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Bananas

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Market Inspection Instructions

Fruit and
Vegetable
Programs

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Branch

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Market Inspection Instructions for Bananas

These inspection instructions are specifically developed by the Fresh Products Branch to assist officially licensed inspectors in the examination and inspection of bananas. They are intended to provide useful information and guidelines to facilitate inspection and marketing of bananas.

There are no U.S. grade standards for bananas. These instructions provide guidelines and definitions which will serve as a common language for the Inspection Service in the inspection and certification of bananas. This publication supersedes any previously issued inspection instructions.

Refer to the General Inspection Instructions for additional information pertaining to date, inspection point, carrier, condition of carrier, lading, etc. that is not covered in this handbook. Reference to "General Inspection Instructions" in all Fresh Products Branch publications refers to any one or all of the following - General Shipping Point Inspection Instructions, General Market Inspection Instructions, or Fresh Fruit and Vegetable Certificate Writing Handbooks.

All U.S. standards are available on the Internet under the USDA homepage.

April 2004

This publication may be duplicated without authorization from USDA.

This replaces Market Inspection Instructions for January 1966. Reformatted May 2003, previously January 1973.

Factors noted with **(Q)** are considered quality only. Factors noted with **(C)** are considered condition at market. Factors noted with **(Q or C)** may be quality or condition depending on the circumstances. Factors not designated do not pertain to either category.

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GENERAL

Bananas are grown in practically all the moist tropical countries where they constitute one of the principal foods. They are commercially grown in Central and South America and the West Indies.

There are no U.S. grade standards for bananas. However, the following guidelines shall be used for the inspection and certification of bananas.

When inspecting bananas, do not use the terms "Grade Defects," "Injury," "Damage," or "Serious Damage." Furthermore, do not use terms such as "materially" or "seriously affecting the appearance," as these terms are generally used in the general definitions of damage and serious damage. Describe the objectionable factors in terms of color, area affected and depth, etc.

REPRESENTATIVE SAMPLING

The importance of obtaining representative samples cannot be over emphasized. Accurate certification is possible only if the samples examined are truly representative of the entire lot or accessible portion. All portions of a lot or load should receive the same attention in sampling regardless of the difficulty involved in reaching all layers or parts of a lot or load. Anytime the entire lot requested is not accessible for sampling, the inspection and certificate must be restricted to the accessible portion.

Size of Sample

Bananas shall be inspected on the basis of count. The sample size shall be a **minimum of 50 count** (50 individual bananas) for packages containing 50 or more specimens. The entire contents of the container shall be the sample size for packages with less than 50 specimens.

Number of Samples

As a general rule a minimum of 1% of the lot must be examined. For lots of less than 300 packages a minimum of 3 samples must be examined. It is the inspector's responsibility to examine additional representative samples when the quality, condition, or size in samples is decidedly different to ensure an accurate description of the lot.

NOTESHEETS AND CERTIFICATE

Entries on the notesheet and certificate must be kept in a legible and accurate manner. It is mandatory that all information which appears on the certificate be supported by information on the notesheet. It is the responsibility of the inspector to

ensure that all information is properly recorded. Notations shall be recorded so that anyone familiar with inspection procedures can interpret them and write a certificate. Also remember that notesheets and certificates are prima facie evidence and must be able to withstand legal scrutiny.

Detailed instructions pertaining to date, inspection point, place of inspection, type of carrier, lading, etc., which are not covered by these instructions may be found in the General Inspection Instructions. Additional information and instructions may be given by your supervisor.

Product

The common name “Bananas,” shall be used to describe this commodity in the product heading. Type may be reported in conjunction with Bananas or may be reported in the “Lot ID” section on market notesheet and certificate.

“Bananas” shall be used to describe this commodity in the “Product” heading. Type may be reported in the “Brands/Markings” section on the notesheet and certificate. Type may refer to the color, pack or size.

The term “Bananas” refers to the yellow type. “Plantains,” “Manzanos,” “Red Bananas,” or “Apple Banana,” etc., should be so designated to distinguish them from regular yellow bananas.

Bananas are commercially packed as fingers, clusters, hands or in a combination of clusters and hands. A finger is a single banana. A cluster is at least two but not more than seven fingers attached to the crown (cut portion of stalk). A hand is eight or more fingers attached to the crown. Most shipments consist of hands or combinations of hands and clusters. Plantains are generally packed as fingers.

