Market Quality Attributes of Orange-fleshed, Non-netted Honey Dew Melon Genotypes Following Different Growing Seasons and Storage Temperature Durations

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SUMMARY. Orange-fleshed honey dew (*Cucumis melo* L., Inodorus group) fruit are known for having superior food-safety, food-quality, and fruit-marketability attributes compared with orange-fleshed netted muskmelon (*C. melo*, Reticulatus group) and to green-fleshed honey dew (*C. melo*, Inodorus group) fruit. However, little is known about the production market attributes and postharvest quality comparisons of the leading orange-fleshed honey dew cultivars. Five orange-fleshed honey dew genotypes ('Honey Gold', 'Orange Delight', 'Orange Dew', 'Temptation', and a breeding line) were glasshouse-grown in both fall and spring, harvested at abscission (full-slip), and compared after storage for 3–24 days in air at 5 or 10 °C. Fruit maturity (full-slip) was between 31 and 38 days after anthesis, with maturation dependent on genotype. Days to maturity were slightly longer in the fall than in the spring. Fruit size (number of fruit per standard commercial shipping box) was between four and six fruit per box. 'Orange Dew' consistently had the smallest fruit (six per box), and the breeding line had the largest (four per box). 'Orange Delight' and 'Orange Dew' had the fewest whole-fruit disorders and the highest percentage of marketable fruit at harvest and following 24 days of storage at 5 or 10 °C. 'Orange Delight', 'Orange Dew', and the breeding line consistently had a more yellow peel, whereas 'Honey Gold' and 'Temptation' fruit peels had a more greenish hue. Whole-fruit firmness was 10–25 N among the cultivars and 24–35 N for the breeding line. Internal-fruit disorders, percentage marketability, and mesocarp (pulp) firmness reflected each genotype's whole-fruit attributes. 'Orange Delight' and 'Orange Dew' fruit consistently had among the highest soluble solids concentration and relative sweetness ratings, and their pulp had a more intense orange hue and lower lightness than those of the other genotypes. After 24 days of storage, 'Orange Delight' and 'Orange Dew' maintained their higher sweetness and more orange hue in both spring and fall harvests; however, depending on harvest, they were not always significantly sweeter or more orange-hued than some of the other genotypes. Our results indicate that orange-fleshed honey dew fruit are a promising new melon type suitable as a substitute for orange-fleshed netted muskmelon fruit not only for food-safety issues but also for overall marketable quality.

Compared with netted, orange-fleshed muskmelon, 'Orange Dew', an orange-fleshed, non-

netted honey dew melon, appears to be a healthier food choice due to its lack of a netted rind, which is well known to harbor bacteria, including human pathogens such as *Salmonella* (*Salmonella* Lignières) (Castillo et al., 2004), its superior β-carotene and phenolic concentrations, and its longer postharvest shelf life

(Hodges and Lester, 2006). As a fresh-cut product, 'Orange Dew' has lower respiration and ethylene production rates and less microbial counts than netted, orange-fleshed muskmelon (muskmelon) chunks (Saftner et al., 2006). Consumers rated 'Orange Dew' fruit superior to orange-fleshed muskmelon in flavor, texture, sweetness, and overall eating quality (Saftner et al., 2006).

Orange-fleshed honey dew fruit are grown in the United States but less extensively than muskmelon or green-fleshed honey dew. Orange-fleshed honey dew germplasm is generated by backcrossing green-fleshed honey dew with muskmelon or other β-carotene-rich melons, but breeding for orange-fleshed honey dew fruit is limited due to restricted consumer awareness and subsequent market demand for this fruit type (K. Crosby, pers. comm.). As a result, there are only few, if any, orange-fleshed cultivars (Honey Gold, Orange Delight, Orange Dew, and Temptation) and breeding lines being tested in state extension cultivar trials in the United States.

We compared commercially available orange-fleshed honey dew genotypes 'Honey Gold', 'Orange Delight', 'Orange Dew', 'Temptation', and SVR 03935152 (breeding line) for market-quality characteristics following fall and spring production, coupled with storage at 5 or 10 °C for 3, 17, and 24 d. The overall objective of this study was to bring additional scientific exposure to this important fruit type which has superior food-safety and food-quality attributes and to determine variation in marketable qualities among some commercially available orange-fleshed honey dew genotypes.

