



Farmers Feeding Illinois

PRODUCE STANDARD GUIDE

WWW.FEEDINGILLINOIS.ORG/FARMERS



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FARMERS FEEDING ILLINOIS

WHAT ARE WE BUYING?

We are looking for fruit, vegetables, cheese, milk, meat, eggs, and more. We would like your excess product and/or seconds.

WHAT IS A SECOND?

Seconds are produce items that are cosmetically imperfect in shape, size, or uniformity or are too ripe to meet the shelf life needs of your market. Seconds are also called No. 2 grade or commercial grade. Produce that is rotten, unsafe, dehydrated or near the end of its shelf life is not a second and it should not be sold.

Check out our produce standard guide on the following pages or inquire about the items we are looking for at www.feedingillinois.org/farmers.

Farmers Feeding Illinois is a program connecting an array of statewide Agri-sourcing initiatives in support of Feeding Illinois food banks and their network of community agencies. The Program encompasses initiatives to increase the supply of specialty crops, meats, dairy, eggs, and any other edible agricultural products - fresh or processed - throughout our state's emergency food system. Through private and public partnerships, Farmers Feeding Illinois is focused on engaging farmers and the entire agricultural sector to improve the availability and accessibility to nutritious, locally sourced foods for Illinois neighbors in need.

The Farm to Food Bank Initiative seeks to connect food banks with farms to purchase products like fruits, vegetables, cheese, milk, meat, and eggs directly from farmers. This is a unique opportunity to identify and build a long-term market and infrastructure for Illinois farmers and Illinois food banks.



HOW TO GET INVOLVED?

Are you interested in becoming a Friend of the Food Banks? If your farm or organization would like to learn more about supporting this program, send us a message and we'll get you connected.

Contact us at www.feedingillinois.org/farmers

CAN I DONATE?

Yes, we will continue to take donations. Any food product that doesn't qualify as seconds can be donated to the food pantry and will still qualify for a tax exemption. To learn more about tax exemptions, visit A Farmer's Guide to the Enhanced Federal Tax Deduction for Food Donation at bit.ly/NRDCfooddonation.

CROP PROFILE

APPLES

HANDLING/PACKING

Grades:

Dec. 19, 2002

- U.S. Extra Fancy: Clean, mature but not over-ripe, fairly-well formed. Apples of this grade must be free of the following: decay, internal browning and breakdown, soft scald, scab, freezing injury, visible water core, broken skins, injury from bruises, brown discoloration, russetting, sunburn or spray burn, limb rubs, hail, drought spots, scars, disease, insects, bitter pit, Jonathan spot, stem cracks. Furthermore, apples must be free of invisible water core damage after January 31, except for the Fuji variety. Tolerance: 10% (5% for serious damage, and 1% for decay).
- U.S. Fancy: Same as U.S. Extra Fancy, with differences in color uniformity.
- U.S. No. 1: Same as U.S. Fancy, except for color, russetting and water core.
- U.S. No. 1 Hail: Same as U.S. No. 1, except that hail marks where the skin has not been broken and well healed hail marks where the skin has been broken, are permitted, provided the apples are fairly-well formed.
- U.S. Utility (also known as U.S. No. 2): Same as U.S. No. 1, except apples do not have to be fairly-well formed, only not seriously deformed.
- Combination Grades: Any "adjacent" pairings are allowed (e.g., U.S. Extra Fancy and U.S. Fancy, but not U.S. Fancy and U.S. Utility), such that at least 50% of the apples meet the requirements of the higher grade.

Cooling:

- Cool apples as quickly as possible to 32-36°F (depending on variety. For Honeycrisp you should store around 60°F for a week before cooling to 36°F).
- Forced-air cooling

Cleaning

Apples can be brushed (to polish) or washed before marketing. They should not be washed before storage.

