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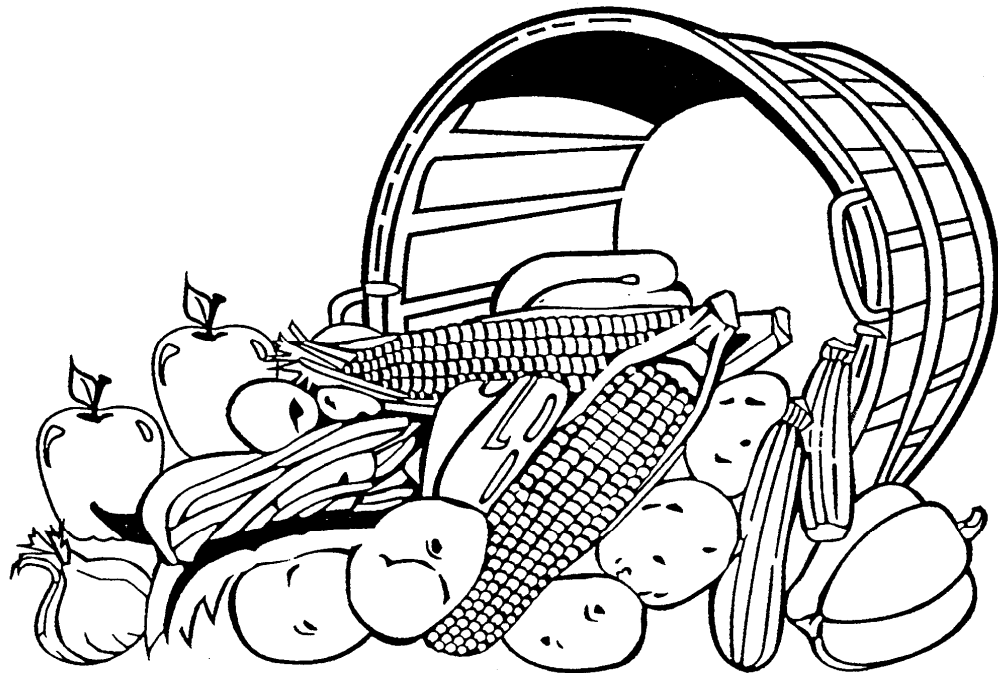
Fruit and
Vegetable
Programs

Fresh Products
Branch

July 2006

Mangos

Shipping Point and Market Inspection Instructions



Shipping Point and Market Inspection Instructions for Mangos

These inspection instructions are specifically developed by the Fresh Products Branch to assist officially licensed inspectors in the interpretation and application of the U.S. Standards for Grades of Mangos, Section 51.1043.

These instructions do not establish any substantial rule not legally authorized by the official grade standards.

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.

Any portion of these instructions beginning with the section number §51.--- and followed by **bold** print are sections or portions of sections copied directly from U.S. standards. The U.S. Standards for Grades of Mangos are printed in the appendix of this handbook. All U.S. standards are available on the Internet under the USDA homepage.

July 2006

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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

Mangos are grown in tropical and subtropical lowlands throughout the world. Mangos are one of the most consumed fruits worldwide and one of the most important fruit crops in tropical and subtropical areas of the world. Major production areas include India, Mexico, Brazil, and the Philippines. Other areas are Guatemala, Ecuador, Nicaragua, Peru, Haiti, Australia, South Africa, Israel, and Egypt.

The United States (U.S.) receives the majority of mangos from Mexico. Mexico produces many varieties but mainly exports five main varieties. The main varieties are Tommy Atkins, Haden, Ataulfo, Kent and Keitt. Mexican mangos are available from February through mid September.

Mangos cannot be shipped freely into the U.S. because of the possibility that insects and diseases could be introduced into the U.S., which could devastate domestic crops. Hot water treatment is one method used to treat mangos and safeguard against fruit flies from entering the United States.

Major subtropical pests of mangos are several species of fruit flies that are not native to the United States. Hot water treatment is a method used to treat mangos and safeguard against the entrance of fruit flies on U.S. soil.

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

The tolerances in the U.S. Standards for Grades of Mangos are determined on the basis of count.

For packages with less than 25 fruit, the entire contents of the package shall be the sample. For packages with 25 or more fruit, the minimum sample size is 25 fruit. Whenever defects exceed the package in one or more samples in package with 25 or more fruit, the entire contents of at least one of those packages must be examined.

