

The Importance of Raw Material Quality for Fresh-cut Products: The Impact of Melon Defect as an Example

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It is generally recognized that raw product quality should be high to insure a good quality fresh-cut product with adequate shelf-life. Fruits can have various external surface defects which are cut away in piece preparation. In melons, surface defects such as sunburned areas and large ground spots (poorly netted areas where melons touch the ground) are very common and make the fruits unattractive for the fresh market. Since processing permits the use of melons which may not be visually acceptable for fresh market, it is likely that pulp from areas below ground spots or sunburned areas are included in fresh-cut pieces. In this study we evaluated the impact of these defects on fresh-cut melon product quality.

Experimental

Two varieties of cantaloupe melons were harvested at commercial maturity ($\frac{1}{2}$ to $\frac{3}{4}$ slip). Fruit were chosen to have no defects or serious external defects which, once the peel was removed, appeared to have normal internal pulp and would likely be processed in a commercial operation. The main defects studied were ground spot areas and sunburn.

The melons were washed with 1000 ppm sodium hypochlorite solution, drained and processed at room temperature 22°C (72 °F) on a sanitized surface. The fruits were cut into rings and pieces (3 x 2 x 2 cm) with stainless steel knives and placed into plastic containers under a humidified air flow at 5°C (41°F). Pulp from below sunburned or ground spot areas were cut into similar sized pieces.

Fruit were evaluated for respiration and ethylene production rates and sensory evaluations were periodically performed. Sensory evaluations included subjective evaluations: visual quality, decay, and sweetness and flavor. Objective evaluations were color, firmness, and soluble solids concentration.

Results

The respiration rates of pieces from good quality areas and ground spot areas were similar, whereas

rates for pieces from sunburned areas were often lower during the first few days of storage (Figure 1). Ethylene production rates of pieces from sunburned areas were notably lower than those for pieces from good quality and ground spot areas.

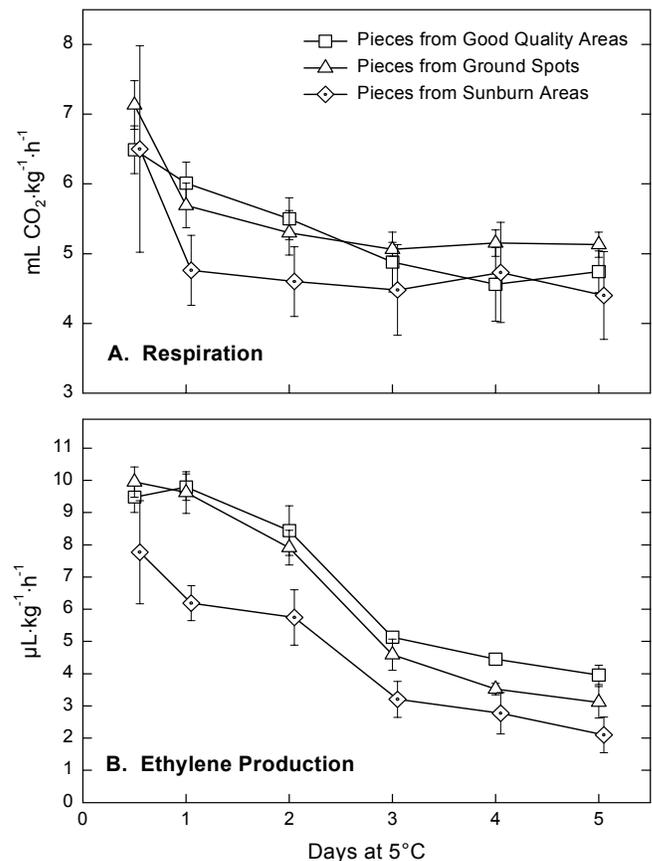


Figure 1. Respiration and ethylene production rates of pieces (3x2x2 cm) from good quality, ground spot or sunburned areas of cantaloupe (variety Cristobal) fruits. Data are averages of 3 replications + standard deviation.

Visual quality scores for pieces from good quality, ground spot and sunburned areas remained above the limit for marketability (score of 6) during 12 days at 5°C (Table 1). Aroma scores were on average lower for pieces from sunburned areas than for pieces from good quality and ground spot areas. Off-odor scores were on average higher for

Table 1. *Quality and defect attributes of cantaloupe (variety Cristobal) pieces prepared from fruits from good quality, ground spot or sunburned areas. Pieces were stored in air at 5°C.*

Parameter	Day	Fruit Area Prepared		
		Good quality	Ground spot	Sunburned
Visual				
Quality	0	9.0	9.0	9.0
	6	6.9	7.2	7.9
	12	7.0	7.0	6.3
	<i>LSD</i> ⁴	0.4		
Aroma ²				
Aroma ²	0	4.9	5.0	4.7
	6	3.7	3.3	2.6
	12	3.4	3.4	3.3
	<i>LSD</i>	0.5		
Off-odors ³				
Off-odors ³	0	1.0	1.0	1.0
	6	1.2	2.2	2.7
	12	1.7	2.3	2.0
	<i>LSD</i>	0.5		
Firmness (N) ⁴				
Firmness (N) ⁴	0	16.0	11.4	9.5
	6	10.7	9.3	6.3
	12	10.0	9.0	6.1
	<i>LSD</i>	0.3		
SSC (%)				
SSC (%)	0	12.0	10.0	8.0
	6	11.5	10.5	7.9
	12	10.9	10.4	7.8
	<i>LSD</i>	0.6		
Chroma ⁵				
Chroma ⁵	0	33.5	32.8	31.0
	6	32.4	32.2	31.7
	12	32.7	31.1	30.9
	<i>LSD</i>	0.7		

¹ Visual quality scoring: 9=excellent, 7=good, 5=fair, 3=poor, 1=unuseable. 6 is considered the limit of salability.

² Aroma scoring: 5=full, characteristic, 3=moderate, 1=none or not characteristic.

³ Off-odor scoring: 1=none, 3=moderate, 5=severe.

⁴ Firmness was measured with a 6 mm probe on a penetrometer.

⁵ Chroma is calculated from a* and b* values; a higher chroma value indicates that pulp had more orange color.

⁶ LSD values calculated for piece type x day at P<0.05.

pieces from ground spot and sunburn areas than for pieces from good quality fruit. Pieces from good quality fruit had the highest initial firmness values. With storage, pieces from good quality fruit were notably firmer than pieces from the defective areas. Pieces from sunburned areas were the least firm. The SSC was also notably lower in pieces from sunburned areas and highest in pieces from good quality fruit areas. Average chroma (orange color) values were highest in good quality pieces, intermediate in ground spot pieces, and lowest in pieces from sunburned areas.

In a second experiment with another variety (Pac Star), similar results were found. Fresh-cut melon quality was the most detrimentally impacted by using pulp from sunburned areas. SSC, chroma and firmness values were lowest for pieces from sunburned areas of fruit. In this experiment, pieces from ground spot areas were similar in quality to those from good quality fruit. That is probably because ground spot areas were not as extensive or poorly netted as in the first experiment.

Conclusions

Common external defects can impact the quality of fresh-cut melon pieces. In particular, using pulp from beneath sunburned areas should be avoided. Pieces from sunburned areas had less orange color, lower SSC and lower firmness than pulp from undamaged areas. Pieces from ground spot areas should probably be avoided also since they can be notably softer than pieces from undamaged areas. To ensure uniform high quality fresh-cut melon products, sunburned and ground spot areas should be removed from the fruit before pieces are cut.