Waxing:

Apples can be waxed to improve shelf life. There are approved waxes for organic production

Carton Sizes:

Weights:

- 1 bu. cartons (weight depends on variety)
- 40-lb. cartons w/ 8 5-lb. bags
- 36-lb. cartons w/ 12 3-lb. bags
- 3-, 5-, 6-, 7-, 8-, or 10-lb. PETE/cello bags
- Tri-wall bins
- 600-lb. tote bin / 300-lb. half tote bin (with bags)

Counts:

- Extra-large: 48, 56, 64, or 72
- Large: 80, 88, or 100
- Medium: 113, 125, or 138
- Small: 150, 163, 175 (no fruit smaller than 175/ct. is marketed fresh)

Diameters:

- 2 ¼" – 198; 2 ½" – 175; 2 ⅝" – 138; 2 ¾" – 125; 3" – 100; 3 ½" – 80

Materials:

Apples are most often packed on soft fiberboard trays made from recycled newspaper, or sometimes soft polystyrene. Cartons are often unvented, but this slows the rate of cooling which is detrimental to the longevity of the fruit; as a result, vented cartons are starting to become more common.

STORAGE

- Temperature: 32°F-34°F (0-1.1°C).
- Humidity: 80-90% (higher humidity would require misting which would encourage disease).
- Respiration: 1-3 mL/kg hr. at 32°F (0°C)
- Atmosphere composition: Varies by apple variety. In general, <5% CO₂, 1.5-4.5% O₂, but check for your specific variety. Fuji, Braeburn and Granny Smith varieties do best when O₂ is reduced only after the apples are chilled to their storage temperature, and when CO₂ is kept lower than O₂. MCP is also becoming more commonly used, although this is not permitted in organic production. Ethylene scrubbing is also sometimes used.
- Ethylene producer: Yes; 2-12 µL/kg hr. at 32°F (0°C).
- Damage potential: Freezing injury, bruising.
- Shelf life: 90-240 days (with refrigeration).



APRICOTS

HANDLING/PACKING

Grades:

Oct. 28, 1994

- U.S. No. 1: Fruits should be mature but not overripe, soft, or shriveled. They should be free of defects such as decay, skin breaks such as cuts or worm holes. They should not have damage from limb rubs, growth cracks, russeting, dirt, scabs, hail, bruises, diseases, or insects. Tolerance: 10% (5% for serious damage, 1% for decay).
- U.S. No. 2: This grade is similar to U.S. No. 2 but includes a slight tolerance to the damages listed above, as long as the damage is not serious. Tolerance: 10% (1% for decay).

Cooling:

Quick cooling to 36-39.2°F (2-4°C) will help prevent ripening and decay. Forced-air cooling is commonly used.

Cleaning:

Washing is not advised for apricots.

Carton sizes:

Weights:

- Tray-packed in single or double layers, or volume-filled. 8-12-pint carton.

ARTICHOKES

HANDLING/PACKING

Grades:

Feb. 23, 2006

- U.S. No. 1: Smoothly cut stem that is not excessively long. Shall be reasonably firm but not excessively long and pointed. Outer scales may be slightly opened but inner scales at the tip of the artichoke must be closely folded into the bud. Shall not be brownish in color, have scales that are tough, leathery and stringy or have the flower in the center of the bud turning dark pink or purple and becoming fuzzy. Shall be free from decay and not damaged by any other cause. Not more than 10% in any container may vary more than ½" in diameter. Tolerance: 10% (2% for decay).
- U.S. No. 1 Long Stem: Meet the requirements of the U.S. No. 1 grade except that stems must be smoothly cut to a minimum length of at least 8", unless otherwise specified. Tolerance (Defects): 10% (2% for decay). Tolerance (Length): 5%.
- U.S. No. 2: Shall not be brownish in color, have scales that are tough, leathery, and stringy or have the flower turning dark pink or purple and becoming fuzzy. Shall not be badly spread and shall be free from decay and not seriously damaged by any other cause. Not more than 10% in any container may vary more than ½" in diameter. Tolerance: 10% (2% for decay).