Sampling for Internal Defects

During examination for external defects it may be difficult for inspectors to detect the presence of internal defects. Some fruit must be cut from every sample. The number of specimens cut is discretionary and based on such factors as varietal characteristics, growing conditions, time of year, the ripeness of fruit and any external characteristics of *possible* internal defects.

When there are external indications of possible internal defects, then that fruit should be cut and the percentage of internal defects is based on the entire sample examined. It is not based upon the number of fruit cut. For example, if an inspector examines a 25-count sample of mangos, and after cutting 10 suspicious specimens finds 1 with an internal defect, the percentage of internal defects is 4% (1 defective fruit out of the entire sample, 25 fruit in this case).

Number of Samples

As a general rule a minimum of 1-1/2 to 2% of the lot 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.

TOLERANCES AND APPLICATION OF TOLERANCES

The tolerances in the U.S. Standards for Grades of Mangos are based on count. Therefore, the determination of percentages must be made on that basis.

51.1044 U.S. No. 1. (a) Tolerances. In order to allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangos in any lot may fail to meet the requirements of this grade, including in this amount not more than 5 percent shall be allowed for defects causing serious damage, including in this latter amount not more than 2 percent shall be allowed for decay.

§51.1045 U.S. No. 2. (a) Tolerances. In order to allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangos in any lot may fail to meet the requirements of this grade, included in this amount not more than 2 percent shall be allowed for decay.

Summary of Tolerances

U.S. Fancy and U.S. No. 1.

Total Defects	10%
<i>Including serious damage</i>	5%
<i>Including decay</i>	2%

U.S. No. 2

Total Defects	10%
<i>Including decay</i>	2%

Application of Tolerances

§51.1046 *Application of Tolerances.* The contents of individual packages in the lot, based on the sample inspection, are subject to the following limitations: (a) For a tolerance of 10 percent or more, individual packages shall have not more than 1-1/2 times the tolerance specified, and for a tolerance of less than 10 percent, individual packages shall have not more than double the tolerance specified; *Provided*, That at least one defective specimen may be allowed in any package: *And provided further*, that the averages for the entire lot are within the tolerances specified for the grade.

U.S. Fancy and U.S. No. 1.

Total Defects	15%
<i>Including serious damage</i>	10%
<i>Including decay</i>	4%

U.S. No. 2

Total Defects	15%
<i>Including decay</i>	4%

Provided, That at least one defective specimen may be allowed in any package. *And provided further*, that the averages for the entire lot are within the tolerances specified by the grade.

NOTESHEET AND CERTIFICATE

Entries on the notesheet and certificate must be kept in a legible and accurate manner. It is mandatory that all information that 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. Your supervisor may give additional information and instructions.

Product

The common name “Mangos” shall be used to describe this commodity in the product heading. Variety may be reported in conjunction with “Mangos” or may be reported in the “Lot ID” section on the notesheet and certificate when marked on the containers or on the applicant’s authority. No variety shall be certified; however, if a variety is marked, it shall be quoted on the certificate.

Number/Type of Containers

The number of containers shall always be reported. In the market and at shipping point locations for stationary lot certification, the inspector shall always verify the container count provided by the applicant for each lot and report it as “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 (such as on a day’s run certification), the inspector may report the count on someone else’s authority. However, the reason for doing so must be reported on the notesheet (e.g., numerous pallets with mixed product).

At shipping point locations for “days-run” certification, the applicant generally provides a manifest for count and it is acceptable to use this for the number of containers.

Mangos are usually packed and shipped in single layered cartons or volume-filled fiberboard 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 inspectors 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 inspector’s 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 in what state or country the mangos were grown.

CONDITION OF PACK

The following terms should be used to describe pack:

Single layered cartons:

Very Tight - the pack is too tight and usually results in bruising in ripe fruit.

Tight - when packed in the containers in a manner that movement is not allowed.

Fairly Tight - there is only slight fruit movement in the container.

Slack - there is free movement of the fruit in the container. When this term is used, the amount of slackness must be reported in inches and fractions thereof.

Volume Filled Cartons:

Well filled - the contents have little or no movement and are packed within 1 inch of the top of the container.

Fairly Well Filled - the contents have some movement and may be below the top edge of the container, but not more than 2 inches below the top edge.

Slack - the contents are loose and the fruit is more than 3 inches below the top edge of the container. This term must always be qualified by showing how much the fruit is below the top edge in fractions of an inch or inches.