Materials and methods

PLANT MATERIAL AND GREENHOUSE CONDITIONS. Four non-netted, orange-fleshed honey dew cultivars [Honey Gold (Harris

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Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
1	%	1 g/100 g	1
0.3048	ft	m	3.2808
3.7854	gal	L	0.2642
2.5400	inch(es)	cm	0.3937
4.4482	lbf	N	0.2248
28.3495	oz	g	0.0353
(°F – 32) ÷ 1.8	°F	°C	(1.8 × °C) + 32

Fig. 1. Fruit maturity (full-slip) (A) and fruit size (number of fruit per standard commercial shipping box) (B) of glasshouse-grown commercial orange-fleshed honey dew genotypes during fall and spring production.

Moran Seed Co., Modesto, CA); Orange Delight (Seminis Seed Co., Oxnard, CA); Orange Dew (Shamrock Seed Co., Salinas, CA); and Temptation (Sakata Seed America, Morgan Hill, CA)] and a breeding line [SVR-03935152 (Seminis Seed Co.)] were grown in a glasshouse following the procedures previously described by Lester et al. (2005).

Briefly, plants were grown in 15-L black plastic pots containing a commercial potting medium (Sunshine Mix #2; Sun Gro Horticulture, Bellevue, WA) at the U.S. Department of Agriculture, Agricultural Research Service, Kika de la Garza Subtropical Agricultural Research Center, Weslaco, TX (lat. 26°10'N, long. 97°58'W, elevation 21 m). Following germination

(7 d after planting), seedlings were thinned to one per pot. Mutual shading among plants was minimized by placing pots at least 45 cm apart. Plants were watered at least once per day using an automatic drip-irrigation system and fertigated twice per week with a complete water-soluble fertilizer (10N-4.4P-8.3K; Peter's Corp., St. Louis) during vegetative and fruit developmental stages. During flowering/pollination stages, plants were fertigated twice per week with a 4.5N-9.9P-6.3K nutrient solution. Natural sunlight was supplemented with 400-W high-pressure sodium-vapor lamps. The average daily photosynthetic photon flux (*PPF*) at the canopy level was $20.7 \pm 0.7 \text{ mol}\cdot\text{m}^{-2}$ in spring and $12.3 \pm 0.50 \text{ mol}\cdot\text{m}^{-2}$ in fall. Cumulative *PPF* for the entire growth periods were 1674 and 1238 $\text{mol}\cdot\text{m}^{-2}$ for spring and fall, respectively. Average day/night temperatures (in °C) were $35.9 \pm 0.7/24.8 \pm 0.3$ and $29.9 \pm 0.5/22.8 \pm 0.5$ in spring and fall, respectively, while average day/night relative humidity (RH) values were $42.0\% \pm 1.4\%/74.3\% \pm 1.1\%$ and $51.2\% \pm 1.3\%/74.0\% \pm 1.1\%$ in spring and fall, respectively. Flowers were hand-pollinated, and only one fruit per plant was allowed to develop. Matured fruit were harvested at 0800 HR each day, and the duration from anthesis to full-slip was recorded for each fruit together with fruit size and fresh weight. After harvest, a group of fruit (10 replicates per treatment) was stored for 3 d at 21 °C to simulate retail display conditions before quality analysis. Another group of fruit was stored at 5 °C (fall) or 10 °C (spring) and 95% $\pm$ 2% RH for 14 or 21 d to simulate commercial transport and storage conditions, followed by an additional 3 d at 21 °C before quality analysis. Therefore, the latter group of fruit was stored for a total of 17 or 24 d at the two temperatures.