Cooling:

Should be pre-cooled to below 41°F (5°C) within 24 hr. of harvest.

Sizes:

- No more than 5% of the apricots by count in each container may vary in size by more than 6 mm when measured at the widest part.

Materials:

Harvest into plastic totes. If a packing line belt is used, it should be padded.

STORAGE

- Temperature: 36-39.2°F (2-4°C); chilling-injury can occur when fruit is held at 36-45.7°F (2.2-7.6°C) for long periods.
- Humidity: 80-90%.
- Respiration: 2 to 4 mL/kg hr. at 32°F (0°C).
- Ethylene producer: Yes; <0.1 µL/kg hr. at 32°F (0°C).
- Damage potential: Chilling-injury can be avoided by keeping fruit as close to 32°F (0°C) as possible.
- Shelf life: 1-2 weeks (with refrigeration).

- Hydrocooling
- Forced-air cooling
- Package icing
- Top-icing

Cleaning:

Can be washed in sanitized water if necessary.

Carton Sizes:

Weights:

- Classified by the number that fit into a standard carton of about 23 lb. e.g., size 18 buds (18 buds per carton or >18s).

Sizes:

- Small: ≤ 2" diameter
- Medium: 8-10 oz.
- Large: over 15 oz.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: >95%.
- Respiration: 8-22 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 1-6% O₂ and 2-7% CO₂ depending on cultivar. Little or no beneficial effect when buds stored at 32°F (0°C).
- Ethylene producer: Very low. Not very sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 14 days.



ARUGULA

HANDLING/PACKING

Grades:

Arugula is not graded in the U.S.

Cooling:

- Hydrocool

Cleaning:

- Baby arugula: salad machine and spin dry
- Bunched arugula: run through the hydrocooler and drain upside-down

Materials:

Packaging generally consists of fiberboard cartons lined with perforated polyethylene bags, small sealed plastic bags, clamshell containers, or trays. Arugula may also be packaged as a whole plant with roots attached, which can extend the postharvest life. Bunched arugula should be packaged with 24-30 bunches per box. A bunch is $\frac{3}{4}$ -lb. on average. 1 $\frac{1}{9}$ bushel box is generally used. Boxes can be iced (but keep a sheet of paper between ice and arugula). For loose baby arugula, generally 12 4 oz. bags are used.

ASIAN PEARS

HANDLING/PACKING

Grades:

Asian Pears are not graded in the U.S.

Cooling:

- Rapid cooling and forced-air cooling are not recommended.
- Room Cooling

Cleaning:

Not recommended.

Materials:

Store in trays complete with packet pack and polyliners.

STORAGE

- Temperature: $32^{\circ}\text{F} \pm 2^{\circ}\text{F}$ ($0^{\circ}\text{C} \pm 1^{\circ}\text{C}$).
- Humidity: 90-95% (fruit are susceptible to water loss).
- Respiration: 1-4 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 1-3% O_2 for some cultivars (e.g., Nijisseiki) or 3-5% O_2 for others (e.g., Ya Li). Sensitive to CO_2 injury ($>2\%$ CO_2 for most cultivars) when stored >1 month.

STORAGE

- Temperature: $32-36^{\circ}\text{F}$ ($0-2^{\circ}\text{C}$).
- Humidity: 95-100%.
- Respiration: 21 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Controlled atmosphere generally not beneficial.
- Ethylene producer: Very low ethylene production, but highly sensitive to ethylene exposure.
- Damage potential: Not sensitive to chilling; should be stored as cold as possible without freezing. Sensitive to overheating.
- Shelf life: 7-10 days.



