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Missouri Novelty Melon Trial Results

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Novelty, specialty or personalized melons are generally smaller and different from traditional Midwest watermelons, cantaloupes or muskmelons. A very successful example has been Sugar Cube, a smaller and sweeter cantaloupe now popular with some growers and consumers. In the summer of 2019, the Missouri Department of Agriculture funded a modest project by MU Extension, to evaluate four novelty melons on yield, quality and storage. Included in the evaluation were Brilliant (Canary), Honey Orange (crispy flesh Honeydew), Lambkin (Piel De Sapo), and Lilly (small & early Crenshaw). Each has an appearance and taste profile distinctly different from cantaloupe.

Materials and Methods

Sugar Cube (the standard or control), Brilliant, Honey Orange, Lambkin, and Lilly were seeded on April 29th in the research greenhouse range on the campus of the University of Missouri. Additionally, Eden's Gem and Snow Leopard were seeded on April 22nd to serve as border plants. Plastic plug trays (32 cells per tray) filled with Pro-mix BX (a standard growing mix) received two seeds per cell and placed on a greenhouse bench to germinate. The seedlings were subsequently thinned to one per cell. Plants were hardened off for 2-3 days before planting which was by hand. Border rows were on May 20th and all others on May 22nd.

The plot was at University of Missouri's Bradford Research Center (4968 Rangeline Road, Columbia, MO 65201). The area used had a mix of grasses and forbs in 2018, which was terminated in August with glyphosate herbicide. It was then tilled and seeded to buckwheat, cowpeas, radish and wheat. On March 21st glyphosate herbicide was applied on the area and turnip seed was broadcast on March 28th. The plot was field cultivated on May 14, roto-tilled on May 16 and raised beds (6) covered with white on black plastic mulch were made on May 17. Pre-plant granular fertilizer was applied to the bed tops before covering with plastic mulch at the following (actual) rates (lb) per acre: N 54, P_2O_5 88, K_2O 36. A soil test (University of Missouri Soil Lab) indicated the following additional fertilizers would benefit the crop during its growth: N 10; P_2O_5 40; K_2O 50; Ca 20 (actual rates (lb) per acre) which were applied through drip irrigation.

Plants were set into white plastic-mulched raised beds and there was no need to water in (rained that evening). All plants were sprayed with Warrior the day before planting. Dual Magnum (1 pint/ac) and Sandea (0.7 oz/ac) were applied to aisle rows on May 20. Prowl H_2O (2 pts/ac), Sandea (0.7 oz/ac), Select (10 oz/ac), gramoxone (3 pts/ac) and crop oil concentrate (1 qt/ac) were applied on June 11. Following the latter, straw was distributed at the density of 2 bales per 1,000 sq feet.

Drip irrigation was used to provide water, when required, and the additional fertilizer recommended above. The fertigation dates were June 20 & 25 and July 9, 12, 17, & 18. Plots were only watered two additional times after July 18. Field insecticide applications were as follows: Assail (May 24), Warrior (June 3), Assail (June 10). Additional insecticide applications were made on border plants only on June 20, 24, 25 and July 12. Foliar fungicide applications were made weekly (specific dates were May 28; June 3, 10, 19, 20, & 25; July 9, 16, & 22; Aug. 2 & 16). Fungicides used included Bravo, Copper Sulfate, Copper Octanoate, Mancozeb, and Rally. A beehive was placed adjacent to the plot on June 11 to facilitate pollination.

The research planting consisted of six rows 6 ft apart (center to center) with four record rows bordered by one guard row on each side of the plot. The experiment was set up in a randomized block design with melon variety as the main effect (plots) and four replications (one in each record row). The experimental unit (plot) was 25 ft long with 10 plants set 2.5 ft apart within the row. Statistical analysis of yield variables were analyzed by Proc GLM in SAS 9.4 (SAS Institute Inc., Cary, NC 27513). Melon variety was treated as the fixed factor and replication was considered the random factor.

Yields: Harvest began the week of July 22-26 and continued the following 4 weeks. Sufficiently ripened fruit were picked, weighed and sorted to marketable or cull, for every plot. Two harvests occurred for each week except for the 3rd week, which had three. Data were summarized per week.

Quality Assessment: Two representative fruits, of each variety, were selected from six different harvests and measured for soluble solids (Brix), exterior length and width and interior seed cavity length and width. Brix was determined using a hand-held refractometer.