MARKET QUALITY AND SWEETNESS DETERMINATIONS. Fruit marketability and disorders (i.e., disease, storage-generated external discoloration, and internal irregularities) were determined according to Lester and Grusak (2001). Briefly, fruit were divided into five different classes: 1, 0% of fruit with disorders; 2, $\leq 15\%$ of fruit with disorders; 3, 16–50% of fruit with disorders; 4, 51%–85% of fruit with disorders; and

5, >86% of fruit with disorders. Firmness (equatorial-region, hypodermal-mesocarp epidermal tissue removed for “external” and equatorial-region, middle-mesocarp for “internal” firmness readings) and soluble solids concentration (equatorial-region, middle-mesocarp tissue) were analyzed on fruit according to Lester and Grusak (2001), and fruit sugars were determined according to Lester et al. (2005). Briefly, 0.5 g of lyophilized equatorial-region, middle-mesocarp tissue was homogenized/extracted with 80% ethanol at 80 °C. The ethanol was evaporated at 50 °C under a nitrogen (N₂) stream, and samples were returned to volume with high-performance liquid chromatography (HPLC)-grade water. Samples were filtered through a C18 Sep-Pak (Waters Corp., Milford, MA), and fruit sugars were cochromatographed with known standards for fructose, glucose, and sucrose by HPLC. Fruit sweetness ratings were based on fructose and glucose sweetness equivalents to sucrose of

1.7, 0.7, and 1.0, respectively (Katz, 1998).

STATISTICS. Ten single plants per genotype per storage time (100 plants total) with one melon fruit per plant were used in a completely random design in both spring and fall repetitions of this study. Data were subjected to analysis of variance using the general linear model (GLM) procedure of SAS (SAS Institute, Cary, NC). Treatment means were compared using the least-square means (LSMEANS) procedure of SAS. Only significant results are discussed unless stated otherwise.

Results and discussion

Fruit maturity, days on the vine before abscission (full slip), appeared to be longer in fall production for all cultivars except Temptation, which matured earlier in fall than in spring (Fig. 1A). In general, for the other genotypes, fall-grown fruit took 2–3 d longer to mature than spring-grown fruit. Considering year-to-year affects, seasonal replication would be

needed to verify this possible trend. However, delayed maturation did not result in larger sized fruit for most fall-grown melons (Fig. 1B). Only ‘Honey Gold’ had measurably larger fall-grown fruit (i.e., four fruit per box vs. five to six fruit per box in spring). ‘Orange Dew’ had the smallest fruit, consistently averaging six fruit per box in both fall and spring. The breeding line had the largest fruit, averaging four fruit per box in both production seasons.

In both seasons, overall fruit marketability remained high following a 3-d simulated retail display at 21 °C (Table 1). Whole-fruit surface disorders were also minimal during this 3-d storage period except for ‘Honey Gold’, which tended to have slightly lower marketability and higher surface disorders (up to 10%) than the other genotypes. After storage for 17 or 24 d at 5 or 10 °C, fruit surface disorders within genotypes generally increased with storage time and storage temperature, negatively affecting fruit marketability (Table 1).

Table 1. Comparison of orange-fleshed honey dew genotypes for whole fruit marketability, external fruit disorders (e.g., disease or storage generated discoloration), peel color (hue angle), and peel firmness, glasshouse, produced in Fall 2005 and Spring 2006.^z

Genotype	Total storage time (d)	Whole-fruit marketability (% of all fruit)		Whole-fruit surface disorders (% of surface covered)		Exterior surface hue angle ^y		Whole-fruit peel firmness (N) ^x	
		Harvest		Harvest		Harvest		Harvest	
		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
Honey Gold	3	99	90	1	10	100.9 A ^w , a ^v	102.6 A, a	20 AB, a	25 A, a
Orange Delight	3	100	100	0	0	93.3 C, a	92.9 B, a	13 C, a	15 B, a
Orange Dew	3	100	100	0	0	95.9 BC, a	97.9 B, a	16 BC, a	17 B, a
SVR 03935152	3	100	100	0	0	96.6 BC, a	97.8 B, a	24 A, a	32 A, a
Temptation	3	100	100	1	0	97.9 AB, a	102.0 A, a	9 C, a	17 B, a
		Storage		Storage		Storage		Storage	
		5 °C	10 °C	5 °C	10 °C	5 °C	10 °C	5 °C	10 °C
Honey Gold	17	93	72	20	26	100.4 A, a	100.7 A, ab	21 A, a	22 A, a
Orange Delight	17	85	58	25	31	92.0 B, a	89.2 B, b	13 B, a	14 B, a
Orange Dew	17	94	82	3	22	95.1 B, a	89.3 B, b	17 AB, a	16 B, a
SVR 03935152	17	90	79	10	28	94.1 B, a	88.9 B, b	23 A, a	30 A, a
Temptation	17	40	58	93	34	95.7 B, a	99.3 A, a	11 B, a	17 B, a
Honey Gold	24	54	52	30	34	97.3 A, a	98.6 A, b	21 A, a	16 B, b
Orange Delight	24	50	50	58	39	92.2 C, a	87.5 B, b	13 B, a	13 B, a
Orange Dew	24	65	56	42	32	91.9 C, a	91.8 B, b	12 B, a	13 B, a
SVR 03935152	24	44	50	66	37	93.8 BC, a	86.9 B, b	21 A, a	28 A, a
Temptation	24	4	56	96	38	95.2 AB, a	99.6 A, a	12 B, a	13 B, b