TEMPERATURE OF PRODUCT

Inspectors would not normally determine or report temperatures at shipping point. However, 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 three temperatures for each lot must be taken and recorded on the notesheet. More temperatures must be taken if the lot is abnormally warm or cold, or there is a specific request for temperature, and these must be reported in greater detail specifying location in the lot and/or load.

SIZE

The U.S. Standards for Grades of Mangos have no size requirements. However, size is usually shown by marking a “count per carton” designation or may be shown in inches and fractions thereof.

Count/Size Designations

Size packs are generally marked with a count/size designation, such as 6, 9, and 12 count/size, etc.

Diameter

§51.1049 Diameter. “Diameter” means the greatest dimension of the mango measured at right angles to a line from stem to blossom end.

This is best measured with a sizing ring. A caliper may also be used to measure diameter.

DEFECTS (QUALITY AND CONDITION)

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** is 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 factors 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.

NOTE: References to area, aggregate areas, or length are based on fruit 3" in diameter; corresponding measures would be allowed on smaller or larger fruit.

Bruising (C)

Bruising may occur due to careless or rough handling, excessively tight pack, or movement of the fruit in a slack pack. Severe bruises are a serious defect and seriously affect the commercial value of the fruit. Mangos that are only slightly flattened on one side by pressure of the pack and show no discoloration shall not be scored.

Bruises are sometimes mistaken for decay. To distinguish the two, it is only necessary to remember that with bruising the flesh has a mottled brown and white appearance and the skin is usually not discolored; whereas with decay, usually both the skin and flesh may be discolored and is typically disintegrating.

Scoring Guide

Bruises are scored on the basis of depth, area, and discoloration.

Score as **injury**: When any slight surface indentation and discoloration of the flesh extending more than 1/8 inch in depth and 1/2 inch in diameter.

Score as **damage**: When the surface indentation and discoloration of the flesh extends deeper than 1/4 inch and causing discoloration exceeding the area of a circle 3/4 inch in diameter.

Score as **serious damage**: When surface indentation and discoloration of the flesh extends deeper than 1/2 inch and causing discoloration exceeding the area of a circle 1 inch in diameter.

Cleanness (Q)

All grades in the U.S. Standards for Grades of Mangos require "clean" mangos.

§51.1047 Clean. "Clean" means that the fruit is practically free from dirt, dust or other foreign material.

Scoring Guide

Score dirt, dust and other foreign material that affects the appearance of the individual mango against the total tolerance of the grade.

External (Surface) Discoloration (Q or C)

Discoloration on the surface of the mango occurs as many colors and resulting from varying causes, for example: leaking of sap from freshly cut stems, diseases, or abrasions. Inspectors should describe the color and/or type of discoloration. If the discoloration occurred prior to packing, then it shall be scored as a quality factor. However, if the discoloration progressed during shipment or storage, then it shall be scored as a condition factor.

Freshly cut stems leaking sap will sometimes cause a sap burn that could turn a dark brown to black color on mango skins due to chemical and physiological injury from the exudate (sap). However, if sap is present and is clear or not dark enough to detract or does not affect the appearance of the fruit, do not score it as a defect. It is permissible to describe discoloration which is not present in sufficient amounts (to be scored) in the "Other" or "Remarks" sections of the certificate.

Note: Some varieties (Haden and similar varieties) have **pinhead size black spotting** that is characteristic of the variety and shall not be scored as a defect.

Anthracnose (Black Spots) (C)

Anthracnose is a fungal disease. It first appears as fruit ripens appearing as black spots and streaks which become sunken. If black spots are present, inspectors should cut the spots to check for decay. Anthracnose shall be reported as decay only when advanced sufficiently to penetrate the skin and affect the flesh or when the spots are large and soft enough to be easily penetrated with slight pressure. Otherwise, if only discolored, use the scoring guide for discoloration and describe the appearance. See visual aid labeled "MAN-IDENT-2" dated, May 2006, for an example of Anthracnose on fruit.

Scoring Guide

Score as **injury**: When the discoloration is affecting an aggregate area more than 5% of the fruit surface.

Score as **damage**: When the discoloration is affecting an aggregate area more than 15% of the fruit surface.

Score as **serious damage**: When the discoloration is affecting an aggregate area more than 25% of the fruit surface.

Firmness/Overripe (C)

Hard - means that the mango does not yield to moderate pressure. This is the stage at which mangos are usually picked for shipping. Such fruit will ripen but are not sweet or well flavored at this stage.

Firm - means that the mango yields very slightly to moderate pressure. Fruit at this stage of maturity is not yet palatable.

