

## UTILIZATION OF CULL AVOCADOS

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Since the organization and enforcement of marketing regulations concerning the grades of avocados sold on the fresh market, a large surplus of wind scarred, scabbed, or otherwise malformed and rejected fruit has been accumulated by both the grower and the packer. Since any stabilized industry demands a nearly complete consumption of its raw materials, the estimated 100,000 boxes of rejected fruit have become a major point of interest.

Methods of utilization discussed here are all applications of the quick freeze principles. In previous years extensive efforts were made to preserve the avocado by means of heat sterilization but in almost every case the product emerged from the retort or sterilizer with an extremely bitter flavor. This type of treatment also resulted in loss of most of the delicate avocado flavor as well as the crisp, appetizing form of the fruit pieces. Pureed preparations generally retained their color and texture but became as bitter as the fruit pieces.

The freezing instrument used in the following experiments is a miniature blast tunnel with a working temperature of  $-30^{\circ}\text{F}$  and an air current of about 1200 cubic feet of air per minute. Freezing time for all experiments was about 90 minutes. With the exception of the congealed salads, no pre-chilling was provided.

When the experiment was started, the majority of the available culls were of the Lula variety, but as the season progressed, other types became available and a decided difference in the character of the products was noticeable. The testing of varieties is not complete as many of the earlier ones were not available, but of those tested, the Lula was the most desirable. It was found, however, that other varieties could be blended with the Lula in certain products.

The very first consideration of the whole problem, however, was the investigation of a quick, simple way of peeling the fruit. While the laboratory does not house equipment for mechanical research, it was felt that an intimate knowledge of the nature of the fruit would be of value in this matter. It was found that by halving the fruit lengthwise and removing the seed that one stroke of a curved knife could remove the flesh from the skin with very little waste. While mechanical methods will undoubtedly be developed, this method is fast enough to be economically feasible.

The first experiment was the freezing of the fruit slices or chunks. Eight ounce, enamel lined cans were sealed under a vacuum, under a blanket of  $\text{CO}_2$ , and with the normal included air. After six months storage the air-filled cans showed slight general discoloration with a definite browning on the cut edges. There was also a definite loss of flavor. Both the  $\text{CO}_2$  and the vacuum sealed cans showed better color retention, no browning at all, and possessed a much better flavor. Upon thawing, some of the sharp,

fresh cut appearance as well as firmness was lost, but no more so than any other frozen fruit product.

The second experiment was a further effort at the utilization of the fruit piece or slice. After preparation the fruit was placed in an eight ounce can and covered with an aspic flavored gelatin. It has become apparent after prolonged storage that the acid content of the gelatin is of critical importance as the flavors tend to blend thus causing the avocado to be overpowered by the acid and spices of the gelatin. After sealing, the cans were pre-chilled for two hours to allow the setting of the gel and then frozen. It was found that if the product were frozen before the gel set that crystals were formed which were not stable when thawed and allowed the product to bleed. After several adjustments a gel was made which would stand at room temperature without excessive bleeding, an important requirement for institutional trade. To prepare for serving, the product is taken from the freezer several hours ahead and placed in the lower part of the icebox to temper. After tempering, both ends of the can are removed, the gel pushed out and sliced into desired portions on the salad dish.

The third experiment consisted of blending the avocado puree with a designated amount of salad dressing, salt, spices and other ingredients to form a smooth textured snack spread and salad dressing base. Packaging was done in enamel lined six ounce cans which were frozen immediately after filling and sealing. It was found that air pockets gave a very undesirable pitted appearance when thawed, but the problem was solved by filling the cans from a large funnel and allowing the stream to settle slowly in the can. Color, texture, and flavor retention have been excellent during some nine months of storage, however a very slight darkening on the top of some of the cans indicate the need of either a vacuum or inert gas blanket at the time of sealing.

A market sample of 2400 cans of the spread was prepared in the laboratory and placed in the freezer cabinet of one of the larger super markets in Miami. In one week, over 1100 cans were sold. On each can was attached a coupon inquiry worth 10c if filled out and returned. Of the entire number returned, over 95% of the answers were favorable and most of them indicated a repeat sale. The other half of the test lot was withdrawn and held for storage and other tests.

## **SUMMARY**

The three experiments discussed here were designed to make maximum use of the cull avocado. Basic methods of handling and packaging of the various products were worked out with commercial production always in mind. In all of the experimental products, an effort was made to preserve the identity of the fruit or flavor so that persons unfamiliar with the fresh fruit might acquire the taste and thereby increase the market for fresh avocados. A local market test of one of the products showed widespread acceptance and almost universal approval of the formula in regard to spices and other incorporated flavors. It was found that variety and maturity are very important in the production of a good product, but since all varieties were not tested, further work in that direction is indicated. Indications are, however, that all rejected fruit will eventually be used in some way, and return to the grower a large part of the loss now being sustained in order to stabilize the fresh market with desirable fruit.