^zFruit were stored 0, 14, or 21 d in fall at 5 °C (41.0 °F) or in spring at 10 °C (50.0 °F) and 95% ± 2% relative humidity, simulating commercial transport and storage, followed by 3 d at 21 °C (69.8 °F) simulating retail display.

^yHue angle: 0° = red, 90° = yellow, 180° = green, 270° = blue.

^x1 N = 0.2248 lbf.

^wUppercase letters within a column indicate significant differences (LSMEANS 5% level) among cultivars within a storage period.

^vLowercase letters within a column indicate significant differences (LSMEANS 5% level) within a cultivar over storage time.

'Temptation' was the exception: spring-grown 'Temptation' fruit stored at 10 °C, on average for 17 and 24 d, had 36% disorders, whereas fall-grown fruit had 95% when stored at 5 °C. These differences were reflected in more marketable fruit at 10 °C than at 5 °C (average 57% and 22%, respectively). 'Temptation' fruit probably suffered chilling injury (CI) at 5 °C resulting in heightened surface disorders. CI is common at low, nonfreezing temperatures, for fully mature, ripening green-fleshed honey dew fruit but not for ripe (full-slip) fruit (Ryall and Lipton, 1979). Fruit from all genotypes used in this study were harvested at full-slip, yet 'Temptation' suffered more surface disorders at 5 °C than at 10 °C in contrast to other orange-fleshed honey dew fruit genotypes. This suggests that 'Temptation' may be more sensitive to low

temperatures and hence not suitable for commercial transport and storage, where temperatures commonly range from 4 to 8 °C (Shewfelt and Prussia, 1993), even though the recommended storage temperature range for honey dew fruit is 5 to 10 °C (Ryall and Lipton, 1979). 'Honey Gold' and 'Orange Dew', in contrast, had fewer surface disorders at either 10 or 5 °C up to 24 d storage, which resulted in these cultivars having a higher percentage of marketable fruit. Again, considering year-to-year affects, seasonal replication would be needed to verify this possible trend.

'Honey Gold' and 'Temptation' tended to have a greener (less yellow) surface peel hue compared with the other genotypes regardless of the production season, storage temperature, or storage duration (Fig. 2). 'Orange Delight', 'Orange Dew', and

the breeding line fruit peels had the most yellow-orange hue among the genotypes. Fruit peel hues of melon fruit tended to be more yellow (less green) when stored at 10 °C than at 5 °C except for 'Honey Gold' and 'Temptation' fruit (Table 1).

Whole-fruit firmness of the breeding line consistently was the firmest among the genotypes (Table 1). Fruit firmness generally remained unchanged during storage, except for spring-grown 'Honey Gold' and 'Temptation' fruit. Fruit firmness retention during commercial transportation and storage is usually associated with reduced overall postharvest losses and is an indicator of prolonged shelf life and marketability (Smith et al., 2003).

Internal fruit disorders generally increased during storage (Table 2). 'Orange Dew' fruit had among the

Fig. 2. Comparison of whole-fruit size, shape and peel color, and internal-fruit pulp thickness and color of glasshouse-grown commercial orange-fleshed honey dew genotypes after 17 d of storage.

