Processed Apricots

frozen, dehydrated and canned products studied for effects on skin textures

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Incidental to the studies which have been undertaken in the Food Technology Division for the past 30 years, it has been observed repeatedly that the skins of frozen apricot halves have a disagreeable tough texture. Consumers of the commercially frozen fruit also have expressed disapproval of this characteristic. Thinking over this problem always raises the question: Are the skins really tougher in frozen apricots than in their fresh counterpart, or do they only appear to be so by contrast with the flesh which becomes somewhat flabby as a result of freezing and thawing?

In 1947 studies were initiated to acquire some specific data bearing upon this problem. A mechanical penetrometer was used to collect objective data concerning skin toughness. This device measures the relative weights required to penetrate pieces of skin tissue. The figures do not represent absolute weights but are comparable as long as the load which travels along the graduated beam of the instrument is kept constant throughout the tests.

The following table summarizes some of the resuts of these penetrometer readings on Royal apricots grown at the University Pomology Division's orchard at Winters, frozen in 40° Brix sirup, and stored at 0°F.

	Penetrometer Readings (averages of 100 readings with standard deviations)
Fresh skin	1.09 ± .16
Quick frozen apricot skin (freshly frozen)	1.09 ± .27
Quick frozen apricot skin (4½ mos. storage at 0°)	.59 ± .12
Quick frozen apricot skin (11 mos. storage at 0°)	.80 ± .21
Quick frozen apricot skin (16 mos. storage at 0°)	2.42 ± .67

The table shows that the average penetrometer reading was the same for freshly frozen as for fresh apricots, but the frozen were more variable. However, after 4½ months' storage at 0°F the penetrometer readings were markedly lower, yet subjective taste tests of this fruit still indicated somewhat tough skins. As the storage period increased, the toughness gradually increased until at the latest testing—after 16 months' storage—the skins required over twice the original amount of weight for penetration. The increased toughness could also readily be recognized by biting into the fruit.

Dehydrated and Canned

A sample of the same lot of Royal apricots also was canned in 40° Brix sirup—processed in steam for 18 minutes at 212°F—and stored at room temperature, while another sample was steam blanched and dehydrated at 150°F. The following penetrometer data were obtained from these samples:

	Penetrometer readings (averages of 100 readings with standard deviations)
Freshly canned apricot skin	.71 ± .51
Canned apricot skins (stored 4½ months)	.31 ± .11
Canned apricot skins (stored 11 months)	.31 ± .13
Dehydrated apricot skins (stored 4 months)	.33 ± .12

The observations from these results are that canned apricot skins became more tender after several months of storage. The processing alone did not cause as much tenderization as occurred after a period of storage. The freshly canned skins were much more variable than either the fresh or any of the other processed skins. At any rate, both the canned and the dehydrated skins are sufficiently tender so as not to constitute a problem in processing.

Varieties

The observations concerning the effect of storage time upon skin toughness of frozen apricots suggested that there might be significant differences in skin toughness among different varieties. The following four varieties were packed in 1946 in 40° Brix sirup containing 100 parts per million sulfur dioxide, and tested after nearly 2½ years of storage at 0°F.

Variety	Penetrometer readings (averages of 100 readings with standard deviations)
Moorpark	1.11 ± .40
Seedings D20-43, U. C. Pomology	2.05 ± .73
Royal	1.54 ± .51
Tilton	1.49 ± .54

In addition to these physical data, morphological characteristics are also being studied in an attempt to understand the texture problems in frozen apricot skins. The studies so far undertaken have shown that apricot skins contain a vascular system somewhat comparable to the veinlets in most leaves and that in this system there are very interesting sclereids. These terminal vascular cells or sclereids are extremely tough and can go unchanged through rather harsh chemical treatments. In the frozen apricot skin these strong vascular elements may contribute to the difficulty of chewing or cutting.

Skins which were removed from apricots processed by freezing, canning, and dehydration were fixed, and prepared for study by embedding in paraffin, sectioning on a microtome, mounting and staining. These were compared microscopically.

Findings

The skin of the frozen fruit is smooth and uninjured. The dehydrated apricot shows marked shriveling and sloughing off of the topmost layer of epidermal cells. The canned apricot skin shows the cell structure intact but the physical characteristics indicated that the chemical nature of the hard portions has been altered. Histochemical studies are projected to further elucidate the changes which occur during processing in each of these ways.

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The mechanical penetrometer mentioned above was designed and built under the direction of Miss Mildred Boggs, United States Department of Agriculture, Albany.

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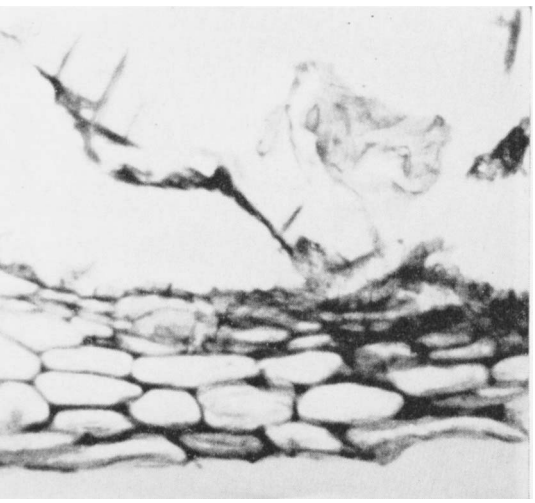

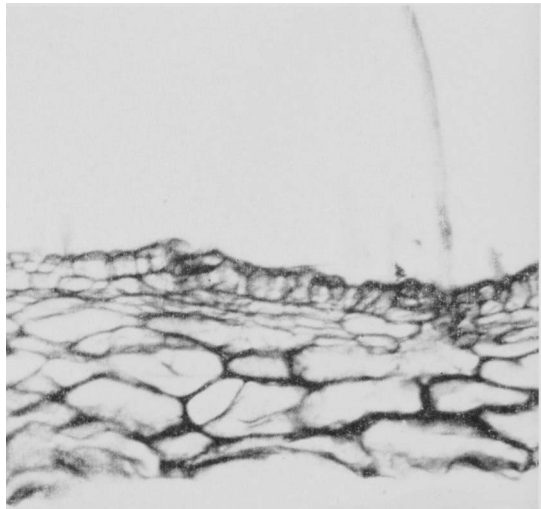

Left. Cross section of blanched, dehydrated apricot skin. ***Right.*** Cross section of frozen apricot skin.