FACT SHEET

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Storage and Handling of Sweet Potatoes

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Northeast Texas sweet potatoes are known nationally for their excellent skin finish. Almost ideal soil types of the area make possible the desirable appearance. The temperature during harvest is favorable for curing and storage of the root. Rainfall is usually adequate for good yields. Also, the area is considered "weevil free" and, therefore, not subject to quarantine. About 80 percent of the State's sweet potato production is centralized in Northeast Texas.

Even with these advantages, the grower's problems are not solved. The outside temperature and relative humidity often drop below the minimum for proper curing and storage. When this happens, managerial control of storage temperature and humidity, along with ventilation, determine the keeping quality of healthy roots. The grower then must cooperate with the "needs" of the sweet potato.

Root Changes after Harvest

The word "cure" has been defined broadly as those changes taking place in the sweet potato root after removal from the vine. Several *physiological* changes take place within the root. For example, the rate of respiration is high for the first week, then tends to level off. A quantity of the starch is finally converted to sugars, thereby improving the eating quality. The sweet potato becomes "sweet." Sweet potatoes baked before this physiological change lack the table quality of cured sweet potatoes. The housewife should insist on cured sweet potatoes for best cooking results.

Changes in root anatomy are probably the most important to the sale of the crop. Anatomy refers to the structure of the cells and is associated with the physiological function mentioned above. Unless certain anatomical changes take place, the crop cannot be handled commercially because of increased decay. Anatomical changes that occur in the root and prevent decay should be understood by anyone handling sweet potatoes. Even the housewife is concerned with this anatomical change, since the potatoes she purchases are likely to decay unless the injured places are properly healed.

Periderm Types

In the anatomy of the sweet potato, the *periderm* is a tissue composed of several cells in thickness located on the surface area of the root, making up what is commonly called the "skin." Anatomical changes occur in the potato skin which result in two types of periderm. (1) A *natural* periderm or skin is formed during growth and increases in cell thickness after harvest. The thickness varies among varieties. (2) *Wound* periderm is similar in structure to natural periderm except that wound periderm is formed after the root is wounded. During harvest, many avoidable nicks and skin injuries take place, and it is through the vital process of wound periderm that healing of the skin takes place. Unless wound periderm forms, the root breaks down.

Wound Periderm, Function

Wound periderm formation, or wound healing, has two important functions: (1) It improves the external appearance of the sweet potato root by healing the injuries, (2) it forms a barrier which helps protect the root from external fungus diseases, such as the common soft rot. The soft rot organism lacks the necessary enzyme to break down the cell walls of a wound which has healed completely. The soft rot organism must have an injured site to enter and destroy.

Wound Periderm, Production

When the surface of the sweet potato root is broken, a fatty substance called "suberin" forms over the cut surface. The suberin protects the cells from drying until a permanent wound periderm or protective covering can be formed. In a zone just below the suberin deposit, new cell division begins, and these cells continue to divide and function as a cambium. The cambium is a part of and gives rise to the layer of cells which is called wound periderm. At the same time, the number of natural periderm cells (no wounds) also increases.