Storage Observation: One representative fruit for each variety was selected from the harvest on August 5th and 12th. These were stored in a CoolBot refrigerated room at 58-62 F until August 19th. Visual observations to the exterior and interior were made, soluble solids were measured, and the flesh was evaluated for taste. Photos of the melons before storage were taken. One melon each of Brilliant, Honey Orange and Lilly was selected and a photo taken at harvest and one week later at room temperature, to determine if any color change was notable.

Consumer Acceptance: Scorecards were made for each melon, asking taste-panelists to rate each entry from 1 (worst) to 5 (best) for (each) sweetness, flavor and texture. Then, the overall acceptance was determined by averaging all three variables. Six tastings were conducted in six different counties (locations) on six dates (July 23 & 31, August 1, 11, 15, & 28). Properly completed scorecards collected per variety ranged from 209 to 216. The experiment was set up in a split-plot design with melon variety as the main effect (plots), location as the secondary effect (subplots), and taste-panelists as replications. Data were analyzed by Proc Mixed in SAS 9.4. Melon variety and location were treated as fixed factors and replication (panelists) was the random factor.

Results and Discussion

Crop growth was excellent, no diseases were seen, cucumber beetle numbers remained less than one per plant and few weeds broke through (which were hand eliminated until mid-July). See Figs. 1 and 2.

Key yield data are presented in Table 1. Yields were very high for all varieties near or exceeding 500 cwt (100 lb) per acre. For comparison, in a 2017 production trial conducted by Purdue University, Sugar Cube produced 433 cwt (100 lb) per acre. Our only explanation for the superior yields is the weather was generally sunny, not overly hot and the pest control was excellent.

The average fruit weight was as expected for Brilliant, Lilly, and Sugar Cube. Fruits for Lambkin and Honey Orange were larger than expected from their seed catalog descriptions (3 lb fruit). The peak week for fruit maturation was July 28-Aug. 3 (2nd week). For Sugar Cube and Lilly it was notable the percentage of total yield in the first two harvest weeks was more than that of the other varieties trialed (80% compared to about 50% for others). All varieties except Lilly had similar cull rates. A rain event of 1.14 inches on July 29 triggered much of the cracking on Lily that resulted in the higher cull percentage. Some cracking on other varieties also occurred with this rain event, but seemed a normal or expected amount. Lilly would have yielded higher if its cull rate were similar to the others. Some varmint damage occurred, but the majority of the latter was to the border row melons.

Fruit quality data are presented in Table 2. Honey Orange had the highest for soluble solids followed by Lambkin, Brilliant, Sugar Cube and Lilly. Compared to previous Midwest variety trials, information was only available for Sugar Cube. For this study, it had lower soluble solids than reported in the 2017 Indiana trial (13.3 °Brix). For that study and a 2010 Kentucky trial, specialty melons varied from 10.6 to 17.8 °Brix, 13 to 15 °Brix being typical. As in this study, 'honeydew' type melons were generally highest in soluble solids.

The storage temperature was selected that is commonly used by growers to partially chill (but not refrigerate) for a short time some warm season vegetables like melons, tomatoes, cucumbers, peppers, and summer squash. Alternatively, melons sometimes are also moved by growers to an air-conditioned room (about 70 degrees F) or just put in a farm shed. One week at the CoolBot temperature would be the equivalent of 2 to 3 days in a farm shed with no cooling or 4-5 days at room temperature.

There was no decline with any of the varieties after one week, as indicated by rind surface spots or other discoloration and interior rotting, softness or poor taste. Thus, that information is not presented. Soluble solids for all melons were of expected range (data not presented). After 2 weeks, Sugar Cube stored the poorest and Lilly had notable decline on the exterior. The others held up remarkably well (Table 3 and Figs. 3-6).

A question arose on whether storing certain melons would influence their coloration, especially noticeable greening of the rind or a greenish hue. After one week at room temperature, the rind

of Lilly notably lost its green coloring. For Honey Orange and Brilliant the change in greenish hue was subtle, but reduced to the point that the former appeared whiter and the latter a deeper yellow. See Figures 3 and 4.

Consumer tasting was conducted at a variety of events or situations, which included the Missouri State Fair, a research farm field day, the University of Missouri campus, a vegetable farm field tour, and a Master Gardener meeting. More than 200 scorecards were successfully filled out for each of the 5 different novelty melons.

