

# Summer Squash Storage Studies

## investigations of postharvest chemical changes in summer squash stored at different temperatures

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**Summer squash** fruits remained in marketable condition for about 14 to 17 days when stored at 32° F; for about 14 days at 50° F; for eight days at 60° F; and for six days at 70° F.

At 32° F practically no chemical changes occurred. At higher storage temperatures there were large initial decreases in starch and alcohol-insoluble materials, and initial increases in reducing sugars. After the initial rise, reducing and total sugars decreased with time.

Fruits of Early Prolific Straightneck summer squash were used in all tests. The plants were grown on a Yolo fine sandy loam soil of high fertility. The experimental fruits were harvested during the early morning in August and September, approximately six days after full bloom. Their average weight was 250 grams.

Six or more uniform lots of 10 to 13 fruits each were weighed and placed in experimental storage rooms with temperatures not varying more than 2° F. The storage time varied and usually exceeded the period of marketability of the product.

Seven tests were conducted: three on fruits stored at 32° F, one each on fruits stored at 50° F and 60° F, and two at 70° F.

In two tests—at 32° F and 70° F—the fruits were divided into rind, pulp, and seeds to determine the chemical changes occurring in these portions of the fruit.

All lots were weighed at the same time of storage and again at removal, and the data for the composite samples calculated on the basis of the original fresh weight. Duplicate determinations were made for total solids, alcohol-insoluble solids, total sugars, reducing sugars, sucrose, fructose, starch and, in some tests, alcohol-soluble nitrogen.

### Appearance of the Fruits

In the first test at 32° F fruits remained in excellent condition for four days, and in good condition for 10 days although the rind was somewhat yellowed and the fruits appeared slightly old. On the 13th day the fruits showed severe pitting and the rind had definitely yellowed.

In the second test at 32° F the fruits remained in good condition for 14 days except for yellowing and slight aging. After this time, pitting developed but the

flesh remained firm and of good texture for the entire 22 days of storage. The seeds darkened somewhat toward the end.

The third test at 32° F was continued for 17 days. Fruits showed slight pitting on the 14th day and were severely pitted on the last day. The flesh became slightly pulpy by the last day.

Storage at 50° F was continued for 22 days. The fruits remained in good external condition until the 14th day when the skin showed yellowing and the bruised areas became brown. At the conclusion of the test, the rind of the fruits was hard and had enlarged brownish areas. The seeds had matured considerably but the flesh was of fair texture and firm.

Storage at 60° F lasted eight days. The appearance of the fruits was still good after six days, and fair after eight. After two days, bruised areas on the skin turned brown. On the eighth day, the seeds were enlarged and hardened.

Both tests at 70° F showed similar results. After three days the flesh became tough and pulpy, and bruised areas darkened. The fruits were still edible after six days, but not after nine when the flesh was very pulpy, the seeds enlarged and hardened, and the skin very light in color, having lost much of the original yellow.

### Chemical Composition

When stored at 32° F fruits did not show any consistent changes in sugar or total solids. Starch and alcohol-insoluble solids decreased slightly from the initial samples. In one of the tests starch and alcohol-insoluble solids increased for the first few days and then decreased.

The seeds slightly decreased in total sugars and starch. Reducing sugars decreased during the first 11 days, then increased slightly. In the pulp there was little change in sugars. Starch increased for the first few days and then decreased. The rind revealed no consistent changes in the compounds tested.

At 50° F storage the starch content dropped from an initial 0.96% to 0.63% within three days, and to 0.26% after 10 days. Alcohol-soluble solids also decreased. Reducing and total sugars increased slightly during the first seven days then gradually decreased during the remainder of the storage. Sucrose more than doubled from the first to the tenth

day and then remained practically constant.

Stored at 60° F, the starch content of the fruit dropped to about half of the initial 1.1% during the first six days. Practically the same change occurred in alcohol-insoluble solids. Total and reducing sugars increased for four days, then decreased below their initial values. Fructose decreased slightly during the eight days of storage, sucrose more than doubled during the first four days.

### Storage at 70° F

Maximum changes in composition occurred at the 70° F storage tests. In the first test—lasting 15 days—starch decreased from 1.41% to 0.63% during the first three days, then remained fairly constant. During the same period, alcohol-insoluble solids decreased from 3.06% to 2.07%. Total and reducing sugars increased the first three days, then decreased below the initial values. Fructose decreased for six days, then increased above the initial amounts.

In the second test at 70° F, starch in the rind decreased from 1.31% to 0.4% during the first three days, then remained practically constant. Alcohol-insoluble solids decreased rather gradually throughout the 11-day storage period. Reducing and total sugars increased slightly for three days, then decreased gradually.

In the pulp, the initial total-sugar and reducing-sugar content was much higher than that of the rind, yet the changes occurring during storage were markedly similar. Starch decreased from 1.08% to 0.53% in three days, then remained constant.

In the seeds, reducing sugar decreased over the entire storage period. Sucrose—much higher than in rind or pulp—decreased to almost half the initial value. Starch decreased for eight days, then rose.

The most striking change in chemical composition was the initial decrease of starch and increase in reducing sugars in fruits stored at high temperatures, suggesting a starch-to-sugar conversion.

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