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## Postharvest Handling Technical Bulletin

# PEPPERS

## Postharvest Care and Market Preparation



Technical Bulletin No. 7

October 2003

# POSTHARVEST HANDLING TECHNICAL SERIES

## PEPPERS

### Postharvest Care and Market Preparation

Ministry of Fisheries, Crops and Livestock  
New Guyana Marketing Corporation  
National Agricultural Research Institute

Technical Bulletin No. 7

October 2003



With the assistance of the United States Agency for International Development

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## **Preface**

This publication is part of a series of technical bulletins that seeks to provide specific recommendations for improvements in postharvest care and market preparation for selected non-traditional agricultural products. The intended audience for this series is primarily extension agents.

Initial market assessments in current export markets and visits with producers and exporters in Guyana have shown the quality of fresh produce currently exported is uneven and in some instances very poor. Stages all along the export chain from harvest and pre-harvest to transportation and final export are all in need of improvement. Pre-harvest practices, sanitation at the packinghouse, packaging, bacterial and fungal problems, and transportation were all identified as areas where improvement could benefit the quality and increase the shelf life of Guyana's fresh produce exports. The technical bulletins address these issues specific to each product. Harvesting techniques and crop maturity indices are provided. Preparation for market, including cleaning, sorting, packing and transportation are covered. The bulletins address and recommend specific storage conditions, covering temperature and humidity controls. Finally the bulletins address postharvest diseases and insect damage.

The undertaking of these technical bulletins is a joint effort of the Ministry of Fisheries, Crops and Livestock; the New Guyana Marketing Corporation (NGMC) and the National Agricultural Research Institute (NARI) to improve quality, increase production and promote exports. As a team, the three agencies are working on the problems, limitations, and constraints identified in the initial reconnaissance surveys, from production and postharvest handling problems, to packaging and transportation, to final market.

## Introduction

A wide range of pepper types are grown in Guyana, ranging from large sweet bell peppers to small pungent hot peppers. Postharvest handling recommendations are identical for all types, whether they are sweet bell, wiri wiri, jalapeno, habanero, cayenne, pimiento, or other pungent hot peppers. Peppers are very sensitive to mishandling and improper storage conditions, and can quickly be damaged by too low or too high of a postharvest temperature. Utilization of proper harvest and postharvest handling methods are essential for maintaining acceptable pepper quality and maximizing market life.

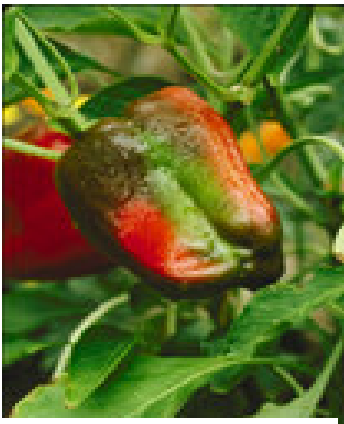


**Figure 1. Mature hot peppers with a thick wall, waxy skin, and fresh green calyx.**

## Harvest Maturity Indices

Usually the first peppers are ready for harvest about 2 months after transplanting, depending on the cultivar and season of the year. Several different indices are commonly used in determining harvest maturity. Size of the fruit is the most widely used index of maturity. The fruit should be fully developed and at full size for the particular cultivar, with a firm thick wall and waxy (shiny) skin (Figure 1). The calyx and stem should be fresh and green. Peppers having a soft, thin flesh and pale green colour (for certain varieties) are immature and not ready for harvest.

External colour is another widely used index of harvest maturity. Most pepper cultivars change skin colour as they become fully mature. However, it is not always desirable to wait for the fully mature colour before harvesting. For example, the principal demand for sweet bell peppers is for uniformly green coloured fruit. If the fruit is allowed to remain on the plant after reaching full size, it will eventually change in colour, typically to red. Hot peppers may change from green to yellow, orange, or red colour. Therefore, the specific colour demanded in the market will dictate when to harvest the fruit. In most cases, it is recommended to wait and harvest the fruit until after it has completely changed colour (Figure 2). However, some hot pepper cultivars can be marketed with a mixed skin colour (Figure 3).