Based on the results of taste-testing, it was apparent that little difference for consumer acceptance existed between the melons tested. The exception was Lilly, which ranked significantly lower in consumer acceptance when compared with Brilliant, Lambkin and Sugar Cube (Table 4). Between the article authors own tasting of the melons, others close to the project and consumer responses at tastings, a comments section was developed and is presented.

Challenges regarding ripening arose. Sugar Cube is excellent for the indicators it displays upon ripening. The netting turns tan and the ribbing stays greenish, lightening to tan when fully ripe. The stem easily slips when the ribbing is still greenish. All the other melons were more challenging to assess ripeness. The maturity cues and additional comments are presented for each below. Harvesting three times per week, versus two, would assist with full ripening before splitting.

- Brilliant- rind first turns bright yellow. Best sweetness if left until shift to a golden color occurs. Stem generally needs to be cut off, but can be forcibly slipped if golden color develops.
- Honey Orange- the most challenging. Rind should become very white and have minimal if any greenish hue. Some tiny bumps seem to develop sporadically on the surface. Bottom of melon should have some orange color coming through. Tiny cracks developing are a final indicator that full ripeness has been reached. These may be towards the stem end or where most exposed to the sun. Challenge to slip even at full ripeness.
- Lambkin- the green mottled rind made locating it in the foliage more difficult than any others. Yellow patches with the green indicated ripening. If these patches were a bit golden, was full ripeness. Could be forcibly slipped when fully ripe which further indicated ripeness; if it couldn’t be tugged off, it wasn’t fully ripe. If less than fully ripe, its flesh was crunchier and still had good flavor.
- Lilly- the rind needs to turn to a creamy white, with some yellow developing (the more the better). An absence of green is good, but a little is acceptable. Some small cracks near the melon tip by the stem are another ripeness indicator and there could be just a bit of softness to the rind at either end. Can be forcibly slipped at full ripeness, but usually needs to be cut.

Summary:

The results of this project should give confidence to growers interested in novelty melons, especially for Brilliant (Canary type) and Lambkin (Piel De Sapo). Both had excellent yields compared to Sugar Cube, stored better than it, and were well received by consumers. Lambkin should be marketed under a more interesting or descriptive name.

Honey Orange and Lilly should be considered more cautiously for production, although yields for both were excellent. Regarding Lilly's tendency to crack when ripe, this might be lessened by restricting irrigation. Lilly may also develop a following from consumers who feel a ripe fruit should be soft. To them the creamy texture is a real selling point.

When Honey Orange was at peak ripeness, it was enthusiastically received. Unfortunately, if not fully ripe, the flavor was less acceptable even with melons having Brix levels of 12 or 13. If a grower can't ensure the harvesters used can determine ripeness, it could be challenging to market or generate consumer enthusiasm.

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Figure 1. Melon Field in Mid-June

Figure 2. Melon Field in Mid-July

Table 1. Marketable Fruit Yield Data

Variety	Fruit per plant (No.)	Fruit weight (oz / lb)	Yield (cwt/acre)	Mature fruit in 1st two harvest weeks (%)	Cull (% by weight)
Brilliant	3.9 b[z]	71 / 4.4 b	502	56 b	9 b
Honey Orange	3.9 b	80 / 5.0 b	566	54 b	11 b
Lambkin	3.9 b	71 / 4.4 b	502	49 b	8 b
Lilly	2.6 c	120 / 7.5 a	557	82 a	28 a
Sugar Cube	8.2 a	33 / 2.0 c	496	83 a	9 b

[z] Mean within each column followed by different letters are significantly different from each other by LSD at $P \leq 0.05$.
cwt = 100 lb

Table 2. Fruit dimension and soluble solids.

Variety	Fruit		Seed Cavity		Total Soluble Solids (°Brix)
	Length (inches)	Width (inches)	Length (inches)	Width (inches)	
Brilliant	8.1 b[z]	5.9 bc	5.3 b	2.6 c	12.7 bc
Honey Orange	6.9 c	6.3 ab	4.1 d	3.1 a	15.1 a
Lambkin	7.7 b	5.8 c	4.8 c	2.7 bc	13.5 b
Lilly	10.0 a	6.6 a	6.7 a	3.0 ab	11.7 c
Sugar Cube	4.9 d	4.8 d	2.8 e	2.0 d	12.0 c

[z] Mean within each column followed by different letters are significantly different from each other by LSD at $P \leq 0.05$.

Table 3. Storage observations after 14 days at 60° F.