Number/Type of Containers

The number of containers shall always be reported. In the market the inspector shall always verify the container count provided by the applicant for each lot and report it as the “inspector’s count.” If the number of containers available for inspection does not match the application it is the inspector’s responsibility to confirm that the amount presented for inspection constitutes the lot. If an accurate count cannot be determined the inspector may report the count at someone else’s authority. However, the reason for doing so must be reported on the notesheet (e.g., numerous pallets with mixed product).

Bananas may be packed in a variety of containers, sizes, and counts. Bananas are generally packed in 40 pound cardboard cartons.

Brands/Markings

The brand, variety, size, count, grade, weight, point of origin and other important information appearing on the container should be reported on the notesheet in the

“Brands/Markings” section. Only the brand name and other key markings necessary to properly identify the lot for certification should appear in this section on the certificate.

Origin

The inspector should not make a positive statement on their own authority, but when container markings list the state or country of origin, it should be quoted in the appropriate space on the notesheet and the certificate. If origin is not marked, it is the inspectors responsibility to make an effort to obtain this information from the applicant. This policy is necessary because some firms may use one mark on the same product packed in several states. The inspector can certify only to the marks and has no means of verifying what state or country the bananas were grown.

CONDITION OF PACK

A description of the type and location of pads and liners should be shown under the “Pack” heading. Liners may be of film or paper and may cover some or all of the inner walls of the container.

The following terms should be used in describing the filling of containers:

- (a) **Well filled** - means that the container is sufficiently filled to prevent movement of the product within the container.
- (b) **Fairly well filled** - means the filling is not ideal but is still tight enough to prevent injury to the product under normal handling conditions.
- (c) **Slack** - This term is to be used when the pack cannot be described with any of the preceding terms, but should never be used without describing the slackness in fractions of an inch or in inches.

The most frequently used banana container is the 40-pound net carton. Bananas are generally packed in the form of cut “clusters and hands” in closed cartons. The cartons may be continuous (one unit) or may contain a cardboard inlay which divides the carton into two compartments. Plantains are generally shipped as single fingers shipped in 40-pound cartons.

Weight is seldom in question; however, whenever gross or net weight is requested refer to the General Market Inspection Instructions for detailed instructions.

TEMPERATURE OF PRODUCT

Due to the importance of the pulp temperature of fresh fruits and vegetables when in transit or at destination, it is essential that the inspector accurately determine and report the temperature or range in temperatures on each lot. Pulp temperature should be reported regardless of the location of the product, whether in the carrier,

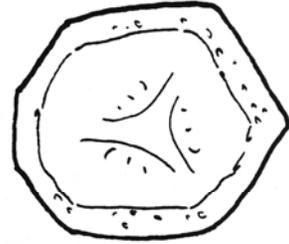
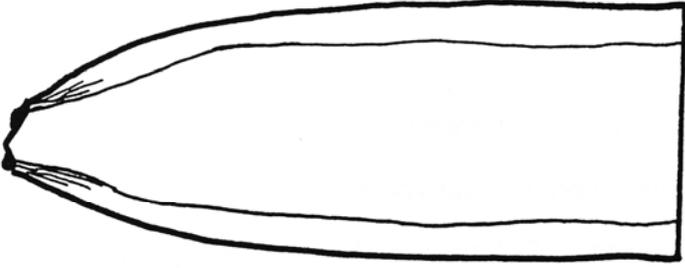
warehouse, or stacked on the platform. Remember to pre-cool the thermometer in order to obtain true readings. Report all temperatures to the nearest whole degree.

A minimum of 3 temperatures for each lot must be taken and recorded on the notesheet. Since bananas are extremely susceptible to injury from exposure to either low or high temperatures, take more than the usual number of temperatures for other products. More temperatures shall be taken if the lot is abnormally cold, heated, or there is a specific request for temperature. If chilling or heating is in question, and the conveyance doors are closed, it may be desirable to note air temperatures in the car or trailers in addition to product temperatures.