- Ethylene producer: Some cultivars (such as Nijisseiki, Kosui, and Niitaka) have very low ethylene production. Others such as Tsu Li, Ya Li, Chojuro, Shinsui, Kikusui, and Hosui produce higher levels. Ethylene levels should be kept as low as possible as it may enhance the development of skin browning and fruit senescence.
- Damage potential: Chilling-injury can be a problem with Chinese pear cultivars such as Ya Li, Daisui Li, Seuri, Tse Li, Shin Li and Korean pears, such as Shingo, Okysankichi and Dan Be. Low O_2 injury can occur during longer term storage (e.g., Nijisseiki at $\leq 1\%$ O_2 and Ya Li and Tsu Li pears at $\leq 2\%$ O_2 for 4 months at 32°F).
- Shelf life: 12-20 weeks storage and a subsequent shelf-life of 10-15 days, depending on variety.

ASPARAGUS

HANDLING/PACKING

Grades:

Feb. 23, 2006

- U.S. No. 1: Fresh, well trimmed (at least 1/3 of the butt of the stalk is smoothly trimmed and is not stringy or frayed), and fairly straight. Free from decay and damage caused by spreading or broken tips, dirt, disease, insects, or other means. The diameter of the stalk must be no less than 1/2". No less than 2/3 of the stalk length must be the same color as the lot. Tolerance: 10% (5% for serious damage, 1% for decay). No more than 10% of the stalks may fail to meet the trimming requirement.
- U.S. No. 2: Fresh, fairly well trimmed, and not badly misshapen. Free from decay and serious damage caused by spreading or broken tips, dirt, disease, insects, or other means. The diameter of the stalk must be no less than 5/16". No less than half of the stalk length must be the color of the lot. Tolerance: 10% for stalks failing to meet grade requirements, including trimming, diameter, or length requirements. (1% for decay).
 - Note: For packages of 50 stalks or less, up to 4 times the standard tolerance is allowed, except that no more than 2 off-size or defective stalks and no more than 1 stalk with decay may be permitted.

Cooling:

Immediate cooling after harvest is necessary.

- Hydrocooling
- Package icing

Cleaning:

- Soaking in buckets
- Pre-moistened soaking pad

BASIL

Grades:

Basil is not graded in the U.S.

Cooling:

Basil should be cooled to no lower than 54°F (12°C).

Cleaning:

Never ice. Generally basil is not washed. Basil can be washed if necessary. Be certain the water temperature is above 55° or chilling injury can occur, and water should not be more than 10°F cooler than the basil. Handle gently. Basil bruises easily.

Materials:

Bunch with rubber band, package in plastic bags or clamshells, pack in corrugated cartons. Perforated polyethylene liners will prevent dehydration and maintain quality. Use waxed boxes, lined with plastic. In the cooler, cover with a blanket to avoid overcooling. Bunch size should be 2-8-oz.; check with buyer. Use clamshells for a longer shelf life.

Carton Sizes:

Weights:

- Bundled into 0.75-1-lb. bunches.
- 15-lb. half-pyramid carton

Sizes: By diameter

- Very small: <5/16"
- Small: 5/16" - 1/2"
- Medium: 1/2" - 11/16"
- Large: 11/16" - 7/8"
- Very Large: >7/8"

Length:

- Spears trimmed to 7-10"

Materials:

Trapezoida-shaped crates minimize bending due to gravity. Trimming the butt end of the stalk and including a wet paper pad in contact with the butt end helps to maintain rigidity. If asparagus containers are unavailable, asparagus should be packaged upright, and should sit on a moist pad. If cooled quickly and maintained cold, it does not need to be packed vertically.

STORAGE

- Temperature: 32-35.6°F (0-2°C).
- Humidity: 95-99%.
- Respiration: 20-40 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5-10% CO₂, >2% O₂.
- Ethylene producer: Yes; 2.1-3.1 µL/kg hr. at 68°F (20°C). Prompt cooling and maintenance of optimal shipping temperatures can prevent ethylene-induced toughening.
- Damage potential: Chilling-injury, spear toughening, feathering, elongation and tip bending. Do not let overheat.
- Shelf life: 14-21 days (with refrigeration).