Firm Ripe - means that the mango yields slightly to moderate pressure. The flesh is fairly palatable but has not reached the prime eating stage.

Ripe - Fruit in this condition yield readily to slight pressure, and are ready for immediate consumption. Ripe fruit are in prime condition for consumption. Such fruit are not to be scored as defects.

Overripe (C) - The flesh of the fruit is mushy. This is the final stage before complete deterioration.

Scoring Guide

Overripe fruit is scored as serious damage against all grades.

Note: Ripe fruit showing injury, damage, or serious damage by soft bruises are scored as bruising and not as overripe.

Freezing and Freezing Injury (C)

Mangos will typically freeze below temperatures of 30° F. The term “frozen” should only be used when ice crystals are present.

“Freezing injury” is the term that should be used when it is evident that the mangos have been frozen, but are not in a frozen condition at the time of inspection. The affected fruit may be soft, glassy, and/or translucent.

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

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

When the location of injury indicates where or when the freezing occurred, this is to be stated. For example: “Freezing injury so located as to indicate freezing occurred after packing but not in present location.” Another example is: “Freezing injury so located as to indicate freezing occurred in trailer.”

Note: For information relating to low temperature or chilling injuries, please see that section.

Ground Color/Blush

The U.S. Standards for Grades of Mangos have no blush or color requirements. The fruit colors have wide variations in both blush and ground color depending on the variety.

Ground Color

Ground color of mangos may be described as green, medium green, light green, turning yellow, yellow, or orange. In describing ground color, consider the predominating color of the fruit even though varying degrees of color are present.

Some of the more common varieties and usual ground colors are described here: (However, keep in mind that this is not an all inclusive list and that varying colors may be present.)

- Haden varieties usually exhibit red and yellow color.
- Tommy Atkins varieties are usually red and yellow color.
- Kent varieties are usually green, red, and yellow color.
- Keitt varieties are usually green, pink, and yellow color.
- Ataulfo varieties are usually yellow color.

Ground color(s) should be reported on the notesheet and certificate.

Blush

Some mango varieties show little to no blush. The applicant may request reporting of blush color. In that case, the approximate percentage of the lot showing blush as well as the approximate percentage of the surface affected in general terms (for quantity of fruit) may be reported.

Example: Most mangos show 1/8 to 1/2 of the surface with blush color.

Insects or Insect or Larva Feeding Injury (Q or C)

Common pests that may affect mangos are: mites, thrips, fruit flies, mango weevils, tip wilters, and scale insects. Some of these insects may feed on the surface of the mango and cause scars or discoloration. They may also leave a sticky residue or deposit their eggs into the mangos as a part of their life cycle.

A part of the fruit fly life cycle is to deposit eggs just below the skin. After hatching, the larva feeds on the flesh of the fruit. Specific species of these flies are not naturally present in the United States. Imported mangos are required to undergo some type of treatment to prevent the importation of fruit flies (such as hot water baths or

irradiation) to prevent the importation of fruit flies. These processes upset life cycles and normally reduce the likelihood of pests entering the United States.

Scoring Guide

Score as **injury**: When any insects are present or when any feeding injury is evident on the fruit.

Score as **damage**: When any insects are present or when feeding injury aggregates an area that exceeds that of a circle 1/2 inch in diameter.

Score as **serious damage**: When any insects are present or when feeding injury aggregates an area that exceeds that of a circle 1 inch in diameter.

Note: Live insects shall be reported as condition; however, if the insects are dead, then report as quality. If both live and dead insects are present, then report as condition.

Internal Breakdown (C)

There are numerous types of physiological breakdown of the flesh. Jelly-Seed is a disintegration of the flesh around the seed into a jelly-like mass which is thought to be caused by premature ripening. Soft-Nose is a softening of the tissue at the blossom end. The flesh appears overripe and may discolor and become spongy. This disorder is thought to be related to a calcium deficiency. These along with other types of internal breakdown shall be scored as serious damage.

Internal Discoloration (C)

Internal discoloration shall be used to describe defects that affect the flesh of the fruit; as opposed to bruising, sunken discolored areas, or pitting. Those defects are scored according to the established scoring guides.

Scoring Guide

Score as **injury**: When present in any amount.

Score as **damage**: When affecting an aggregate area more than 3/4 inch in diameter.

Score as **serious damage**: When affecting an aggregate area more than 1-1/2 inch in diameter.

Do not confuse a gradation of color extending from the seed to skin caused by the ripening process with internal discoloration.