**Figure 2. Avoid harvesting mixed-coloured bell pepper fruit.**

Pimiento pepper fruit should generally not be harvested until they are dark red. However, since fruits will sometimes crack in wet weather during the rainy season, they can be harvested at a light red stage and set in a dry place to redden.



**Figure 3. Harvest of mixed-coloured hot pepper fruit may be acceptable.**

Chili peppers for processing are usually harvested when red. For the fresh market, they are usually harvested green because of better quality maintenance during shipping. Chili peppers are usually green when immature and turn red with maturity, so harvest time depends on product usage and market destination.

### **Harvest Methods**

Peppers should be harvested by grasping the fruit in the hand with the thumb and forefinger and pressing against the stem, followed by snapping the fruit off the plant. Care should be taken not to sever or damage the fruiting branches while attempting to remove the fruit. Pepper plants have brittle branches that may break during harvest. Most sweet bell pepper cultivars lack a defined abscission zone in the stem, while pungent cultivars do possess a clearly defined abscission layer, allowing for a cleaner separation of the fruit from the mother plant.

Peppers are typically harvested once per week. They should be picked in the cool hours of the day and placed directly into a field basket, plastic container, or field crate. Never drop or throw pepper fruit into the picking container. Peppers should not be harvested when wet because surface moisture increases decay.

Fruit which have injuries that penetrate the skin are likely to rot and should be eliminated. Unmarketable quality or diseased fruit should also be removed from the plant and not mixed in the same field container as the marketable fruit. The discarded peppers should be removed from the field to avoid the spread and buildup of diseases and insect pests.

Peppers should be handled carefully when picking and transferring to field containers to avoid bruising and punctures. Picking containers which have rough inner surfaces may cause skin damage or fruit punctures and should be avoided. The picking containers should be wide, shallow, and stackable to avoid excessive weight and bruising of the fruit at the bottom of the container. Sturdy, well-ventilated plastic containers and/or plastic buckets make ideal harvest containers. They have smooth inner walls, which eliminate abrasion damage to the delicate skin of the pepper fruit. In addition, they can easily be cleaned and last for many years. The plastic field containers should be cleaned and sanitized before each days harvest to prevent accumulated disease organisms from infecting healthy peppers. The plastic containers should be rinsed with water to remove

debris then submerged for 2 minutes in a sanitising solution consisting of 200 ppm sodium hypochlorite (household bleach) at a water pH of 6.5.

If wooden crates or straw baskets are used as field containers, they should be lined with newspaper to minimize fruit abrasion during transport. Large canvas or nylon sacks are not suitable field containers because they are usually stuffed with too many fruit and provide little protection. The fruit may also heat up and deteriorate more rapidly due to restricted ventilation. Harvested peppers should be placed in the shade immediately after harvest and cooled as soon as possible.

Fruit should never be packed tightly into the harvest container or allowed to remain in the sun. It is not unusual for the pulp temperature of harvested peppers to be more than 32°C (90°F). In addition, peppers left in the sun for an hour on a hot, sunny day can be 10°C (50°F) hotter than fruit held in the shade. If peppers are allowed to remain at these high temperatures for more than several hours, they will begin to soften and show signs of shrinkage. Shelf life can be reduced by one-half if peppers are left in full sunlight for two hours after harvest.

During all operations, from harvesting through packing, peppers should be handled carefully to avoid bruising, cuts and punctures. Physical injury not only detracts from the visual quality of the fruit, but also causes increased weight loss and decay.

## **Preparation for Market**

### *Cleaning*

Peppers should be cleaned by dipping into a tank of water or wiping with a soft cloth to remove dirt, sand, and surface stains. If peppers are washed, chlorine should be added to the water at a concentration of 150 ppm; this is equal to 2 oz of household bleach (such as Marvex) per 5 gallons of water, or .3 liters of bleach per 100 liters of water. This will significantly reduce the amount of postharvest decay. The chlorine level and pH of the wash water should be checked at least hourly during the day with test papers or a meter. A water pH of 6.5 is desirable. The fruit must be air dried before packaging in order to reduce storage rot.