STORAGE

- Temperature: 54°F (12°C) is the lowest safe temperature.
- Humidity: 95-100%.
- Respiration: 37 mL/kg hr. at 50°F (10°C).
- Atmosphere composition: 4-6% CO₂, 5-10% O₂.
- Ethylene producer: Low. Very sensitive to ethylene exposure.
- Damage potential: Water loss can be a serious cause of quality loss. Basil is highly sensitive to loss of essential oils and aroma – critical components of fresh culinary herb quality – the visual shelf life is generally longer than the culinary shelf life. Harvest basil as close to shipping as possible and avoid chilling temperatures, which reduce aroma quality.
- Shelf life: 7 days.



BEANS, GREEN AND SNAP VARIETIES

HANDLING/PACKING

Grades:

Jul. 5, 1990

- U.S. Fancy: Reasonable and uniform size, well formed, clean, brightly colored, fresh, tender, firm, free from soft rot and damage. Tolerance: 10% (5% for serious damage, 3% for broken beans, and 1% for soft rot)
- U.S. No. 1: Same as U.S. Fancy, but can be of non-uniform size, and can be fairly-well formed, fairly bright and fairly tender. Tolerance: 13% (10% for defects other than broken beans, 5% for serious damage, and 1% for soft rot).
- U.S. No. 2: Fairly fresh, not over mature, fresh, firm, and free of disease and damage. Tolerance: 15% (10% for serious defects other than broken beans and 1% for soft rot).

Cooling:

- Hydrocool. Dry on screen table before packing.
- Forced-air
- Room Cooling

Cleaning:

Washing can be avoided if beans are picked clean. If necessary, wash in water tank with sanitizer and dry on screen table before packing.

Carton Sizes:

Weights:

- 25-lb. 1 1/9 bushel box or green bean bushel box.

STORAGE

- Temperature: 41-46°F (5-7.5°C).
- Humidity: 95-100%.
- Respiration: 33 mL/kg hr. at 41°F (5°C).
- Atmosphere composition: 3-10% CO₂ and 2-5% O₂.
- Ethylene producer: Very low. Sensitive to ethylene exposure.
- Damage potential: Chilling-injury.
- Shelf life: 8-12 days.



BEETS

HANDLING/PACKING

Grades:

Aug. 1, 1955

- U.S. No. 1: Well trimmed, firm, fairly smooth, fairly-well shaped, fairly clean, free from soft rot and from damage caused by cuts, freezing, growth cracks, disease, rodents or insects, or mechanical or other means. Bunched beets or beets with short-trimmed tops shall have tops that are fresh and free from decay and free from damage caused by discoloration, freezing, disease, insects, or mechanical or other means. No beet shall be less than 1 ½" long. Tolerance: 10% (5% for serious damage and 1% for soft rot).
- U.S. No. 2: Well trimmed, firm, not excessively rough, not seriously misshapen and free from soft rot and from serious damage caused by cuts, dirt, freezing, growth cracks, disease, rodents or insects, or mechanical or other means. Bunched beets or beets with short-trimmed tops shall have tops that are fresh and free from decay and from damage caused by discoloration, freezing, disease, insects, or mechanical or other means. No beet shall be less than 1 ½" long. Tolerance: 10% (5% for serious damage and 1% for soft rot).

Cooling:

Green top beets are highly perishable and must be cooled as quickly as possible. Bulk beets are not highly perishable.

- Bunched green top beets
 - Hydrocool in water with sanitizer after roots have been spray cleaned.
 - Top-ice
- Topped beets
 - Room cool

Cleaning:

- Bunched green top beets
 - Wash bunched beets with sprayer on screen table. Pressure washer can be used on roots only. Can be packed damp.
- Topped beets
 - Barrel wash, or clean with a sprayer or pressure washer on screen table or in harvest tote.