Low Temperature/Chilling Injuries (C)

Mangos (especially Haden and Keitt varieties) can be susceptible to chilling injury when stored at moderately low temperatures, usually below 50° F. Other varieties such as the Tommy Atkins and Irwin can usually be stored at 50° F for as long as three weeks.

The usual signs of chilling injury are grey scald-like discoloration of the skin. Often it is accompanied by pitting, uneven ripening, poor flavor development and ground color development. However, if chilling injury is found, do not use the terms “chilling injury,” simply describe the defect and use the general definitions of injury, damage, and serious damage as scoring guides.

Maturity (Q)

Mangos must be physiologically mature in order to ripen properly. Maturity is one of the most important factors in determining the quality of the fruit, as it has a direct bearing on the flavor and palatability of the fruit. Mature mangos usually have a glossy skin color with lenticels of a light brown color for the Haden, Keitt, Tommy Atkins, and Kent varieties. For these and similar varieties, cutting may be made to help determine maturity by cutting along the flat side (parallel to the seed) of the mango as close to the seed as possible (the seed should be visible).

As a guide: Haden and Keitt varieties should have a minimum of 50% of the volume of the pulp (on each half) with at least a pale yellow color. The remaining flesh must have a light yellow color (not white). For varieties such as Tommy Atkins and Kent, the flesh usually does not show a gradation of color from seed to skin. All of the pulp must have a minimum of a light cream color (not white) to be considered mature.

Other indicators of “immaturity” that can be used for the majority of fruit are:

- Lack of sufficient color of the flesh;
- Shriveling (when held a sufficient length of time to show shriveling without normal ripening);
- poor flavor; and,
- uneven ripening.

§51.1052 Mature. “Mature” means that the mango has reached the stage of development that will ensure the proper completion of the ripening process.

Scoring Guide

If the mangos show signs of immaturity, then score as serious damage and reported as “Immature.”

Mechanical Damage (Q or C)

Mechanical damage may be caused by any number of physical injuries to the fruit. Normally, healed mechanical damage is scored against quality. However, if the mechanical damage is fresh (due to packing or damaged containers, etc.), then score it against condition.

Scoring Guide

Score as **injury**: When unhealed or when the aggregate area of healed breaks exceeds that of a circle 1/4 inch in diameter or 1/4 inch in length.

Score as **damage**: When any break is into the flesh or when the aggregate area of healed breaks exceeds that of a circle 1/2 inch in diameter or 1/2 inch in length.

Score as **serious damage**: When any break is into the flesh or when the aggregate area of healed breaks exceeds that of a circle 1 inch in diameter or 1 inch in length.

Scab (Q)

Scab is caused by a fungus that attacks leaves, flowers, twigs of the tree, as well as the fruit. In early stages, mango scab infection resembles Anthracnose. Lesions on fruit usually become covered with corky brown tissue (crustaceous spots) with irregular margins. See visual aid labeled “MAN-IDENT-3” dated, May 2006, for an example of scab on fruit.

Scoring Guide

Score as **injury**: When cracked, or when the aggregate area exceeds that of a circle 1/4 inch in diameter.

Score as **damage**: When cracked, or when the aggregate area exceeds that of a circle 1/2 inch in diameter.

Score as **serious damage**: When the aggregate area exceeds that of a circle 3/4 inch in diameter.

Scars and Russeting (Q)

Scars and russeting are scored on the basis of color, degree of roughness, depth, and area. Since more than one type of scar is often found on a single mango, it

must be remembered that a combination of two or more types must be scored whenever it affects the appearance to a greater extent than the maximum allowed for any one type.

Scoring Guide

Score as **injury**: When light colored, smooth and affecting an aggregate area more than 5% of the surface, or when dark, rough, or scaly and affecting an aggregate area more than 2-1/2% of the surface.

Score as **damage**: When light colored, smooth and affecting an aggregate area more than 10% of the surface, or when dark, rough, or scaly and affecting an aggregate area more than 5% of the surface.

Score **serious damage**: When light colored, smooth and affecting an aggregate area more than 15% of the surface, or when dark, rough, or scaly and affecting an aggregate area more than 10% of the surface.

Shape (Q)

The U.S. Standards for Grades of Mangos have the following requirements for shape: U.S. Fancy is required to be “Well formed.” U.S. No. 1 and U.S. No. 2 grades are required to be “Fairly well formed.” Shape is scored against the total tolerance for the grade.

§51.1057 Well formed. “Well formed” means that the shape of the mango is typical of the variety and is symmetrical without irregularities in shape.