Table 2. Comparison of orange-fleshed honey dew genotypes for internal fruit marketability, internal fruit disorders (e.g., disease or storage-generated irregularities), pulp firmness, soluble solids concentration, and relative sweetness.^z

Genotype	Total storage time (d)	Internal marketability (%)		Internal disorders (%)		Pulp firmness (N) ^y		Soluble solids concn (%)		Relative sweetness (g/100 g FW sucrose equivalents) ^x	
		Harvest		Harvest		Harvest		Harvest		Harvest	
		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
		5 °C	10 °C	5 °C	10 °C	5 °C	10 °C	5 °C	10 °C	5 °C	10 °C
Honey Gold	3	100	100	0	0	11 B ^w , a ^v	15 B, a	10 BC, a	9 A, a	9.4 B, a	8.2 A, a
Orange Delight	3	96	100	6	0	6 C, a	9 B, a	11 AB, a	9 A, a	10.3 AB, a	8.7 A, a
Orange Dew	3	100	100	0	0	6 C, a	17 B, a	12 A, a	9 A, a	10.9 A, a	8.5 A, a
SVR 03935152	3	100	100	0	0	16 A, a	22 A, a	10 BC, a	10 A, a	9.8 B, a	7.0 A, a
Temptation	3	67	90	31	14	4 C, a	10 B, a	9 C, a	9 A, a	10.5 A, a	7.4 A, a
		Storage		Storage		Storage		Storage		Storage	
		5 °C	10 °C	5 °C	10 °C	5 °C	10 °C	5 °C	10 °C	5 °C	10 °C
Honey Gold	17	100	90	0	10	7 B, a	11 B, a	11 A, a	8 A, a	10.3 AB, a	6.5 B, a
Orange Delight	17	100	100	0	0	5 B, a	8 B, a	11 A, a	9 A, a	11.0 A, a	8.3 A, a
Orange Dew	17	99	100	4	0	6 B, a	12 B, a	11 A, a	9 A, a	10.4 A, a	8.2 A, a
SVR 03935152	17	99	100	4	0	14 A, a	18 A, a	9 B, ab	9 A, a	9.3 BC, a	7.3 B, a
Temptation	17	75	86	31	10	5 B, a	8 B, a	10 AB, a	9 A, a	9.1 C, b	7.1 B, a
Honey Gold	24	100	82	0	10	11 A, a	9 B, b	10 A, a	8 A, a	9.6 BC, a	6.3 A, b
Orange Delight	24	97	85	5	22	5 B, a	8 B, a	11 A, a	9 A, a	10.8 A, a	7.0A, b
Orange Dew	24	95	100	6	0	5 B, a	11 B, b	11 A, a	8 A, a	10.6 AB, a	6.4 A, b
SVR 03935152	24	88	100	10	0	13 A, a	18 A, a	8 B, b	8 A, b	9.0 C, a	6.1 A, a
Temptation	24	67	89	63	11	5 B, a	6 B, b	10 A, a	7 A, b	9.1 C, b	6.0 A, a

^aMelons were glasshouse-produced in Fall 2005 and Spring 2006. Fruit were stored 0, 14, or 21 d in fall at 5 °C (41.0 °F) or in spring at 10 °C (50.0 °F) and 95% ± 2% relative humidity simulating commercial transport and storage; followed by 3 d at 21 °C (69.8 °F) simulating retail display.

^y1 N = 0.2248 lbf.

^xRelative sweetness = 1.8 (g/100 g FW fructose) + 0.7 (g/100 g FW glucose) + 1.0 (g/100 g FW sucrose); 1 g/100 g = 1%.

^wUppercase letters within a column indicate significant differences (LSMEANS 5% level) among cultivars within a storage period.

