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Introduction

Ground provisions (sweetpotato, yam, cassava, eddoe) are underground storage organs with a thin delicate skin that is easily damaged during harvest and handling. Wounding and skin damage causes the product to have a high rate of water loss, leads to an unsightly appearance, and increases the susceptibility to postharvest decay.



Ground provisions in Guyana are mostly traded without a proper curing treatment. Often the uncured storage organs are bundled straight into large bags with damp soil still attached to the surface. The poorly ventilated bags are handled roughly during transport and distribution to market. It should not be surprising that postharvest losses are high.

Proper curing of ground provisions immediately following harvest is an effective way to reduce the amount of postharvest loss and increase product storage life. Uncured ground provisions will deteriorate faster and lose more weight than adequately cured ones.

What is Curing

Curing is a high temperature [(26.5-32°C) (80-90°F)] and high relative humidity (90-98% RH) treatment immediately after harvest. The total duration of the curing treatment ranges from 2 to 7 days, depending on the crop and environmental conditions. Curing does not occur below 23°C (73°F) or 65% RH. Dry air will cause injured surfaces to desiccate. The temperature should not exceed 35°C (95°F) nor should the RH be so high (i.e. 100%) where moisture condensation occurs on the surface of the product. Free moisture will allow spoilage organisms to enter the product before the protective layer forms. Ventilation is needed during the curing process to introduce fresh air (oxygen) and remove CO₂.

The Curing Process

There are two steps in the curing process. The first step is suberization, which is the production of a waxy suberin material and its deposition in the cell walls. The second step is the formation of a cork cambium and production of cork tissue (wound periderm) several cell layers below the surface of the wounded flesh tissue. The new cork tissue acts

a second skin and seals the cut or bruised areas and helps prevent the entrance of decay organisms.

Benefits of Curing

All root and tuber crops suffer some damage during harvest and handling. Curing is a natural wound healing process of damaged areas in the skin and flesh tissue of the ground provision. Curing is particularly beneficial for ground provisions intended to be stored for prolonged periods and/or exported. The stronger skin of the cured product protects against decay, reduces the amount of water loss, and extends postharvest life. The curing treatment also enhances the culinary characteristics of some ground provisions (i.e. sweetpotato). The benefits of curing are well known for sweetpotatoes, yams, and cassava. However, little information is available on curing of eddoe.

When to Cure

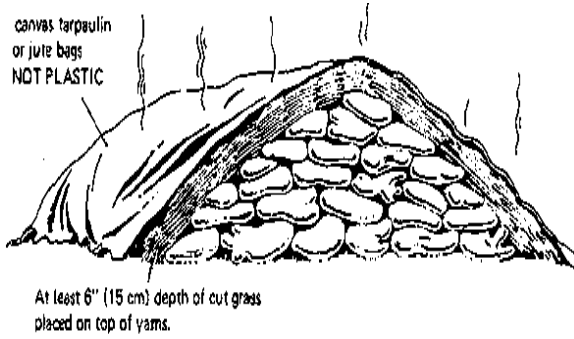
Curing should begin as soon as possible after harvest, ideally within 12 hours after digging. The roots/tubers should not be washed before curing, as this increases postharvest decay.



Methods of Curing

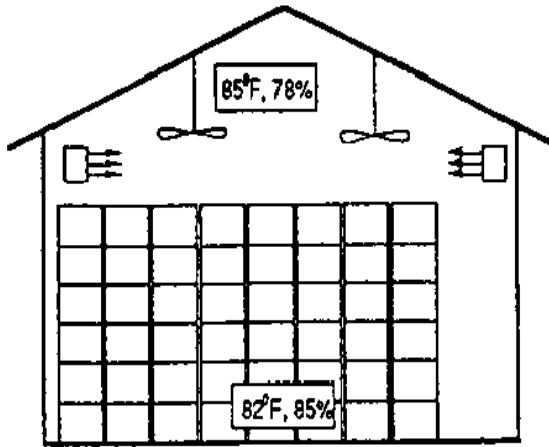
Field Curing

Ground provisions can be cured outdoors if piled in a partially shaded area. Cut grasses or straw can be used as insulating materials and the pile should be covered with canvas, burlap or woven grass mats. This covering will trap self-generated heat and moisture.



