Pearl' has shown consistent productivity with spur pruning and averages two clusters per shoot. Even under the low-chill hour conditions present in the Coachella Valley, productivity of 'Valley Pearl' has remained consistent. Whereas vegetative budbreak of 'Valley Pearl' is slightly before 'Perlette' in the San Joaquin Valley, it is much delayed in the same comparison when grown in the low-chill conditions of the Coachella Valley. Chill hours varied considerably between the San Joaquin and Coachella Valley vineyard locations. Hours below 7 °C averaged 1041 h (845–1233 h range) in Parlier and 211 h (123–307 h range) in Oasis during the 2006–11 study years. Own-rooted 'Valley Pearl' vines have moderate vigor compared with other *V. vinifera* table grape cultivars. Vines are not resistant or tolerant to powdery mildew. The application of GA at berry set to increase berry size does not reduce fruitfulness the following year. Fruit astringency has been noted in 'Valley Pearl' vines that have been girdled at berry set.

At the USDA/ARS production trial in Parlier, CA, 'Valley Pearl' vines thinned to 35–40 clusters yielded 22.2 kg (13.4–35.9 kg range) from trimmed clusters when averaged across harvest seasons. In the same plot and using best known cultural practices for each cultivar, fruit yields of 'Perlette' and 'Thompson Seedless' were 17.4 kg (5.4–31.1 kg range) and 19.4 kg (7.8–36.0 kg range) per vine, respectively (Table 1). Fruit of 'Valley Pearl' matured between harvests of 'Perlette' and 'Thompson Seedless', being closer to the 'Thompson Seedless' harvest window.

Cluster characteristics. Natural untreated clusters of 'Valley Pearl' are large and conical in shape (Fig. 2). Natural berry set is considered average in the upper half of the cluster and slightly tight in the lower half. With a desired commercial cluster mass of ≈500 g, the lower tighter-berry cluster half can be removed, eliminating the need for a GA bloom spray. An ideal cluster size would contain 50–60 berries, each with a berry mass of 9–10 g (Fig. 3). Clusters averaged 294, 594, and 566 g for 'Perlette', 'Valley Pearl', and 'Thompson Seedless', respectively, produced at the USDA/ARS plot trial in Parlier, CA (Table 1).

Berry characteristics. Berries of 'Valley Pearl' are large and attractive with firm and meaty flesh texture. Berry skin adheres to the flesh and has a medium thickness. Berries are resistant to cracking on the vine and during postharvest storage. Sunburning or berry yellowing has not been a problem with sun-exposed fruit. Fruit quality remains stable with appropriate postharvest handling and storage conditions, with little berry shatter noted from clusters stored as long as 9 weeks after harvest. 'Valley Pearl' berry shape is round, as evidenced by nearly

Received for publication 15 Mar. 2015. Accepted for publication 11 Apr. 2016.

We acknowledge Norma Ambriz and Jacob Andresen for technical assistance in the laboratory and field. Appreciation is also extended to the California Table Grape Commission for assistance in funding research in table grape cultivar development.

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Fig. 1. Parentage of 'Valley Pearl' table grape.

Table 1. 'Valley Pearl' table grape as compared with 'Perlette' and 'Thompson Seedless' at Parlier, CA during 2006 through 2011 harvests. Values represent means $\pm$ SD of variables across harvest years.

Cultivar (Kg)	Harvest date	Cluster		Berry			Juice		Vine yield
		No. per vine	Wt (g)	Wt (g)	Length (cm)	Diam (cm)	Brix ($^{\circ}$)	Acidity ^z	
Perlette	22 July	57.4 $\pm$ 20.9	294.4 $\pm$ 91.4	4.6 $\pm$ 0.9	2.0 $\pm$ 0.2	1.9 $\pm$ 0.2	18.0 $\pm$ 1.2	0.63 $\pm$ 0.03	17.4 $\pm$ 9.2
Valley Pearl	4 Aug.	36.6 $\pm$ 8.3	594.2 $\pm$ 70.7	8.9 $\pm$ 1.3	2.5 $\pm$ 0.2	2.4 $\pm$ 0.1	17.9 $\pm$ 0.8	0.35 $\pm$ 0.02	22.2 $\pm$ 6.8
Thompson Seedless	11 Aug.	32.6 $\pm$ 8.8	566.0 $\pm$ 198.9	4.9 $\pm$ 0.8	2.6 $\pm$ 0.3	1.7 $\pm$ 0.1	20.3 $\pm$ 1.6	0.63 $\pm$ 0.13	19.4 $\pm$ 11.1

^zJuice acidity based on titration to pH 8.2 and reported as mg tartaric acid/100 mL.

equal berry lengths and diameters (Table 1). Berry mass averaged 8.9 g across harvest seasons for 'Valley Pearl', nearly double the masses obtained for 'Perlette' (4.6 g) and 'Thompson Seedless' (4.9 g). Girdling vines to further increase berry size is not recommended in 'Valley Pearl' as astringency has been noted in fruit from girdled vines. At harvest, juice Brix was slightly lower in

'Valley Pearl' as compared with 'Perlette' and 'Thompson Seedless'. However, 'Valley Pearl' juice acidity was also reduced, leading to Brix:Acid ratios being higher for 'Valley Pearl' (51.1) as compared with 'Perlette' (28.6) and 'Thompson Seedless' (32.2). Increased Brix:Acid ratios are known to be indicators of increased fruit quality in table grapes (Jayasena and Cameron,

2008). In addition to the high Brix:Acid ratio, 'Valley Pearl' can also develop a light muscat flavor in berries exposed to direct sunlight.

Availability

'Valley Pearl' has been indexed by the Foundation Plant Services, University

Fig. 2. Natural untreated cluster of 'Valley Pearl' table grape.

of California, Davis, and found free of known viruses. A U.S. Plant Patent was approved for 'Valley Pearl' on 26 Feb. 2013 (Ramming and Tarailo, 2013). The

Fig. 3. 'Valley Pearl' cluster tipped and treated with 40 ppm gibberellic acid at berry set.

cultivar is licensed exclusively to the California Table Grape Commission, which will make it widely available through sublicensing agreements. Inquiries regarding availability of 'Valley Pearl' should be addressed to

Ross Jones, ross@grapesfromcalifornia.com, California Table Grape Commission, 392 W. Fallbrook, Suite 101, Fresno, CA 93711 or Craig Ledbetter, craig.ledbetter@ars.usda.gov, ARS, 9611 S. Riverbend Avenue, Parlier, CA 93648. It is requested that appropriate recognition be made if this germplasm contributes to the development of a new breeding line or cultivar.

Literature Cited

- Emershad, R.L. and D.W. Ramming. 1984. *In-ovulo* embryo culture of *Vitis vinifera* L. cv. 'Thompson Seedless'. Amer. J. Bot. 71: 873–877.
- Emershad, R.L., D.W. Ramming, and M.D. Serpe. 1989. In-ovulo embryo development and plant formation from stenospermic genotypes of *Vitis vinifera*. Amer. J. Bot. 76: 397–402.
- Jayasena, V. and I. Cameron. 2008. °Brix:Acid ratio as a predictor of consumer acceptability of Crimson Seedless table grapes. J. Food Qual. 31:736–750.
- Peacock, W.L., L.P. Christensen, and D.J. Hirschfeld. 1998. Best management practices for nitrogen fertilization of grapevines. Tulare County UCCE, Pub. NG4-96.
- Ramming, D.W. and R.E. Tarailo. 2013. United States Plant Patent for grapevine denominated 'Valley Pearl'. USPP 23:422.