Carton Sizes:

Weights:

- Bulk beets are packed in waxed boxes with polyethylene liners.
 - 25 lb. in a 5/9 carton
 - 40 lb. in a 1 1/9 carton
- Storage Beets: 44 lb. polyethylene lined crates, or bins of 1100-1320 lb. capacity.
- Green-top bunched beets are packed in waxed boxes with waxed paper liners on top and bottom.
 - 12 bunches in a 1 1/9 carton.
 - 24 bunches per case in a leafy greens box.

Sizes:

- Diameter of not less than 1 ½"
- Bunches must weigh at least 1.1-lb. (0.5kg) and must contain at least 3 beets.

STORAGE

- Temperature: 32°F (0°C) for bunched beets; 32.9-35.6°F (1-2 °C) for topped beets.
- Humidity: 98%.
- Respiration: 2-3 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: None needed.
- Ethylene producer: Very low. Not sensitive to ethylene exposure.
- Damage potential: Low for bulk beets. Green-top beets are sensitive to warm temperatures and loss of moisture.
- Shelf life: 10-14 days for bunched beets; 4-10 months for topped beets (with ventilation or refrigeration).



BLACKBERRIES

HANDLING/PACKING

Grades:

Feb. 13, 1928

- U.S. No. 1: One variety firm, well colored, well developed and not overripe. Free from caps (calyxes), mold, and decay, and from damage caused by dirt or other foreign matter, shriveling, moisture, disease, insects, or mechanical or other means. Tolerance: 10% (5% for serious damage and 1% for mold or decay).
- U.S. No. 2: One variety, fail to meet the requirements of the U.S. No. 1 grade but that do not contain more than 10%, by volume, of berries in any lot which are seriously damaged by any cause, including therein not more than 2% for berries that are affected by mold or decay.
- Unclassified: Does not imply a failure to meet standards, merely that a grade standard has not been applied, or does not apply (e.g., multiple varieties sold together).

BLUEBERRIES

HANDLING/PACKING

Grades:

Mar. 20, 1995

- U.S. No. 1: Similar varietal characteristics, clean, well colored, not overripe, crushed, split, leaking, or wet. Fruit should be free from attached stems, mold, decay, insects, mummified berries, clusters, shriveled or broken skin, scars, and green berries. Tolerance: 10% with attached stems, 8% for other defects (4% for serious defects and 1% for mold or decay).
- Unclassified

Cooling:

Forced-air cooling to <50°F (10°C) within an hour of harvest.

Cleaning:

Blueberries should not be washed.

Carton Sizes:

Weights:

- 1-or 2-pint vented polyethylene or polystyrene clamshell containers, 12 units to a tray.

BOK CHOY

HANDLING/PACKING

Grades:

Bok Choy is not graded in the U.S.

Cooling:

- Hydrocooling
- Room cooling
- Top-icing

Cleaning:

Wash in water tank with sanitizer; drain upside down.

Cooling:

Forced-air to within 41°F (5°C) within 4 hrs.

Cleaning:

Blackberries should not be washed.

Carton Sizes:

1-pint, 2-pint, or 1-quart vented plastic clamshell containers, packed in units of 12 per carton.

STORAGE

- Temperature: 31.1-32°F (-0.5-0°C).
- Humidity: > 90%.
- Respiration: 9-10 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 10-20% CO₂, 5-10% O₂.
- Ethylene producer: 0.1-2 µL/kg hr.; sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 2-7 days.

Sizes:

- Extra-large: <90 berries/cup.
- Large: 90-129 berries/cup.
- Medium: 130-189 berries/cup.

STORAGE

- Temperature: 32-37.4°F (0-3°C).
- Humidity: >90%.
- Respiration: 1-5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 10-15% CO₂, 1-10% O₂ for Rabbiteye, Lowbush and Highbush.
- Ethylene producer: 0.5-10 µL/kg hr.; sensitive to ethylene exposure.
- Damage potential: Susceptible to damage during shipping.
- Shelf life: 2-4 weeks.

STORAGE

- Temperature: 32-41°F (0-5°C).
- Humidity: >95%.
- Respiration: 2.5-3 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5% CO₂, 3% O₂.
- Ethylene producer: Very low. Not very sensitive to ethylene exposure.
- Damage potential: Sensitive to overheating.
- Shelf life: 21 days.