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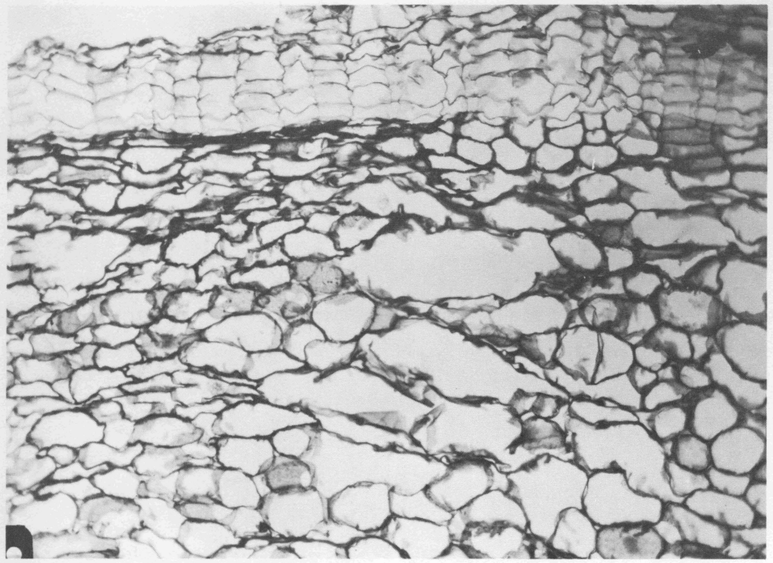
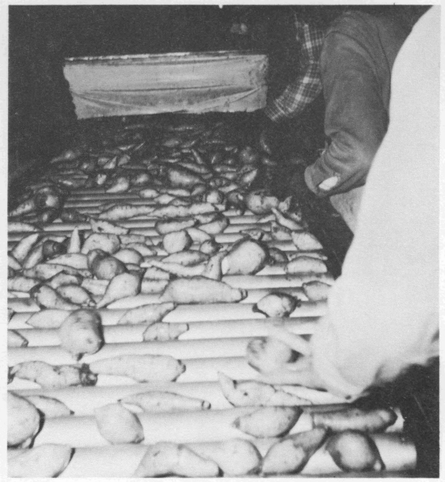
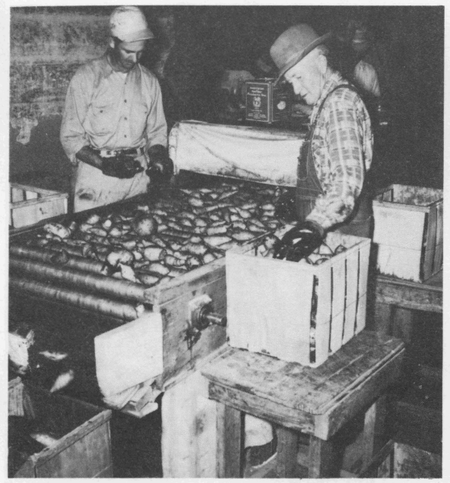
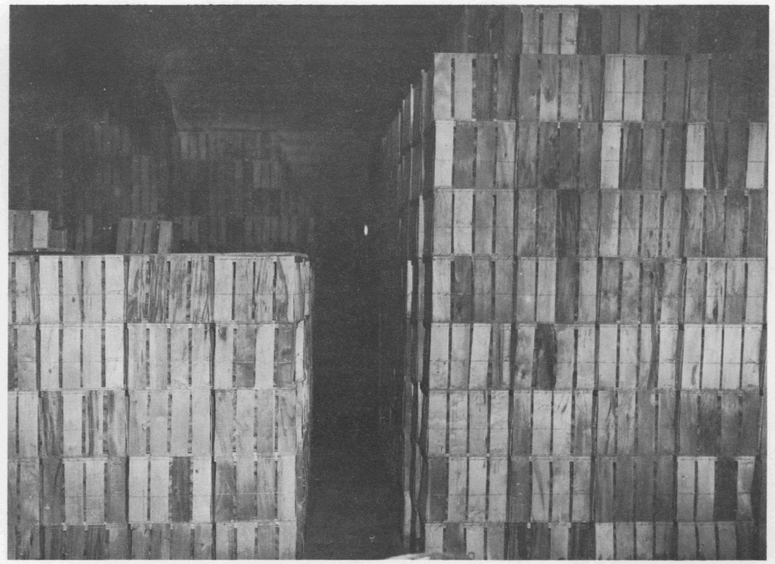


*The rectangular shaped cells at the top of the photomicrograph make up the **periderm** of the sweet potato root tissue.*