### *Grading*

The initial grading of the fruit should take place in the field at the time of harvest. Pickers should separate the unmarketable or damaged peppers from the marketable ones. At the packinghouse, the pepper fruit should be graded according to size, shape, colour, appearance, and amount of surface defects. The fruit intended for market should be fresh in appearance, uniform in shape, and free from decay and physical injury. An irregular shape does not affect edible quality, but reduces eye appeal and may lower market acceptability. Peppers should be separated into different size classes. For example, bell peppers intended for export should not be less than 7.5cm (3 inches) in diameter and not less than 9 cm (3.5 inches) long.

Export destined fruit should be firm, well-shaped, and free from damage caused by scars, sunburn, disease, insects, or mechanical injury. Peppers that are misshapen, cracked, damaged, decayed, or wilted should be discarded. The fruit should also have a uniform colour typical of the cultivar with a shiny skin. Pepper fruit of different colours should not be packed in the same carton. For example, red or partially red bell peppers should not be mixed with green-coloured fruit (Figure 4). All fruit packed in the same carton should be similar in appearance.



**Figure 4. Fruit of different colours should not be mixed in the same market container.**

### *Waxing*

A light supplementary wax coating applied to the surface of pepper fruit can increase market life, reduce fruit shriveling, and diminish the amount of vibration damage incurred during transit. Fruit appearance may also be enhanced by making the fruit more glossy (Figure 5). Pepper waxes must be food-grade and are often made from plant extracts.

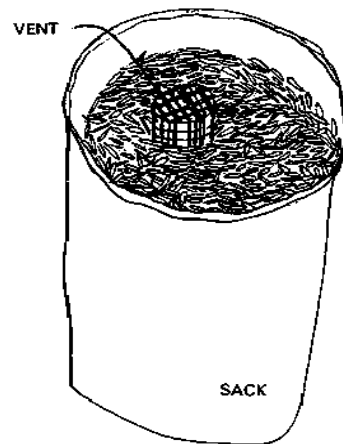


**Figure 5. Waxed peppers exhibit a noticeable surface shine.**

### *Packing*

Only the highest quality peppers should be packed for export. They should be selected for uniform maturity of colour, shape, and size and be free from defects. Any pepper showing signs of sunscald, mechanical or insect damage, or disease should be discarded. Peppers should be sent to the market as soon as possible after packing.

Peppers are packed in different sized containers, depending on the market destination. Domestic markets usually receive peppers in sacks or baskets, although these packages provide minimal protection to the fruit. If a large bag or basket must be used for packing peppers destined for the domestic market, inserting a simple vent can help reduce the buildup of heat inside the bag as the fruit respire (Figure 6).



**Figure 6. Inner tube of woven bamboo used to vent a large sack of hot peppers.**



Fiberboard cartons are the most common type of package used for export markets. The cartons should be well ventilated and strong. The carton should have a minimum 275 psi bursting strength in order to avoid collapse while stacked on a pallet. One-piece self-locking cartons or two-piece telescopic cartons are the most widely used package designs.

Hot peppers destined for export are typically packed in shallow perforated fiberboard cartons containing 4.5 kg (10 lb) of fruit (Figure 7). Bell peppers destined for the North American export market are often packed in fiberboard cartons that hold 14 kg (30 lb) of fruit. They may also be packed in smaller 40 x 60 cm (16 x 24 in) cartons holding two layers of fruit (Figure 8). This size carton is also very popular in Europe.



**Figure 7. Scotch Bonnet peppers packed loose in 4.5 kg (10 lb) cartons.**

### **Postharvest Temperature**

The optimum temperature for storage and transport of peppers is 7°C (45°F). At this temperature, the market life of peppers will be about 3 weeks. Peppers held at higher temperatures suffer more water loss and shrivel. Peppers are susceptible to chilling injury at temperatures below 7°C.



**Figure 8. Two layers of red bell peppers packed in a 40 x 60 cm carton for export.**

Cooling of the pepper fruit immediately after harvest is necessary for maintaining quality and maximizing postharvest life. It is not unusual for the pulp temperature of harvested peppers to be 32°C (90°F) or more if harvested in the heat of the afternoon or if they are exposed to full sun. If they are allowed to remain at high temperatures for more than a few hours, they will begin to show signs of shrinkage and softening. In addition, temperatures greater than 21°C (70°F) greatly accelerate fruit colour changes.

