

Translucency in Melon: Another Example of Cutting Damage and the Need for Very Sharp Knives

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Another general principal of fresh-cut product preparation is that cutting tools should be as sharp as possible. The work by USDA researchers Bolin and Huxsoll on shredded lettuce has been used as the “classic example” of shelf-life and quality differences due to sharp and dull blades. Another classic example has been the “white-blush” problem of baby peeled carrots in which it is understood that the cell wall debris left from the abrasion process can dry out to leave the white surface. Surface coatings, moisture and low temperature storage in film packages all reduce this surface drying. More recently sharp cutting equipment rather than abrasion equipment has been recommended as the solution to this damage problem. Using very sharp cutting tools limits the number of injured cells, while blunt cutting instruments can induce injury to cells many layers removed from the actual cut because of the mechanical shock (transmission of the wound signal) imparted to the tissue.

Translucency in melons is another problem that we can demonstrate is due to dull cutting tools. For experimental purposes we often prepare melon pieces with a stainless steel borer. If the tool is not sharpened we can produce pieces that almost immediately take on a darker color than those prepared with a well sharpened cutter. With time the tissue becomes translucent and does not have normal coloration. There does not appear to be enhanced juice loss, any difference in aroma or decay development, or differences in the physiology (respiration and ethylene production) of the cut pieces. However the visual quality and typical cantaloupe color are less and the translucent disorder is very noticeable, at least in our experimental system. There is also a significant increase in electrolyte leakage, an estimate of membrane permeability, in the translucent pieces. Curiously, the firmness of the pieces prepared with the blunt tool was higher than if prepared with a sharp tool.

Table 1. Effect of sharpness of the borer used for cutting on sensory attributes of melon cylinders of three varieties stored in air at 5 °C.

Variety	Cutting Treatment	Visual Quality ¹		Translucency ²		Decay ²		Firmness ⁴ (N)	
		6 d	12 d	6d	12d	6d	12 d	6d	12d
Hy Mark	Sharp	7.5 a ⁵	4.3 a	1.3 b	1.8 b	1.0 a	3.0 a	11.1 a	9.8 b
	Blunt	3.3 b	3.7 a	3.3 a	3.8 a	1.0 a	1.3 b	12.9 a	12.0 a
Mission	Sharp	7.7 a	3.0 a	1.1 b	2.3 b	1.0 a	3.3 a	12.0 a	8.9 b
	Blunt	5.3 b	3.0 a	3.5 a	5.0 a	1.0 a	2.2 a	13.3 a	13.8 a
Ranger	Sharp	8.0 a	6.3 a	1.0 b	1.0 b	1.0 a	1.7 a	8.5 a	8.9 b
	Blunt	6.4 b	4.7 b	2.2 a	3.5 a	1.0 a	2.0 a	10.2b	12.0 a

¹ Overall visual quality (OVQ) was scored on a 9 to 1 scale, where 9 = excellent, and 1 = unusable. A score of 6 was considered the limit of salability.

² Translucency, decay and off-odor were scored on a 1 to 5 scale, where 1 = none, and 5 = severe.

³ Aroma was evaluated on a 5 to 1 scale, where 5 = full, characteristic, and 1 = absence of characteristic aroma.

⁴ Firmness was measured on the end of each cylinder with a manual firmness tester equipped with a flat-tipped cylindrical 6-mm diameter probe.

⁵ Different letters within variety and day of storage indicate significant differences at the 5% level.