

# Banana, Plantain

Recommendations for Maintaining Postharvest Quality



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## MATURITY INDICES

Maturity can be judged by the angularity of the fingers. Plantains are harvested mature-green and may or may not be ripened upon arrival at destination markets since plantains are eaten both at the mature-green stage and when fully yellow.

## QUALITY INDICES

Finger size (minimum length of 22 cm = 9 inches). Freedom from mechanical damage, scars, insect damage, disease and chemical residues.

## OPTIMUM TEMPERATURE

7.2–10°C (45–50°F) for up to 7 days  
10–12°C (50–54°F) for longer than 7 days

## OPTIMUM RELATIVE HUMIDITY

90–95%

## RATES OF RESPIRATION

Temperature	13°C (56°F)	15°C (59°F)	18°C (65°F)	20°C (68°F)
ml CO <sub>2</sub> /kg·hr <sup>1,2</sup>	10-30	12-40	15-60	20-70

<sup>1</sup>Low end for mature-green plantains and high end for ripening plantains.

<sup>2</sup>To calculate heat production multiply ml CO<sub>2</sub>/kg·hr by 440 to get BTU/ton/day or by 122 to get kcal/metric ton/day.

## RATES OF ETHYLENE PRODUCTION

Temperature	7.2°C (45°F)	10°C (50°F)	12.5°C (54.5°F)	14°C (57.2°F)	20°C (68°F)
μl C <sub>2</sub> H <sub>4</sub> /kg·hr <sup>1</sup>	0.01-0.05	0.01-0.26	0.01-0.11	0.01-0.12	0.01-2.58

<sup>1</sup>Low end for mature-green plantains and high end for ripening plantains.

## RESPONSES TO ETHYLENE

Ethylene stimulates ripening of plantains. Thus, plantains that are marketed mature-green should be protected from exposure to ethylene. Plantains that are marketed ripe should be ripened with bananas (exposure to 100–150 ppm ethylene for 24–48 hours at 15–20°C = 59–68°F and 90–95% relative humidity).

Produce Facts



## RESPONSES TO CONTROLLED ATMOSPHERES (CA)

Optimum CA: 2% O<sub>2</sub> and 5-10% CO<sub>2</sub>

CA delays ripening, reduces respiration and ethylene production rates, and maintains overall appearance of the fruit.

CA may decrease the occurrence of subepidermal browning at marginally low temperatures.

## PHYSICAL DISORDERS

**Skin abrasions.** Abrasions result from skin scuffing against other fruit, surfaces of handling equipment, or shipping boxes. When exposed to low relative humidity conditions (<90%), water loss from scuffed areas is accelerated and peel color turns brown and in severe cases black, which is similar to severe peel browning associated with chilling injury.

**Impact bruising.** Dropping of plantains may induce browning of the flesh with or without damage to the skin. In some cases, damaged areas may become infected with fungal growth.

## PHYSIOLOGICAL DISORDERS

**Chilling Injury.** Symptoms include peel browning, dull or smoky peel coloration, sub epidermal vascular browning, abnormal ripening (possible acceleration); and in severe cases failure to ripen. Chilling injury results from exposure of plantains to temperatures less than or equal to 7.2°C (45°F) for 7 or more days, depending on cultivar, maturity, and temperature. Chilled fruit are more sensitive to mechanical damage and postharvest decay.

## PATHOLOGICAL DISORDERS

**Crown rot.** This disease is caused by one or more of the following fungi: *Thielaviopsis paradoxa*, *Lasiodiplodia theobromae*, *Colletotrichum musae*, *Deightonialla torulosa*, and *Fusarium roseum* – which attack the cut surface of the hands. From the rotting hand tissue the fungi grow into the finger neck and with time, down into the fruit.

**Anthraxnose.** Caused by *Colletotrichum musae*, becomes evident as the bananas ripen, especially in wounds and skin splits.

**Stem-end rot.** Caused by *Lasiodiplodia theobromae* and/or *Thielaviopsis paradoxa*, which enter through the cut stem or hand. The invaded flesh becomes soft and water-soaked.

**Cigar-end rot.** Caused by *Verticillium theobromae* and/or *Trachysphaera fructigena*. The rotted portion of the plantain finger is dry and tends to adhere to fruits (appears similar to the ash of a cigar).

**Control strategies.** Minimizing bruising; prompt cooling to 12°C (54°F); proper sanitation of handling facilities; hot water treatments (such as 5 minutes in 50°C (122°F) water and/or fungicide (such as Imazalil) treatment to control crown rot).

## POSTHARVEST PHOTO GUIDE

### MATURITY AND QUALITY



RIPENING VARIABILITY



RIPE AND GREEN PLANTAINS

### DISORDERS



CHILLING INJURY SYMPTOMS



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