§51.1050 Fairly well formed. “Fairly well formed” means that the shape of the mango is typical of the variety and is symmetrical with slight irregularities in shape allowed; but, not to an extent where its appearance is materially affected.

Scoring Guide

In the U.S. Fancy grade, if the shape does not meet the requirements of well formed, then the shape shall be described as “Not well formed.”

In the U.S. No. 1 and U.S. No. 2 grades, if the shape does not meet the requirements of fairly well formed, then the shape shall be described as:

§51.1053 Misshapen. “Misshapen” means that the shape of the mango is abnormal to an extent that its appearance is materially affected.

Shriveling (C)

Shriveling may be caused by various storage conditions and length of time stored. Ataulfo varieties are more likely to shrivel than other varieties.

Scoring Guide

Score as **injury**: When affecting an aggregate area more than 5% of the surface.

Score as **damage**: When affecting an aggregate area more than 15% of the surface.

Score as **serious damage**: When affecting an aggregate area more than 25% of the surface.

Similar Varietal Characteristics (Q)

All grades in the U.S. Standards for Grades of Mangos require “similar varietal characteristics.”

§51.1056 Similar varietal characteristics. “Similar varietal characteristics” means the fruit in any package is of similar shape and of similar skin and flesh color.

Scoring Guide

Any mangos that are found in containers, which are obviously not the same variety as the majority of the fruit, shall be scored against the total tolerance for the grade and reported as “dissimilar varietal characteristics.”

Skin Breaks (Q or C)

Skin breaks are ruptures of the external epidermal tissue. Healed skin breaks are scored against quality. If the skin breaks are fresh, then score as condition.

Scoring Guide

Score as **injury**: When unhealed or when the aggregate area of healed breaks exceeds that of a circle 1/4 inch in diameter or 1/4 inch in length.

Score as **damage**: When any break is into the flesh or when the aggregate area of healed breaks exceeds that of a circle 1/2 inch in diameter or 1/2 inch in length.

Score as **serious damage**: When any break is into the flesh or when the aggregate area of healed breaks exceeds that of a circle 1 inch in diameter or 1 inch in length.

Sunken Areas with Underlying Flesh Discolored (C)

A common defect seen on mangos is sunken areas (generally affecting the stem end/shoulders) with the underlying flesh slightly discolored. These affected areas are generally starchy with open areas and pithy. The flesh in these areas remains firm. It has been attributed to immature mangos and specific varieties that cannot withstand the hot water treatment. Use the scoring guide that is applicable, i.e. if immature - use that scoring guide or if sunken areas with underlying flesh discolored use the scoring guide below.

Scoring Guide

Score as **injury**: When more than 5% of the fruit has a distinct sunken area with underlying flesh discolored.

Score as **damage**: When more than 10% of the fruit has a distinct sunken area with underlying flesh discolored.

Score as **serious damage**: When more than 15% of the fruit has a distinct sunken area with underlying flesh discolored.

Sunken Discolored Areas (C)

Sunken discolored areas can develop due to numerous causes such as disease or improper temperature handling. Another common defect seen on mangos is sunken areas (generally affecting the stem end/shoulders) with the underlying flesh sometimes slightly discolored. These areas generally exhibit a pithy, starchy or open area. The flesh in these areas remains firm. It has been attributed to immature mangos and specific varieties that cannot withstand the hot water treatment. Use the scoring guide which applies, i.e. if immature - use that scoring guide or if sunken area and not immature - use the scoring guide for sunken discolored areas below.

Scoring Guide

Score as **injury**: When more than 5% of the surface has a distinct sunken area with discoloration.

Score as **damage**: When more than 10% of the surface has a distinct sunken area with discoloration.

Score as **serious damage**: When more than 15% of the surface has a distinct sunken area with discoloration.

Trimming (Q)

All grades in the U.S. Standards for Grades of Mangos are required to be well trimmed. Mangos are usually harvested from the ground or from within the tree through the use of “picking poles” with a bag attached at the end of it. In some cases, mangos are harvested by hand. In addition, stems are usually then broken off by hand.

The stem should be measured from the point of attachment beginning at the woody portion of the stem.

§51.1058 Well trimmed. “Well trimmed” means the stem is neatly clipped or broken off at a point not more than 1 inch beyond the point of attachment.

Scoring Guide

Mangos which do not meet this requirement shall be scored against the total tolerance for the grade and reported as “Not Well Trimmed.”