Containers of peppers should be loosely stacked in a cool room with space between the containers to allow for sufficient air circulation.

## Relative Humidity Management

The optimum postharvest relative humidity (RH) for holding peppers is between 90 to 95%. Holding peppers at a lower RH will result in more transpiration (water loss), mainly through the stem scar. Shriveling of the fruit may become apparent with as little as 3% weight loss. Storage of peppers at a high RH (90 to 95%) will minimize weight loss and maintain the firmness of the fruit.

## Principal Postharvest Diseases

Peppers are susceptible to a number of postharvest diseases, most of which require mechanical damage or weakening of the tissue before they can penetrate the fruit. The waxy skin of peppers offers protection against infection, but it is easily damaged by rough handling. Bacteria and fungal pathogens may also enter the fruit through the severed stem tissue and natural openings around the calyx.

The most common postharvest diseases of peppers are bacterial soft rot, gray mold, rhizopus rot, watery soft rot, black mold, anthracnose, and sour rot. The incidence of these diseases is always higher during wet, rainy weather. Proper pre-harvest disease control practices along with careful handling, cleaning, and grading of the fruit, and appropriate postharvest temperature control will minimize the occurrence of disease.

### *Bacterial Soft Rot*

Bacterial soft rot, caused by the soil-borne bacteria *Erwinia carotovora*, is generally the worst postharvest disease of peppers. Infections occur during rainy weather when soil containing the bacterium is splashed onto susceptible fruit. Contaminated wash water in the postharvest cleaning operation may also rapidly spread this disease. The bacteria can enter the pepper fruit through any wound, crack, or opening. Tissue damaged by insect feeding is particularly susceptible. Incidence of bacterial soft rot is generally much greater during warm, moist weather. Initial symptoms begin as light coloured, water-soaked areas around the edge of wounds on the fruit or stem. The water-soaked areas quickly enlarge. Tissue around the infection site begins to soften and the fruit eventually turns into a mushy watery mass (Figure 9). Postharvest infections are particularly damaging, because if one fruit decays the disease may eventually spread to all fruit in the same container. Bacterial soft rot is easily recognized by a foul-smelling odour as the fruit decays. The optimal temperature for bacterial soft rot growth is 27°C to 30°C (81°F to 86°F). The minimum temperature for growth is 3°C (37°F).



**Figure 9. Soft watery mass of fruit tissue due to bacterial soft rot.**

Field infections are best controlled by controlling insects that create wounds for infection. Postharvest decay is reduced by picking fruit when it is dry, avoiding injury during handling, and holding the fruit at 7°C (45°F). If fruit is washed after harvest, the water should be properly chlorinated and the fruit should be dried as quickly as possible after washing. The usual site of bacterial soft rot entrance is the broken stem tissue and calyx area, especially if free water is present. Pungent pepper cultivars usually have a defined abscission zone and do not suffer stem infections unless damaged during harvest.

### *Gray Mold*

Gray mold, caused by the fungus *Botrytis cinerea*, is usually the second worst postharvest disease of peppers. Small cream-coloured specks form on wounded areas of the fruit surface. They may soon enlarge into round water-soaked lesions covered with a gray mold (Figure 10). Optimal temperatures for growth of the fungus are between 18°C to 23°C (64°F to 73°F). However, some growth will also occur at the recommended cool storage temperature. Proper field sanitation and prevention of wounds on the fruit help reduce the incidence of gray mold.



**Figure 10.** Symptoms of gray mold on sweet pepper.

### *Rhizopus Rot*

Rhizopus rot, caused by the fungus *Rhizopus stolonifer*, is another common postharvest pepper disease. The pathogen becomes established in wounded areas of the fruit tissue or through the broken stem. Initially, small water-soaked spots form which quickly enlarge, but do not become discoloured. The entire fruit soon becomes engulfed by the pathogen, especially at ambient storage temperature. Grayish-white masses of mold develop over the wounded area, which eventually turn black (Figure 11). A clear liquid is released from diseased tissues. Nests of mold and decaying fruit may form within a carton of packed fruit. High temperature and humidity and fresh wounds promote disease development. The main ways to control *Rhizopus* are to sanitize all field containers and grading surfaces, prevent wounding of the fruit tissue, dry wet surfaces of the fruit, and cool the fruit to 7°C as soon as possible.



