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BLOSSOM-END DISORDERS OF FLORIDA TOMATOES[1]

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Abstract. **Mature green tomatoes with normal, catfaced, and pinhole blossom scars were collected from commercial packinghouses and ripened in Gainesville. Table-ripe fruit were tested for their tendency to leak from the blossom end, sliced to determine if channels extended into locules, and rated for internal appearance. Catfaced and pinhole blossom scar (PBS) fruits had more internal channels than fruit with normal blossom ends. However, internal appearance was rated excellent for 97.3%, 83.8%, and 70% of the normal, PBS, and catfaced fruits, respectively. Only 4.2% of PBS fruits had defects that more than slightly detracted from internal appearance. The presence of PBS or catfacing increased the chance of a leak occurring but only 1.7% of the PBS fruits leaked.**

Apparently the prolonged cold weather during early Spring, 1981, produced a large number of tomato fruit with blossom-end irregularities. These disorders ranged from extremely malformed and scarred fruit, normally referred to as catfaced (2, 3, 4), to fruit with a small, deep, pinhole-type blossom scar (Fig. 1). Fruits with pinhole blossom scar (PBS) tended to be small and somewhat flattened on one side, but otherwise appeared normal.

Fig. 1. External (A) and internal (B) appearance of a typical fruit with pinhole blossom scar. Internal appearance rated a three (moderate, slightly objectionable).

Current USDA grade standards score catfaces with channels that extend into a locule as a defect against all grades (1). The apparent reasons for this are to protect the trade from fruit that would leak during marketing and to provide consumers tomatoes with good internal appearance. Questions arose about applying the grade standards for catfaced fruits to fruits with PBS. Fruits with PBS were distinguished from catfaced fruits in previous studies (3, 5). This study was undertaken to compare normal, PBS, and catfaced fruits with respect to internal appearance and tendency to leak.

Materials and Methods

Normal, PBS, and catfaced mature green fruits of 'Duke', 'FTE 12', and 'Flora-Dade' were collected from field containers or dump tanks in four commercial packinghouses on April 7, 1981. A Federal/State Inspector assisted in the identification of PBS fruits to insure that fruits collected were suspected to have a channel extending into a locule. All fruits were brought to Gainesville, Florida and ripened at 68°F and 90-95% RH.

Table-ripe fruit were tested for tendency to leak from the blossom end, sliced to determine if channels extended into locules and rated for internal appearance. Each fruit was subjected to a 2-kg force for 5 seconds with a Cornell pressure tester and observed for leaking from the blossom end. Following the leak test, each fruit was sliced in cross section just below the blossom scar to determine if the channel extended into a locule, remained in the pericarp tissue, or both. Internal appearance of each fruit was rated as follows: 1=no defects, no channel; 2=slight, channel extended into fruit but did not detract from appearance; 3=moderate, channel extended into fruit and slightly detracted from appearance; 4=severe, channel extended into fruit and was very detrimental to appearance; 5=extreme, channel extended into fruit, appearance was very poor and a large part of the fruit would have to be discarded before use.

Results and Discussion

Catfaced and PBS fruits were much more likely to have internal channels than normal fruit types (Table 1). However, some fruits with normal looking blossom ends had channels that extended into the fruit. If the USDA grade standards for channels that extend into the locule were strictly applied, then culls (fruits that are graded out) would be 13%, 64%, and 82% of the normal, PBS, and catfaced types, respectively. Fruits with channels that remain in the pericarp only are not scored as culls.

Table 1. Effect of blossom-end type on the extension of channels into table-ripe tomatoes. Data are combined for all cultivars.

Blossom-end type	Location of channel			
	None	Locule (L)	Pericarp (P)	Both L & P
	%			
Normal	87	13	0	0
PBS[z]	33	60	3	4
Catfaced	14	71	4	11

[z]Pinhole blossom scar.

Most of the catfaced fruits would have been removed during normal commercial grading procedures. Culling of the PBS fruits may not be warranted since only 4.2% had internal problems that more than slightly detracted from fruit appearance (Fig. 2). PBS fruits had 83.8% excellent internal appearance (1 or 2 rating) compared to 97.3% and 70.0% for normal and catfaced types, respectively. Only a small percentage of the 919 fruit tested were leakers (Table 2). The presence of PBS or catfacing increased the probability that a leak occurred. However, the percentage of PBS fruit that leaked was so small that it represents only a minor problem. Removal of PBS fruits during a grading operation represents a monumental task. Fruit must be