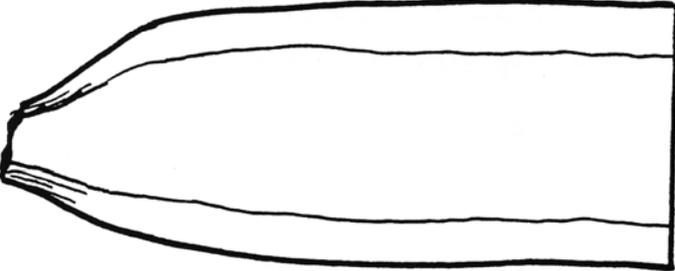
SIZE

Statements in reference to size apply only to fingers, even if they are in the form of clusters or hands. The size of fingers should be described in terms of length and fullness. Fullness refers to the roundness of the finger, the amount of pulp between the peel. The terms used to describe fullness are **thin**, **medium full** or **full**. The terms **small**, **medium** or **large** refer to the length of fingers. The following should be used as a guide for terms applied to length of fingers:

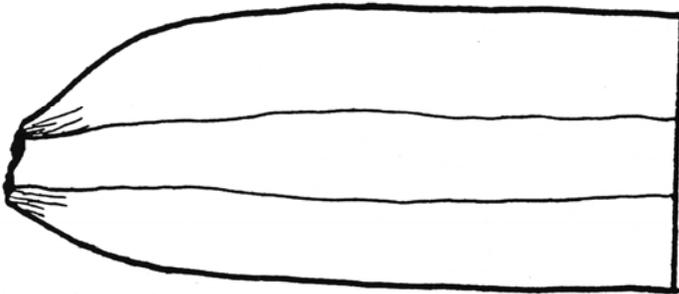
	<u>Length in inches</u>
Small	up to 5-1/2
Medium	Over 5-1/2 to 8
Large	Over 8



Maximum of Thin



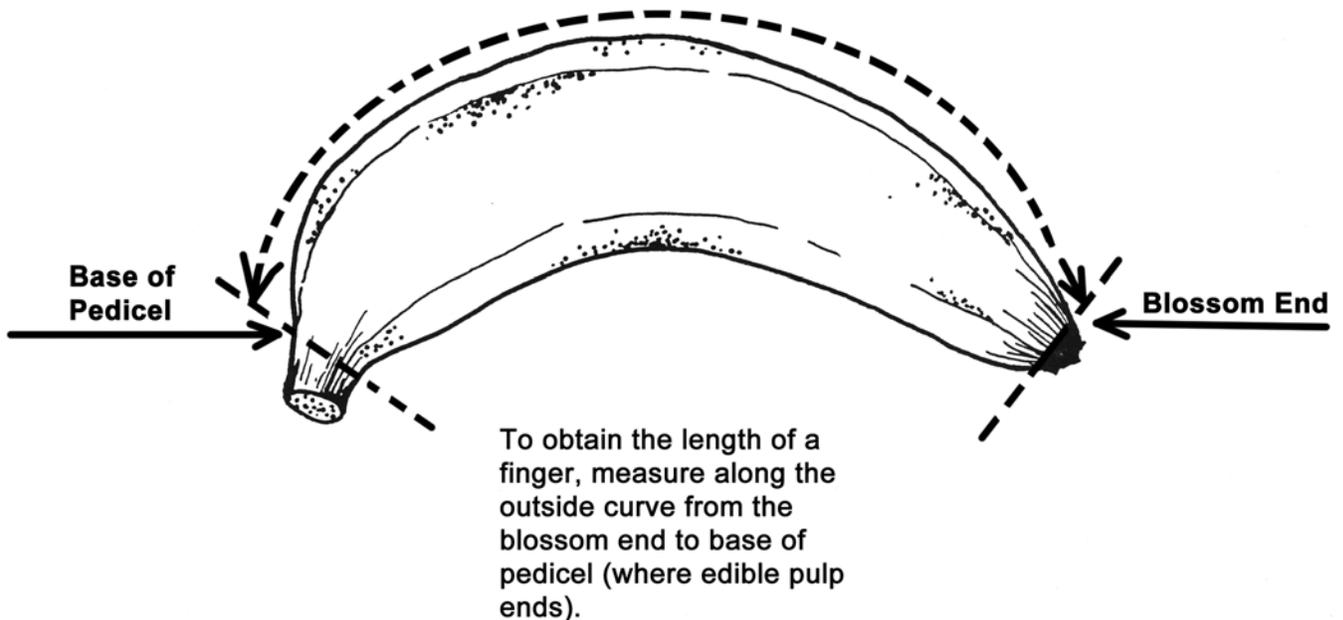
Maximum of Medium Full



Full

Bananas are generally slightly to decidedly curved. The length is the overall length of the finger measured along the line of the outer curve from blossom end to end of pulp. Measurement can best be accomplished with a flexible ruler or by a known finger span length or by marking the overall length on a flat surface, where it can be accurately measured to determine the length of the finger.