Decay (C)

All grades require that mangos are free from decay. Therefore, any amount of decay is scored against the 2% decay tolerance. The most common decays that affect mangos are: Alternaria Rot, Black Mold Rot, and Diplodia Stem-End Rot. The type of decay is not to be reported on the certificate.

When decay exceeds the tolerance, report the range as well as the average and report the degree of advancement in general terms as: early, moderate, or advanced stages (Early – up to 10% of the individual fruit affected, moderate – over 10% to 25% of fruit affected, or advanced – more than 25% of fruit affected).

APPENDIX I U.S. GRADE STANDARDS

United States Standards for Grades of Mangos

Effective August 24, 2007

Grades

51.1043 U.S. Fancy.

51.1044 U.S. No. 1.

51.1045 U.S. No. 2.

Application of Tolerances

51.1046 Application of tolerances.

Definitions

51.1047 Clean.

51.1048 Damage.

51.1049 Diameter.

51.1050 Fairly well formed.

51.1051 Injury.

51.1052 Mature.

51.1053 Misshapen.

51.1054 Overripe.

51.1055 Serious damage.

51.1056 Similar varietal characteristics.

51.1057 Well formed.

51.1058 Well trimmed.

Classification of Defects

51.1059 Classification of defects.

Grades

§51.1043 U.S. Fancy.

“U.S. Fancy” consists of mangos of similar varietal characteristics which are mature, clean, well formed, well trimmed, and which are free from decay, overripe, freezing, internal discoloration, insects, larva, insect or larva feeding, skin breaks which are not healed, and free from injury by healed skin breaks, bruising, scab, shriveling, external (surface) discoloration, sunken discolored areas, scars, russeting, other diseases, mechanical or other means.

(a) Tolerances. In order to allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangos in any lot may fail to meet the requirements of this grade, including in this amount not more than 5 percent shall be allowed for defects causing damage, including in this latter amount not more than 2 percent shall be allowed for decay.

§51.1044 U.S. No. 1.

“U.S. No. 1” consists of mangos of similar varietal characteristics which are mature, clean, fairly well formed, well trimmed, and which are free from decay, overripe, freezing, skin breaks which are not healed and extend into the flesh, insects or larva, and free from damage caused by insect or larva feeding, bruising, shriveling, scab, external (surface) discoloration, internal discoloration, sunken discolored areas, scars, russeting, other diseases, mechanical or other means.

(a) Tolerances. In order to allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangos in any lot may fail to meet the requirements of this grade, including in this amount not more than 5 percent shall be allowed for defects causing serious damage, including in this latter amount not more than 2 percent shall be allowed for decay.

§51.1045 U.S. No. 2.

“U.S. No. 2” consists of mangos of similar varietal characteristics which are mature, clean, fairly well formed, well trimmed, and which are free from decay, overripe, freezing, skin breaks which are not healed and extend into the flesh, insects or larva, and free from serious damage caused by insect or larva feeding, bruising, shriveling, scab, external (surface) discoloration, internal discoloration, sunken discolored areas, scars, russeting, other diseases, mechanical or other means.

(a) Tolerances. In order to allow for variations incident to proper grading and handling, not more than 10 percent, by count, of the mangos in any lot may fail to meet the requirements of this grade, included in this amount not more than 2 percent shall be allowed for decay.

Application of Tolerances

§51.1046 Application of tolerances.

The contents of individual packages in the lot, based on the sample inspection, are subject to the following limitations:

(a) For a tolerance of 10 percent or more, individual packages shall have not more than 1-1/2 times the tolerance specified, and for a tolerance of less than 10 percent, individual packages shall have not more than double the tolerance specified; **Provided**, That at least one defective specimen may be allowed in any package: **And provided further**, that the averages for the entire lot are within the tolerances specified for the grade.

Definitions

§51.1047 Clean.

“Clean” means that the fruit is practically free from dirt, dust or other foreign material.

§51.1048 Damage.

“Damage” means any defect that materially affects the appearance, or the edible or shipping quality of the mango. Any one of the following defects listed in the “Classification of Defects” table (See §51.1059.), or any combination thereof, the seriousness of which exceeds the maximum allowed for any one defect, shall be considered as damage.

§51.1049 Diameter.

“Diameter” means the greatest dimension of the mango measured at right angles to a line from stem to blossom end.

§51.1050 Fairly well formed.

“Fairly well formed” means that the shape of the mango is typical of the variety and is symmetrical with slight irregularities in shape allowed; but, not to an extent where its appearance is materially affected.

§51.1051 Injury.