Variety	Part	Observation	
		Visual	Taste
Brilliant	exterior	OK, but some brown speckles	
	interior	OK	Good taste, just slightly softer
Honey Orange	exterior	Small bumps turning tan	
	interior	OK	Excellent, slightly soft; appears to ripen in storage
Lambkin	exterior	Slight browning on a few cracks	
	interior	OK	Excellent, no loss of texture
Lilly	exterior	Small rot spots developing	
	interior	OK, rot is from outside	Creamy, still very good
Sugar Cube	exterior	Large rot spots developing	
	interior	Decay evident in certain places	Something is 'off', too musky

Figure 3. Brilliant (top), Lilly (bottom left) and Honey Orange (bottom right) after harvest.

Figure 4. Brilliant (top), Lilly (bottom left) and Honey Orange (bottom right) one week after harvest (stored at room temperature).

Figure 5. Lambkin (top) and Sugar Cube (bottom) at one week (left) and two weeks (right) after storage at 60° F.

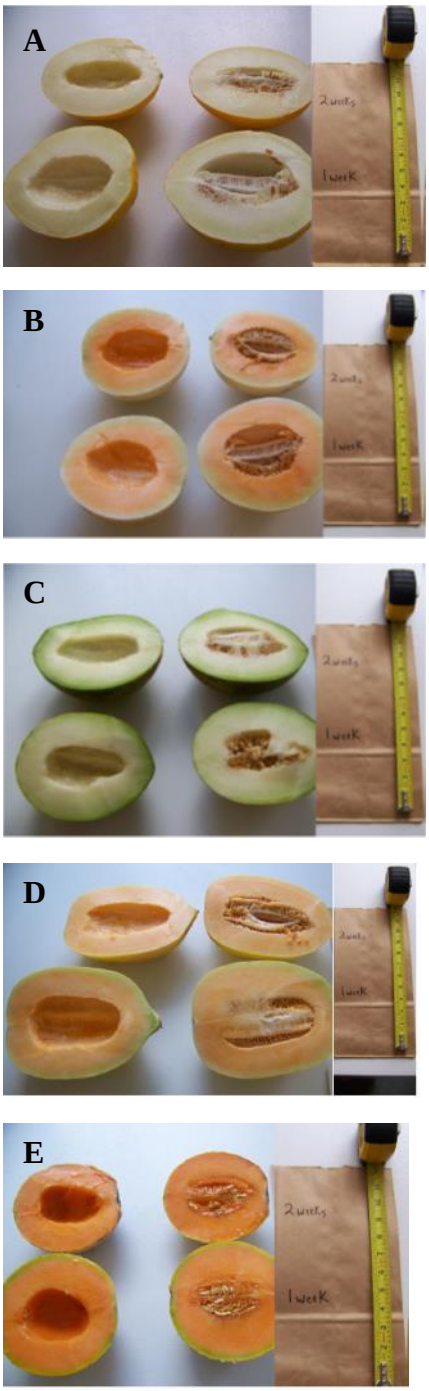

Figure 6. Melons one and two weeks after storage at 60°F. **A:** Brilliant (Canary type). **B:** Honey Orange (crisp flesh honeydew). **C:** Lambkin (Piel de Sapo). **D:** Lilly (Crenshaw). **E:** Sugar Cube (control).

Table 4. Consumer rating and comments on fruit quality.

Variety Name	Consumer Rating	Comments	
		Texture or sweetness	Flavor or general
Brilliant	3.86 a	Very crispy. Tasted sweet even if °Brix less than 12.	Mild flavor, generally liked. Broadly appealing.
Honey Orange	3.59 ab	Very crispy, but can soften if stored. Super sweet; best when °Brix 14 or above.	Subtle delicious flavors required high °Brix to perceive. If °Brix too low then less accepted.
Lambkin	3.97 a	Crispy flesh if less ripe or firm if ripe; good both ways. Consistently sweet.	Tropical to piney flavors appealed to many as 'different'. Consistently sweet.
Lilly	3.23 b	Old time melon with creamy texture appealed to specific customers. Being less sweet hurt its rating.	It's more delicate cantaloupe type flavor also appealed to certain consumers.
Sugar Cube	3.88 a	Firm but not crispy. Enjoyed even if Brix slightly low.	Rich, robust flavor. What many felt a cantaloupe should taste like.

[z] Mean within column followed by different letters are significantly different from each other by LSD at $P \leq 0.05$.