The Outer Curve Measurement



QUALITY AND CONDITION FACTORS

Statements pertaining to freshness, maturity, shape, color, the amount and type of defects, and the amount of decay are shown under the appropriate headings.

Factors noted with **(Q)** are considered as **QUALITY** only (**Quality**, sometimes referred to as “**permanent**” defects) means defects which do not change during storage or shipment (shape, scars, etc.).

Factors noted with **(C)** shall be reported as **CONDITION** on market certificates. (**Condition defects** are defects which are subject to change during shipment or storage, including but not limited to bruising, discoloration, shriveling and decay).

Those factors noted with **(Q or C)** may be considered as **QUALITY or CONDITION**, depending on the circumstances.

There are no U.S. grade standards for bananas. However, the following guidelines shall be used for the inspection and certification of bananas.

As a general policy, only those factors which are serious enough to affect the salability of the product should be reported on the certificate. Note any insect injury, scarring, sunburn, chemical, mechanical or other means which affect the appearance of the finger. Slight superficial injuries should not be noted. Any defect that causes injury to the pulp of the banana should be considered as affecting the shipping or edible quality of the banana.

Bruising (C)

Bruising is usually not a problem with green fruit but as ripening advances bananas become progressively softer and will readily bruise if handled improperly. Bruising of turning or ripe fruit may result in discolored pulp without any visible peel injury.

Note any bruising which affects the appearance, shipping or edible quality of the bananas. When reporting bruising, the inspector should also mention the ripeness of affected fruit, location in container and location of containers in the shipment.

Chilling & Freezing (C)

Chilling is a form of peel injury caused by low but not freezing temperatures. Chilling and freezing of bananas are separate conditions and should not be confused.

Chilling affects both green and ripe bananas, but less mature and thin fruits are more susceptible to low temperatures than more mature full fruits of the same variety. The extent of chilling depends on both the temperature and length of exposure. Twelve hours exposure at any temperature below 45° F in still air generally causes injury sufficient to affect marketability of fruit, regardless of the stage of ripeness when exposed. Exact upper limits of chilling temperatures are not sharply defined but vary according to the variety, condition of fruit and duration of exposure.

The market value of bananas depends to a great extent upon their appearance, regardless of eating quality. The fruit may be very slightly chilled externally, due to exposure to while being unloaded, but this has no effect other than to retard the ripening process, and is of little importance. In cold weather, work rapidly and do not keep the conveyance doors open longer than absolutely necessary.

Chilling mainly affects the peel in which certain cells are killed. The dead cells darken and give the peel a characteristic smoky or dull-yellow appearance after ripening rather than a bright yellow color. Although chilled fruit has a poor appearance when ripened, flavor and consistency may differ little from that of normal fruit if chilling is not severe. No mention should be made of chilling injury unless the injury is of sufficient extent to be of importance. For instance, if contents of top layer cartons adjacent doors show some indication of injury, and the balance of the load is free from injury, such a circumstance would be of little importance. Chilling will generally affect, to a greater degree, the more exposed portions of the load.

Chilling of green fruit: On breaking the fruit the latex (vascular bundle juices) exudes reluctantly, if at all, and has a tendency to be clear rather than milky or cloudy in appearance. This condition of the latex is not, however, brought about solely by chilling. At slightly advanced stages of ripening, even before yellow color appears, the latex also becomes clear and no longer flows freely. In the case of severely chilled bananas, dark green water-soaked areas, varying in size from small spots to the entire surface of fruit, are readily noticed on the peel before darkening sets in.

Chilling of turning and ripe fruit: On turning and ripe fruit the effect of chilling is not immediately apparent. The characteristic dull color does not appear until after the fruit is exposed to warmer temperatures. Chilling causes a dullness of the peel and also increases sensitivity to handling. Chilled bananas will often show finger marks and develop discolored areas where fruit has come into contact with packing material or other objects.

Whenever the term “chilling injury” is used on the certificate, a description of the condition of the bananas shall always be given.

Examples of chilling statements:

1. In upper 2 layers of load between doors and top layer cartons in remainder of load, nearly all green bananas, upon breaking, show comparatively dry skins with brown discoloration of vascular bundles and practically no exudation of juice, which is characteristic of chilling injury. (Follow with description of remainder of fruit.)
2. (Finger pack in ripening room.) In most cartons throughout the room green fruit shows slight to severe, mostly slight chilling injury. Riper fruit generally shows severe chilling injury with skins slate color to dark brown and dry, with flavorless flesh, location indicating chilling occurred after packing, but not in present location. (Follow with description of remainder of fruit.)
3. In all cartons adjacent doors and in upper 2 layers of cartons in 3 stacks each side of doorway, nearly all bananas show comparatively dry skins with brown discoloration of vascular bundles and practically no exudation of juice, which is characteristic of chilling injury.