**Figure 11.** *Rhizopus* soft rot of yellow pepper.

### *Watery Soft Rot*

Watery soft rot, caused by the fungus *Sclerotinia sclerotiorum*, is most common after periods of extended rainfall. The soil-borne pathogen ejects spores into the air, which can become established in wounded areas of the fruit. Lesions begin to develop on the fruit surface, which are soon enveloped in a white mold (Figure 12). Infected fruit tissue becomes soft and watery. The decay spreads within a carton of packed fruit to form nests of rotting fruit.



**Figure 12. Watery soft rot of hot peppers.**

High temperature and humidity and fresh wounds promote disease development. Control of this disease is obtained by using

good pre-harvest sanitation practices, removal of diseased plants as a source of inoculum, and holding the fruit at 7°C (45°F) to retard growth of the pathogen.

### *Black Mold*

Black mold, caused by the fungus *Alternaria alternata*, primarily affects mature fruit that have been injured. Symptoms initially begin as small, circular, slightly sunken spots associated with cracks or other surface injuries. The spots enlarge into sharply sunken lesions,



**Figure 13. Sunken lesion covered with *Alternaria* mold.**

eventually becoming covered with a grayish to black mold (Figure 13). The larger lesions may show alternating light and dark-brown concentric zones. Heavy fungal spore production gives the fruit surface a dusty appearance. When the fruit is cut open, the seeds and inner fruit walls will be found to be covered with mold. Storage of the fruit at cool temperatures will significantly retard the development of black mold. The disease does not usually spread from fruit to fruit.

### *Anthracnose*

Anthracnose, caused by the fungus *Colletotrichum capsici*, is an important postharvest disease of all pepper types. Infection usually occurs prior to harvest, when fungal spores are splashed on to developing fruits. The spores usually remain in a dormant state until conditions are right for sporulation and growth of the fungus. Ripe fruits are more susceptible to this disease.

Symptoms first appear as small, water-soaked lesions on the fruit surface. The lesions rapidly enlarge at ambient temperature. Fully expanded lesions are sunken and often tan to black in colour. As the infection progresses, salmon-coloured spores appear either scattered or in concentric rings within the lesions (Figure 14). Control of anthracnose begins with proper field sanitation practices to remove infected crop debris and periodic applications of protective fungicides. Holding the fruit at 7°C (45°F) after harvest will also minimize decay.

### *Sour Rot*

Sour rot, caused by the soil-borne fungus *Geotrichum candidum*, is another common postharvest disease of peppers. On green fruit, the water-soaked lesions have a pale and greasy appearance. Although the decay may originate at cracks, cuts, or skin punctures, it frequently is found starting at the edge of the stem scar. The affected tissues remain fairly firm until the decay is quite advanced. A definite sour odour is given off by the fruit as it rots. Control of this disease is obtained by holding the fruit at 7°C, preventing injury to the fruit during harvest and handling, and maintaining good ventilation during storage. Also, elimination of flies and insects in the storage environment is important as they can transfer spores and spread the disease to healthy fruit.