^vLowercase letters within a column indicate significant differences (LSMEANS 5% level) within a cultivar over storage time.

lowest incidences of internal disorders (≤6%) following 24 d storage, which was reflected in 95%–100% marketable fruit. ‘Temptation’ fruit tended to have the highest incidences of internal disorders (up to 31%) and unmarketable fruit (up to 33%) when held for 3 d at 21 °C, and disorders worsened during prolonged storage. This is in contrast to the high storability rating of ‘Temptation’ as a fresh-cut product (Saftner et al., 2006), the current results suggest that whole fruit of this cultivar may be sensitive to prolonged storage, especially at temperatures <10 °C. The main difference between the current study and the fresh-cut study is that our fruit were grown in a glasshouse whereas fruit from the fresh-cut study were grown under commercial field conditions. Growth environment (for instance glasshouse vs. field) can significantly influence fruit-quality attributes (Lester, 2006).

Internal fruit pulp firmness averaged ≈40% firmer in spring-grown vs. fall-grown fruit (Table 2). Although there was great variation (≈3-fold difference) in pulp firmness at harvest among the genotypes, significant

declines occurred only in ‘Honey Gold’, ‘Orange Dew’, and ‘Temptation’ fruit during storage at 10 °C. The breeding line had the firmest pulp at harvest, about twice as firm as all other fruit, and this firmness was maintained throughout storage. The high firmness of the breeding line would be well suited for fresh-cut processing from a mechanical standpoint, but textural measurements and sensory evaluations would be needed to determine acceptability as a fresh-cut product, especially as our study also shows that soluble solids concentration (SSC) and sweetness ratings were relatively low (Table 2).

SSC was generally higher in fall- than in spring-grown fruit for all genotypes except the breeding line (Table 2). Although the cumulative photon flux during spring was higher than in fall, this did not translate into higher photosynthesis-induced sugar accumulation in these fruit. Higher SSC in fall-grown vs. spring-grown orange-fleshed honey dew fruit was also observed in fall vs. spring glasshouse-grown muskmelon (Lester et al., 2006). Differences in fruit SSC between spring and fall are

probably related to higher springtime night temperatures during fruit maturation affecting sugar enzyme activities (Beaulieu et al., 2003), resulting in respiratory consumption of photoassimilates and fruit cell size variations (Kano, 2006) altering fruit sugar accumulation. Higher SSC coincided with higher relative sweetness (Table 2). ‘Orange Delight’ and ‘Orange Dew’ had the highest SSC and sweetness ratings among genotypes. Although SSC and sweetness tended to decline, significantly for some genotypes, during storage, ‘Orange Delight’ and ‘Orange Dew’ fruit consistently had among the highest SSC and relative sweetness values, indicating that these cultivars might be more acceptable to consumers from a flavor standpoint. ‘Temptation’, notably in fall-produced fruit, had relatively high SSC but low sweetness, indicating high total sugars (likely mostly sucrose), but relatively low fructose levels. Relative sweetness is greatly affected by fructose content because fructose is perceived to be 1.7-fold sweeter than sucrose (Katz, 1998).

In addition to sweetness and flavor, fruit flesh color is correlated

Table 3. Comparison of orange-flesh honey dew genotypes pulp lightness, chroma, and hue angle, glasshouse-produced in Fall 2005 and Spring 2006.^z