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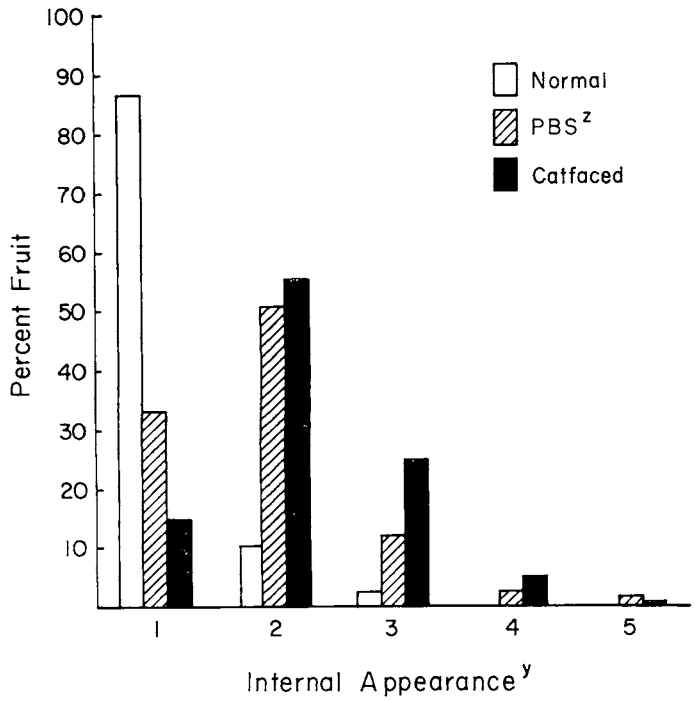

z PBS = pinhole blossom scar

y Appearance rating:
1. No defects; 2. Slight defects, not objectionable; 3. Moderate defects, slightly objectionable; 4. Severe, objectionable; 5. Extreme, appearance very poor.

Fig. 2. Internal appearance rating of blossom-end types. Data are combined for all cultivars.

individually inspected to determine if the pinhole is present and then judged to determine if the channel extends into the locule. Positive identification requires cutting which renders fruit unsaleable. These problems make it impractical to grade for PBS on a commercial scale.

Table 2. Percent of table-ripe fruit that leaked from the blossom end when subjected to a 2-kg force from a Cornell pressure tester for 5 seconds.

Cultivar	Packinghouse	Blossom-end type Normal	PBSz	Catfaced
		(% Leakers)		
Flora-Dade	A	0	2.2	0
FTE-12	B	0	1.6	0
Duke	C	0	1.1	4.3
Duke	D	0	1.8	2.2

zPinhole blossom scar.

In previous studies tomatoes with PBS appear to have been termed "normal" (3) or "concave blossom ends" (5). In both studies they were distinguished from catfaced fruits. The data presented above indicate that application of the grade standards for catfacing to tomatoes with PBS is unnecessary. Fruits with PBS were otherwise well-shaped, had good internal appearance and presented little threat of leaking during marketing.

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ETHYLENE AS RELATED TO FRUIT RIPENING IN PEACHES[1]

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Abstract. **Ethylene production of 'Flordagold' and a numbered peach selection (Fla 3-2) was studied as related to ripening. Fruits at the firm-ripe stage were treated with different concentrations of Ethrel, aminoethoxyvinylglycine (AVG), 1-amino-cyclopropane-1-carboxylic acid (ACC), Ethionine, Methionine, silver nitrate and a combination of ethrel and silver nitrate. In general, ethylene production was much higher in the 'Fla 3-2' than in 'Flordagold' which might reflect the higher firmness values in 'Flordagold' compared to 'Fla 3-2'. Maximum ethylene production was observed with ACC; ethrel produced slightly lower levels of ethylene. Ethylene production was inhibited by both silver nitrate and AVG and stimulated by ethionine, methionine and ACC. It was concluded that peach fruit has primarily the methionine pathway for ethylene production.**

Ethylene is recognized as an important ubiquitous plant hormone involved in many developmental processes including fruit ripening (1). It has been associated with development (12), storage and shelf-life (5) of many fruits.

Silver nitrate (4, 7, 11) and aminoethoxyvinylglycine (AVG) (3, 7) were found to inhibit ethylene action and production. AVG reduced endogenous ethylene production and overcame the increased ethylene production brought about by other promoting chemical applications (7).

On the other hand, ethylene production was found to be accelerated by ethylene releasing chemicals or those contributing to ethylene biosynthesis. Methionine and 1-aminocyclopropane-1-carboxylic acid (ACC) were found to be ef-

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