If the inspector is unable to determine the cause of the discoloration, or is unsure if the defect is actually “chilling injury,” then he/she shall describe the defect as discoloration (not chilly injury) on the certificate.

Freezing

Freezing is caused by temperatures low enough to cause ice formation in the tissues. Frozen bananas have absolutely no commercial value because they turn black externally when exposed to warmer temperatures and will not ripen.

The term “frozen” is only to be used when ice crystals are present. The term “Freezing injury” should be used when it is evident that the bananas have been frozen, but is not in a frozen condition at time of inspection.

Reporting Chilling and Freezing Injury

When reporting chilling or freezing injury it is important to give the following information:

- Record pulp temperatures taken at various locations.
- Determine and record the extent of the injury in the load.
- Determine and record the degree to which individual specimens are affected.
- Describe the pattern of chilling or freezing injury in clear concise terms.

When the location of injury indicates where or when the injury occurred, it should be reported in the chilling/freezing statement. For example: "Chilling injury so located as to indicate chilling injury occurred after packing, but not in present location."

Discoloration (Q & C)

Discoloration of the peel may appear as a reddish bronze, rust, slate, brown or black color and may be caused by many factors, including but not limited to insect, rough handling, growing conditions, chilling and overheating. (See Chilling injury and Overheating sections for specific instructions.)

Black or dark brown leathery scars that usually do not penetrate the peel but may cause it to adhere to underlying flesh. This type of scar occurs on the outer (convex) side of fingers and generally is caused by rubbing of adjacent fingers as stalks are conveyed from plantation to packinghouse.

Light or dark brown discoloration, which is usually mottled or streaked and covers from one side to all sides of a finger. This type of discoloration is confined to the epidermis of the peel. If this type of discoloration is not severe enough to report on the basis of individual fingers, it may be reported as affecting the general appearance of clusters or hands and reported in the "Other" section of the certificate.

A light reddish cast on the peel is called "**red rust**" by the trade and is caused by thrips. This type of discoloration does not change appreciably as the fruit ripens and is not objectionable unless very severe. Bananas affected by thrips initially appear as water soaked smoky areas between adjacent fruit where the thrips feed. In later stages these areas may become rusty red to dark brown or black, and is confined to areas where the fingers are touching. This type of discoloration does not change appreciably as the fruit ripens and is not objectionable unless very severe.

Overheating (C)

Bananas that have been overheated or "cooked" (trade term) are drastically reduced in market value and must be disposed of promptly. Overheated bananas will not develop the desired bright color and good flavor. Instead the fruit has a flat flavor and deteriorates rapidly. Usually overheated fruit will become abnormally soft while turning from green to yellow and will show a characteristic dull grayish tint, with the skin

becoming excessively brittle, causing the fingers to separate easily from the cut stalk. These conditions are soon followed by the appearance of numerous brown spots resembling those present on soft ripe fruit. To help distinguish discoloration from overheating from other causes, it is recommended to cut the affected banana lengthwise to examine the internal pulp. Bananas affected by overheating often show a brownish to grayish discoloration emanating from the center of the pulp outward. The actual degree of overheating injury will depend upon the conditions to which the fruit has been subjected.

Overheating injury shall be reported by the individual finger, and each defect shall be reported separately. **Do not use the term “overheating” on the certificate.**

Ripeness

Under “Condition” refer to the stage of ripeness, as indicated by the color of the fruit. (While the size of the finger is related to the stage of growth and maturity, it is reported to better advantage under “Size.”) It is usually desired that the fruit arrive at destination in green condition. When bananas arrive at destination with higher stages of ripeness, they will have a reduced shelf life, and the shipment must be disposed of within a short period, and if ripe, there may be considerable damage due to bruising and crushing of the fruit. Such condition may be reported either in terms of approximate number of cartons showing certain stages of ripeness or in fractional portions of the load.

When reporting ripeness, the terms green, turning yellow and ripe may be used in most cases. In some cases it may be desirable to be more specific and report degrees of ripeness.