Genotype	Total storage time (d)	Pulp lightness ^y		Pulp chromaticity ^x		Pulp hue angle ^w	
		Harvest		Harvest		Harvest	
		Fall	Spring	Fall	Spring	Fall	Spring
		5 °C	10 °C	5 °C	10 °C	5 °C	10 °C
Honey Gold	3	68.1 B ^v , b ^u	69.9 B, a	32.2 B, a	28.2 B, a	72.1 B, c	79.0 A, a
Orange Delight	3	65.1 C, b	70.6 B, a	34.5 B, a	31.8 A, a	72.3 B, a	73.6 B, a
Orange Dew	3	64.1 C, b	70.4 B, a	37.7 A, a	33.5 A, a	70.0 C, a	73.8 B, a
SVR 03935152	3	75.1 A, a	73.5 A, a	27.4 C, a	28.8 B, a	75.6 A, a	74.5 B, a
Temptation	3	72.4 A, a	73.4 A, a	29.2 C, a	26.2 B, a	74.3 A, a	78.5 A, b
		Storage		Storage		Storage	
		5 °C	10 °C	5 °C	10 °C	5 °C	10 °C
Honey Gold	17	69.6 B, b	70.9 A, a	30.0 B, ab	25.2 C, b	74.3 AB, b	77.9 A, a
Orange Delight	17	66.9 B, b	68.5 B, a	34.4 A, a	29.7 B, b	72.7 B, a	75.3 B, a
Orange Dew	17	67.0 B, a	70.2 A, a	33.8 A, b	33.1 A, a	72.0 B, a	74.6 B, a
SVR 03935152	17	75.4 A, a	71.7 A, a	26.0 C, a	27.1 C, a	76.0 A, a	75.5 B, a
Temptation	17	68.5 B, b	70.3 A, b	27.5 C, a	26.0 C, a	76.4 A, a	78.9 A, b
Honey Gold	24	71.3 A, a	70.4 B, a	29.4 B, b	24.8 CD, b	75.2 AB, a	78.4 B, a
Orange Delight	24	69.3 B, a	70.5 B, a	32.7 A, a	28.4 B, b	73.8 BC, a	74.5 C, a
Orange Dew	24	67.2 C, a	69.4 B, a	33.7 A, b	32.3 A, a	72.0 C, a	75.0 C, a
SVR 03935152	24	74.6 A, a	74.6 A, a	25.5 C, a	26.7 BC, a	77.1 A, a	76.0 C, a
Temptation	24	69.3 B, b	71.5 B, b	28.4 B, a	22.9 D, b	75.6 A, a	82.5 A, a

^zFruit were stored 0, 14, or 21 d in fall at 5 °C (41.0 °F) or in spring at 10 °C (50.0 °F) and 95% ± 2% relative humidity, simulating commercial transport and storage, followed by 3 d at 21 °C (69.8 °F) simulating retail display.

^yLightness: +100 = white, -100 = black.

^xChromaticity = color intensity.

^wHue degree: 0° = red, 90° = yellow, 180° = green, 270° = blue.

^vUppercase letters within a column indicate significant differences (LSMEANS 5% level) among cultivars within a storage period.

^uLowercase letters within a column indicate significant differences (LSMEANS 5% level) within a cultivar over storage time.

with consumers' overall preference rating of honey dew fruit (Francis, 1980; Lester and Shellie, 1992). Flesh surface color is a combination of lightness (L^* : black = -100, white = +100), chromaticity (C^*), and hue (h° : 0° = red, 90° = yellow, 180° = green, 270° = blue). Surveys have shown consumers prefer melon pulp tissue that has a clear, intense, typical color. 'Orange Delight' and 'Orange Dew' both had among the lowest L^* (i.e., a greater color clarity) and highest C^* (color intensity) and more orange hue than the other fruit at harvest from both fall and spring productions (Table 3). Storage of fruit for up to 24 d at either 5 or 10 °C exhibited a general bleaching (i.e., higher L^* value) of the pulp tissue (Fig. 2). Chromaticity also increased during storage while hue generally remained unchanged, suggesting a possible decline in unknown, nonorange-interfering substances.

Conclusions

Marketability and quality differences were observed among commercially available orange-fleshed honey dew genotypes at harvest and following simulated transport/storage/

retail conditions. The breeding line is noteworthy; although it tended to have lower SSC and sweetness values, it was nearly twice as firm as the commercial cultivars and likely more than twice as firm as the leading muskmelon cultivar, Cruiser (Saftner et al., 2006). High internal fruit firmness is an important trait for fresh-cut produce not only from a shelf-life standpoint but also from a consumer-preference perspective because firmer fruit tend to have a crisp bite and are more appealing to consumers.

All the cultivars tested had relatively high SSC and sweetness values compared with muskmelons, whose SSC seldom exceeds 9% in wholesale markets (Lester and Dunlap, 1985). Because sweetness (which is highly correlated with sugar content) is the single most significant attribute correlated with flavor and overall consumer preference of muskmelons (Lester and Shellie, 1992), orange-fleshed honey dews could be a highly suitable and more food-safe substitute for netted, orange-fleshed muskmelons. Also, because orange-fleshed honey dews are not widely available in the produce industry, further field

cultivar evaluations are needed to characterize the agronomic practices that could maximize their postharvest consumer preference attributes.

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