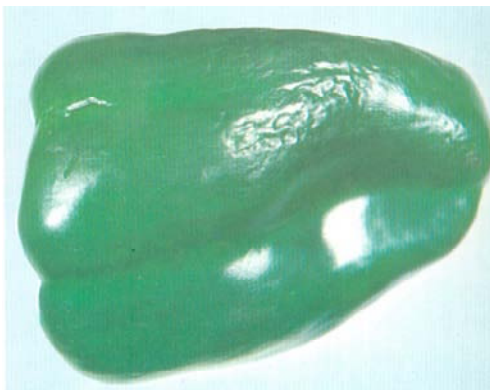


**Figure 14. Anthracnose lesions on different types of pepper fruit.**

## **Postharvest Disorders**

### *Chilling Injury*

Peppers are subject to chilling injury (CI) when held at temperatures below 7°C. Symptoms of CI include fruit softening, water-soaked spots, surface pitting, lack of colour development, discolouration of the seed cavity, and increased susceptibility to decay (Figure 15). CI also causes browning and decay of the stem. At 2°C (35°F) peppers will develop surface pitting in a few days. Severity of CI increases with more exposure in low temperature and decreases with higher temperature. However, symptoms of chilling damage usually do not appear until peppers are moved from cold storage to ambient temperature. Ripe or coloured peppers are less chilling sensitive than green peppers.



**Figure 15. Surface pitting of bell pepper fruit due to chilling injury.**

### *Ethylene Injury*

Peppers are sensitive to the natural ripening hormone ethylene, a colourless and odourless gas produced as a natural by-product of ripening by some fruits and vegetables. The presence of even minute quantities can cause a loss of chlorophyll and discolouration of the green pigment in peppers, resulting in a mosaic of yellowish, chocolate, and red colours. The combination of ethylene with high temperatures accelerates the rate of loss in green pigment. Ethylene-producing crops such as bananas, plantains, and tomatoes should not be stored or shipped with green-coloured peppers.

## **ANNEX I**

### **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.

### **PLANNED PUBLICATIONS - 2004**

Cassava: Postharvest Care and Market Preparation.

Eggplant (Boulanger): Postharvest Care and Market Preparation.

Lime: Postharvest Care and Market Preparation.

Sweet Potato: Postharvest Care and Market Preparation.

Yam: Postharvest Care and Market Preparation.

Ginger: Postharvest Care and Market Preparation.

Pumpkin: Postharvest Care and Market Preparation.

## Harvest Maturity

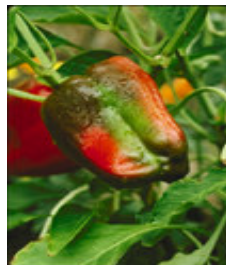
Peppers should be harvested based on a combination of different maturity measurements. The best measurements to use are time after transplanting, size and appearance.

Peppers are usually ready for harvest about 2 months after transplanting. The fruit should be fully developed and at or near its maximum size. The fruit should be firm to the touch. The fruit should have a thick wall, a shiny, waxy skin and a fresh green stem. The fruit should have an even colour, which depends on market preference.



## Harvest Methods

Grasp the fruit with the thumb and forefinger and press against the stem. Snap the fruit off the plant, being careful not to break or damage the fruiting branches. Peppers should be harvested once per week and picked in the cool hours of the day. Do not harvest when wet, as this will increase postharvest decay. Throw out injured or diseased fruit. Place the fruit directly into a field container. Never drop or throw the fruit and do not overstuff the fruit in the field container. Do not use picking containers with rough inner surfaces. Strong, well-ventilated plastic containers are ideal harvest containers. The containers should be cleaned and sanitized with a 200 ppm bleach solution before each day's harvest. Line straw baskets and wooden crates with newspaper to prevent fruit abrasion. Large canvas or nylon sacks should not be used as field containers. They provide little protection and the fruit deteriorates more rapidly due to heat build-up. Harvested peppers should be placed in the shade as soon as possible. Peppers exposed to full sun for several hours will begin to soften.



## Preparation for Market

### Cleaning

Small-scale operations can wipe the fruit with a soft cloth to remove dirt, sand, and surface stains. Larger producers should clean the fruit by dipping in a tank of clean water with 150 ppm. This is equal to 2 oz of household bleach (such as Marvex) per 5 gallons of water, or .3 liters of bleach per 100 liters of water. Check the chlorine level and pH of the wash water at least hourly using test papers or a meter. A water pH of 6.5 is desirable. Air-dry the fruit before packing.

### Grading

Sort fruit by size and according to shape, colour, appearance, and amount of surface defects. Fruit should be fresh, uniform in shape, and free from injury and decay. Fruit for the export market must be firm, well-shaped, and free from damage caused by scars, sunburn, disease, insects, or injury. Throw out badly misshapen, cracked, or wilted fruit.