The following is a list of degrees of ripeness included in each stage:

GREEN	<ol style="list-style-type: none"> 1. Green 2. Light green, breaking slightly toward yellow.
TURNING YELLOW	<ol style="list-style-type: none"> 3. Yellowish-green, more green than yellow. 4. Greenish-yellow, more yellow than green.
RIPE	<ol style="list-style-type: none"> 5. Yellow with green tips. 6. Yellow. 7. Yellow, flecked with brown.

(For color illustrations of above stages see Banana Color Chart C-1.)

Examples:

- (1) Most fingers in approximately 1/2 of cartons are green, in remainder of cartons fingers are turning yellow.
- (2) In most cartons fingers are green to light green, in some cartons yellowish-green to yellow with green tips.
- (3) In nearly all cartons fruit is yellowish-green to yellow and generally soft. (These conditions plus high temperatures would indicate overheating.)
- (4) Fruit in most cartons are green, in some cartons fruit is mostly yellowish-green to yellow with entire contents of a few cartons yellow flecked with brown.

Bananas are shipped from the plantation in a green condition and generally will arrive at the wholesaler's warehouse in the same condition if properly handled. Upon arrival at the warehouse the bananas are placed in airtight, humidity and temperature controlled rooms called "ripening rooms."

Ethylene gas is often artificially administered to control the speed of ripening. The most desirable temperature range for ripening with ethylene lies between 58° and 64°F. **The inspector should never work in ripening rooms where ethylene gas is being used.** The gas is flammable and under certain conditions EXPLOSIVE.

Shape (Q)

Consider the shape of the finger on its own or as a component part of the cluster or hand. The term well formed should be used for fingers having normal curvature and proportion and lying within the natural contour of the hand.

Misshapen should be used for those fingers which are twisted, stunted, or otherwise deformed so that the normal contour of the cluster or hand is destroyed.

Doubles

Two bananas joined together shall be counted as one fruit and scored as "doubles."

Decay (C)

When dead ripe, bananas invariably become spotted with small brown specks called Anthracnose. Being so closely related to advanced ripeness, these specks should be mentioned in connections with stages of ripeness. When in the early stage, merely describe the condition and appearance of the fruit without mentioning the specific nature of the spots. Parties connected with the banana industry would consider a report too technical if such spots were reported as Anthracnose. In extreme cases, the spots may become very large and slightly sunken, covering practically the entire

surface, and the characteristic pink spores are developed. In this condition the fruit is commercially worthless and should be reported as decay.

Black Rot of bananas is caused by the same fungus (Thielaviopsis) that causes Black Rot of pineapples. Infections of the fungus take-place at the plantation. Green bananas usually do not show Black Rot until they begin to turn yellow in transit or in ripening rooms.

First evidence of Black Rot of the fruit is a pliable, black discoloration of the peel at the neck of the finger. This discoloration is of irregular shape and without any definite margin. Usually there is little or no surface mold apparent in advanced stages of decay. Any surface mold that develops will be fine in texture and white to grayish-black in color. The decay is chiefly confined to the peel. Black Rot affecting only the crown shall be called Crown Rot.

Scoring/Reporting Decay

Decay may be reported on the basis of the individual finger, hand or cluster. Separate columns shall be kept on the notesheet and certificate when determining and reporting decay.

Decay shall be scored on the basis of the individual finger when:

1. Affecting the peel covering the edible pulp: or
2. Affecting any portion of edible pulp.
3. When affecting only the neck of the banana.

Decay shall be scored on the basis of the cluster or hand when decay is confined only to the crown of clusters or hands.

When scoring decay on the basis of the cluster or hand, percentages shall be determined by the number of fingers on the hand or cluster. If a hand or cluster is affected by crown rot, then all bananas on the hand or cluster shall be scored as crown rot. If a hand or cluster has both decay affecting the fingers and crown, report the fingers affected by decay by the individual finger, and report all remaining fingers under crown rot. (i.e. A cluster with 5 fingers has crown rot, one finger is also affected by decay affecting the edible portion of the banana. Report 4 fingers under crown rot, and one finger as decay affecting the edible quality.)

Example:

20% Crown Rot (0 to 40%)

10% Decay affecting fingers (8 to 16%)

When decay is in excess of one percent, report the degree of advancement as: early, moderate or advanced in the "Other" section on the certificate.

GRADE

There are no U.S. Grade Standards for Bananas. When quality factors are reported, the grade statement shall be reported as "No Established U.S. Grade."