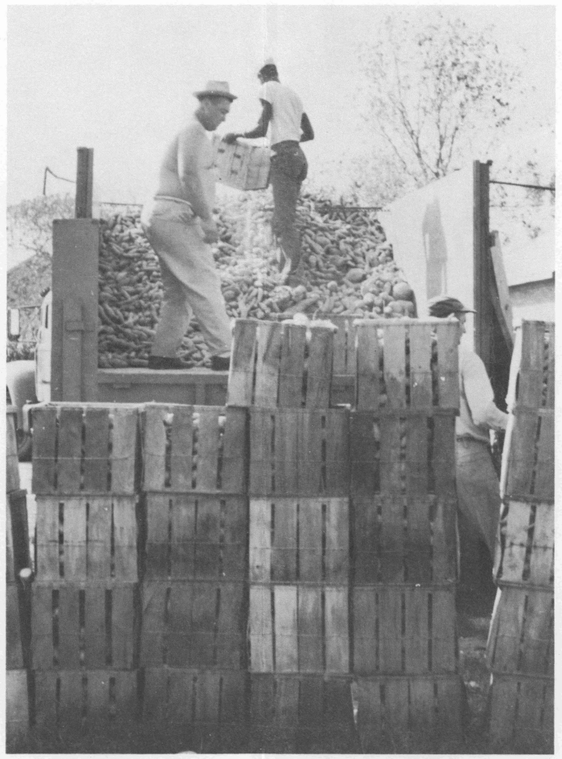


A roller conveyor on which sweet potatoes are washed, waxed, sorted and graded. Less bruising results when sweet potatoes are placed in the crates by hand.



Inside a typical storage house in East Texas.

A typical truck equipped with heater and air conditioner for transporting Number 1 grade sweet potatoes to market.



*Sweet potatoes for **processing** are handled roughly in bulk trucks and are marketed mostly "green" or uncured.*

***Anatomical** and **physiological** changes begin to take place in the sweet potato as soon as it is removed from the vine.*

Necessary Factors

Temperature, humidity and oxygen are the key factors in development of the wound periderm. With adequate ventilation, the most rapid healing takes place at 85 degrees F. and 85 percent relative humidity during a 5 to 7-day period.

At low relative humidity, the suberization process is retarded or inhibited, and, as a result, a hard crust forms at the injured surface. The area then may become dark and sunken. At a continued low humidity, shriveling may occur because of water loss.

At a lower temperature – even with an adequate relative humidity – the healing of wounds is slower, and danger is that the organism causing decay may enter the unprotected root. This slow healing is a possible cause of increased decay when roots are handled during low temperature. The housewife should be instructed to store the sweet potatoes in the warmest part of the kitchen and *never* in the refrigerator.

Ventilation is important for a proper balance of oxygen for wound healing and for the normal respiration process of the roots. Excessive ventilation can reduce the storage relative humidity, especially if the outside air is "dry," resulting in poor healing and dehydration. At this point ventilation management becomes most important. A humidistat, which gives an indication of the storage relative humidity, can be purchased for a small cost. With uniform air movement inside the storage, moisture can condense on the walls for the 5 to 7-day curing period.

Curing or Drying?

Research has shown that changes in the root during curing are *not* a drying process. These changes which take place during the 5 to 7 days after harvest actually help prevent total water loss. Total water loss is only slight during the period of optimum wound healing. Adequately healed roots will lose less weight from water loss during the storage period which follows. "Kiln dried" is a term used commercially to indicate cured sweet potatoes, as compared to "green" or "freshly harvested" sweet potatoes.

Optimum Storage Conditions

After the curing period, maintain the storage temperature at 60 degrees F., and control the relative humidity at 75 to 80 percent. This can be accomplished in larger houses by using a curing room and then moving the boxes on pallets with a fork lift to the storage room. In smaller houses, partitioned areas using temporary polyethylene plastic offer conditions for curing, if properly managed. Prolonged periods below 55 degrees F. may cause "chilling" of the roots. Results of "chilling" are surface pitting, internal breakdown, more susceptibility to disease organism and poor sprout production.

Commercial Operations

Under many commercial operations, providing optimum conditions for curing and storing the sweet potato may not be possible. Close supervision of all handling operations, however, can reduce root injuries. The sweet potato has a mechanism which operates to prevent the entry of disease organisms that destroy the root. The grower must provide conditions which allow the mechanism to function.

A fungicide, Botran, provides additional protection against the entry of soft rot organisms during handling and shipment. Since the residue on the roots must be kept within a tolerance established by the Food and Drug Administration, follow the manufacturer's recommendations. There is no substitute, however, for proper handling practices. By providing as nearly as possible the proper temperature and humidity for the sweet potato, the operator can receive dollar returns for his cooperative efforts.

To improve the industry, wholesale and retail customers should be instructed in the proper handling of sweet potatoes. The sweet potato must have the "cooperation" of handlers at all stages in the market system if it is to survive.

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