### Waxing

Benefits of waxing include enhanced shine, reduced weight loss, and extended market life. A carnauba-based wax is recommended for peppers. The simplest ways to apply the wax is a manual rub or an overhead spray as the peppers are rotating on a bed of soft brushes.

### Packing

Pack only the highest quality peppers. Select for uniformity of colour, shape, and size. Do not pack damaged or decayed fruit. Do not pack fruit of different colours in the same carton. Send peppers to market as soon as possible after packing. Use strong well-ventilated containers. Use fiberboard cartons for export.

**Tip:** Waxing greatly improves the appearance and shelf life of peppers. For more details on waxing fruits and vegetable contact the New Guyana Marketing Corporation or the National Agricultural Research Institute.



Peppers packed and ready for transport

## Postharvest Temperature

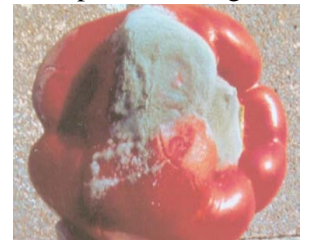
Cool fruit immediately after harvest. Fruit will soon shrink and soften at ambient temperature. Optimum postharvest temperature is 7°C (45°F). Maximum market life is 3 weeks. High temperature causes shriveling. Peppers are vulnerable to chilling injury (CI) below 7°C (45°F).

## Relative Humidity

Optimum postharvest RH is 90% to 95%. Holding peppers at low RH results in more water loss. High RH keeps the fruit firm.

## Postharvest Diseases

Postharvest diseases generally usually occur where there is tissue damage, more often during rainy season and are worse at warm temperatures. The best prevention begins with pre-harvest disease control. Start with clean seed, plant in well-drained soil and follow good field sanitation practices. Remove infected crop debris and throw out diseased fruit. Make periodic fungicide applications. Carefully handle fruit during harvest. Pick fruit when dry and clean fruit surface with soft cloth. Use clean sanitary wash water (150 ppm bleach) and dry fruit surface before packing. Peppers should be held at 7°C (45°F) postharvest temperature.





### Chilling Injury

Chilling Injury occurs below 7°C (45°F). Symptoms include fruit softening, water-soaked spots, surface pitting, discolouration of seed cavity, and increased susceptibility to decay. Injury increases the longer the fruit is exposure and the lower the temperature. Signs of damage usually appear after peppers are returned to average or room temperature.

### Gray Mould

Gray mould begin as small cream-coloured specks on wounded areas. And grows into round water-soaked spots covered with a gray mould.



*Bacterial Soft Rot (below left)* Symptoms of soft rot are water-soaked areas of tissue around the edge of wounds. Tissue softens and fruits turn into a mushy watery mass. There is a foul smelling odour and decay can spread to all fruit in the container.



*Rhizopus Rot (above right)* infects the entire fruit. Small water-soaked spots, quickly enlarge. Signs are grayish-white masses of mould that eventually turning black. Clear liquid is released and nests of mould form within the carton of fruit.



### Watery Soft Rot

Watery soft rot causes spots to develop on fruit surface, which is soon enveloped in a white mould. Infected fruit tissue becomes

soft and watery. Decay spreads within carton to form nests of rotting fruit.

### Black Mould

Black Mould symptoms are small, circular, slightly sunken spots that grow into sunken holes, later covered with gray to black mould. Seeds and inner fruit walls become covered with mould.



### Anthracnose

Anthracnose easily spreads to ripe fruits. It begins with small, water-soaked lesions that grow and become sunken with a tan to black colour.



New Guyana Marketing Corporation

# PEPPERS

## Postharvest Care and Market Preparation Information Sheet



**Technical bulletins also available on Waxing Fruits and Vegetables. Contact:**

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With the assistance of  
The United States Agency for International Development

*This information sheet provides growers and agriculture extension personnel with a summary of the recommended harvest and postharvest handling practices for peppers. A more technical and detailed bulletin is available from the New Guyana Marketing Corporation (NGMC) and the National Agricultural Research Institute (NARI).*