“Injury” means any injury or defect that slightly affects the appearance, or the edible or shipping quality of the mango. Any one of the following defects listed in the “Classification of Defects” table (See §51.1059.), or any combination thereof, the seriousness of which exceeds the maximum allowed for any one defect, shall be considered as injury.

§51.1052 Mature.

“Mature” means that the mango has reached the stage of development that will ensure the proper completion of the ripening process.

§51.1053 Misshapen.

“Misshapen” means that the shape of the mango is abnormal to an extent that its appearance is materially affected.

§51.1054 Overripe.

“Overripe” means that the flesh of the mango yields to slight pressure and is beginning to disintegrate and is past commercial utility.

§51.1055 Serious damage.

“Serious damage” means any defect which seriously affects the appearance, or the edible or shipping quality of the mango. Any one of the following defects listed in the “Classification of Defects” table (See §51.1059.), or any combination thereof, the seriousness of which exceeds the maximum allowed for any one defect, shall be considered as serious damage.

§51.1056 Similar varietal characteristics.

“Similar varietal characteristics” means the fruit in any package is of similar shape and of similar skin and flesh color.

§51.1057 Well formed.

“Well formed” means that the shape of the mango is typical of the variety and is symmetrical without irregularities in shape.

§51.1058 Well trimmed.

“Well trimmed” means the stem is neatly clipped or broken off at a point not more than 1 inch beyond the point of attachment.

§51.1059 Classification of Defects. ¹			
Defects	Injury	Damage	Serious Damage
Bruising	Any slight surface indentation and discoloration of the flesh extending more than 1/8 inch in depth and 1/2 inch in diameter.	Surface indentation and discoloration of the flesh extends deeper than 1/4 inch and causing discoloration exceeding the area of a circle 3/4 inch in diameter.	Surface indentation and discoloration of the flesh extends deeper than 1/2 inch and causing discoloration exceeding the area of a circle 1 inch in diameter.
External (Surface) Discoloration	Discoloration affecting an aggregate area more than 5% of the fruit surface.	Discoloration affecting an aggregate area more than 15% of the fruit surface.	Discoloration affecting an aggregate area more than 25% of the fruit surface.
Insects or Insect or Larva Feeding Injury	When any is present or when any feeding injury is evident on the fruit.	When any is present or when feeding injury aggregates an area that exceeds that of a circle 1/2 inch in diameter.	When any is present or when feeding injury aggregates an area that exceeds that of a circle 1 inch in diameter.
Internal Discoloration	When present in any amount.	When affecting an aggregate area more than 3/4 inch in diameter.	When affecting an aggregate area more than 1 1/2 inch in diameter.
Scab	When cracked, or when the aggregate area exceeds that of a circle 1/4 inch in diameter.	When cracked, or when the aggregate area exceeds that of a circle 1/2 inch in diameter.	When the aggregate area exceeds that of a circle 3/4 inch in diameter.

¹ References to area, aggregate areas, or length are based on fruit 3 inches in diameter. Corresponding smaller or larger areas would be allowed on smaller or larger fruit.

§51.1059 Classification of Defects (continued).¹			
Scars or Russeting	When light colored, smooth and affecting an aggregate area more than 5% of the surface, or when dark or rough or scaly and affecting an aggregate area more than 2 1/2% of the surface.	When light colored, smooth and affecting an aggregate area more than 10% of the surface, or when dark or rough or scaly and affecting an aggregate area more than 5% of the surface.	When light colored, smooth and affecting an aggregate area more than 15% of the surface, or when dark or rough or scaly and affecting an aggregate area more than 10% of the surface.
Skin Breaks	When unhealed or when the aggregate area of healed breaks exceeds that of a circle 1/4 inch in diameter or 1/4 inch in length.	When any break is into the flesh or when the aggregate area of healed breaks exceeds that of a circle 1/2 inch in diameter or 1/2 inch in length.	When any break is into the flesh or when the aggregate area of healed breaks exceeds that of a circle 1 inch in diameter or 1 inch in length.
Shriveling	When affecting an aggregate area more than 5% of the surface.	When affecting an aggregate area more than 15% of the surface.	When affecting an aggregate area more than 25% of the surface.
Sunken Discolored Areas	When more than 5% of the surface has a distinct sunken area with discoloration.	When more than 10% of the surface has a distinct sunken area with discoloration.	When more than 15% of the surface has a distinct sunken area with discoloration.

¹ References to area, aggregate areas, or length are based on fruit 3 inches in diameter. Corresponding smaller or larger areas would be allowed on smaller or larger fruit.