Room Curing

Ground provisions are more effectively cured inside protected structures or insulated buildings with rooms designed for this purpose. Temperature, RH, ventilation, and air circulation can be more precisely controlled. Ceiling fans can be used to help redistribute the heat down into the room of ground provisions. A high RH can be maintained by wetting the floor or using an electric humidifier. The ground provisions can be left in their field crates during curing, provided they are well-ventilated and sufficiently strong enough to be stacked. Bulk bins must be stacked to allow a gap of 10-15 cm (4-6 inches) between rows for adequate air circulation.



Recommended Conditions for Curing Ground Provisions

Commodity	Temperature		Relative Humidity (%)	Days
	C	F		
Sweetpotato	26.5-32	80-90	90-98	4-7
Yams	29-32	85-90	90-95	4-5
Cassava	26.5-29	80-85	90-95	3-4
Eddoe	26.5-30	80-86	90-95	2-4

Storage

After the ground provisions have been adequately cured, they should be moved to a longer term storage facility. Roots/tubers which have partially deteriorated following curing should be separated from the marketable ones before storing. Adequately cured ground provisions will have a significantly longer potential storage life. This will also help in marketing, by allowing for more consistent supplies of high quality product.



ANNEX 1

PUBLICATIONS IN THE POSTHARVEST HANDLING TECHNICAL BULLETIN SERIES

PH Bulletin No. 1	Pineapple: Postharvest Care and Market Preparation, November 2002.
PH Bulletin No. 2	Plantain: Postharvest Care and Market Preparation, June 2003.
PH Bulletin No. 3	Mango: Postharvest Care and Market Preparation, June 2003.
PH Bulletin No. 4	Bunch Covers for Improving Plantain and Banana Peel Quality, June 2003.
PH Bulletin No. 5	Papaya: Postharvest Care and Market Preparation, June 2003.
PH Bulletin No. 6	Watermelon: Postharvest Care and Market Preparation, October 2003.
PH Bulletin No. 7	Peppers: Postharvest Care and Market Preparation, October 2003.
PH Bulletin No. 8	Oranges: Postharvest Care and Market Preparation, October 2003.
PH Bulletin No. 9	Tomato: Postharvest Care and Market Preparation, October 2003.
PH Bulletin No. 10	Okra: Postharvest Care and Market Preparation, October 2003.
PH Bulletin No. 11	Pumpkin: Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 12	Lime: Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 13	Grapefruit: Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 14	Passion Fruit: Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 15	Green Onions: Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 16	Sweet Potato: Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 17	Eggplant (Boulanger): Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 18	Avocado (Pear): Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 19	Bitter Melon: Postharvest Care and Market Preparation, January 2004.
PH Bulletin No. 20	Bora: Postharvest Care and Market Preparation, April 2004.
PH Bulletin No. 21	Cassava: Postharvest Care and Market Preparation, April 2004.
PH Bulletin No. 22	Eddoes: Postharvest Care and Market Preparation, April 2004.

- PH Bulletin No. 23 Ginger: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 24 Breadfruit: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 25 Cabbage: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 26 Calaloo: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 27 Coconut: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 28 Cucumber: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 29 Lemon: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 30 Starfruit: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 31 Tangerine: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 32 Yam: Postharvest Care and Market Preparation, May 2004.
- PH Bulletin No. 33 Waxing Fruits and Vegetables: Postharvest Care and Market Preparation,
June 2004.
- PH Bulletin No. 34 De-Greening Citrus: Postharvest Care and Market Preparation, June
2004.
- PH Bulletin No. 35 Curing of Ground Provisions: Postharvest Care and Market Preparation,
June 2004.