BROCCOLI

HANDLING/PACKING

Grades:

Nov. 2, 2006 Italian Sprouting Broccoli

- U.S. Fancy: (Very high quality, very difficult to produce, very expensive.) Shall be free from decay and damage caused by overmaturity, discoloration of bud clusters or leaves, freezing, wilting, dirt or other foreign material, disease, insects, or mechanical or other means. The bud clusters shall be generally compact. Bunched broccoli shall be neatly and fairly evenly cut off at the base and closely trimmed unless otherwise specified as well trimmed. Tolerance: 10% (2% for decay).
- U.S. No. 1: (Most broccoli sold for fresh consumption.) Shall be free from decay and from damage caused by overmaturity, discoloration of bud clusters or leaves, freezing, wilting, dirt or other foreign material, disease, insects, or mechanical or other means. The bud clusters shall be generally fairly compact. Bunched broccoli shall be neatly and fairly evenly cut off at the base, and well trimmed, unless otherwise specified as closely trimmed, fairly well trimmed, or leafy. Tolerance: 10% (2% for decay).
- U.S. No. 2: Shall be free from decay, and from damage caused by overmaturity, insects, and from serious damage caused by discoloration of bud clusters or leaves, freezing, wilting, dirt or other foreign material, disease, or mechanical or other means. Bunched broccoli shall be fairly well trimmed unless otherwise specified as closely trimmed, well trimmed, or leafy. Tolerance: 10% (2% for decay).

Cooling:

- Broccoli is highly perishable and must be cooled as quickly as possible to 32°F-35.6°F (0-2°C).
- Top ice in waxed cartons.
- Hydrocool in water with sanitizer.
- Forced-air cooling can be done but care must be taken to avoid loss of moisture.
- Room cooling is generally too slow.

Cleaning:

Harvest clean. Can be washed in water tank with sanitizer if necessary.

Carton Sizes:

Weights:

- Bunched (2-3 heads): 14-18 bunches in waxed cardboard boxes. Approx. 21 lb. (10kg).
- Main heads 18-20 lb. broccoli boxes.
- Crown cuts are packed loose in 20 lb. boxes.
- Side shoots or individual florets are packed in 5.5 or 11 lb. plastic bags for hotel, restaurant and institution use.

Diameters:

- U.S. Fancy:
 - Bunched: < 2.5"
 - Crowns: 2.5 < diam < 5"
 - Florets: 0.75 < diam < 3"
- U.S. No. 1:
 - Florets: 1-4"

Length:

- U.S. Fancy:
 - Bunched: <8.5"
 - Crowns: 2.5 < length < 5"
 - Florets: 1 < length < 3.5"
- U.S. No. 1:
 - Bunched: 5 < length < 9"
 - Crowns: 3.5 < length < 6"
 - Florets: 1.5 < length < 4.5"
- U.S. No. 2: No requirements

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 98-100%.
- Respiration: 10-11 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5-10% CO₂, 3-5% O₂.
- Ethylene producer: Very low. Extremely sensitive to ethylene exposure.
- Damage potential: Very high: extremely sensitive to high respiration at warm temperatures.
- Shelf life: 2-3 weeks.



BRUSSELS SPROUTS

HANDLING/PACKING

Grades:

Jan. 18, 1954

- U.S. No. 1: Well-colored, firm, not withered or burst, free from soft decay and seedstems and from damage caused by discoloration, dirt or other foreign material, freezing, disease, insects, or mechanical or other means. Tolerance: 10% (2% for soft decay).
- U.S. No. 2: Fairly well colored, fairly firm, not withered or burst, free from soft decay and seedstems and from damage caused by insects, and free from serious damage caused by discoloration, dirt or other foreign material, freezing, disease or mechanical or other means. Tolerance: 10% (2% for soft decay).
- Unclassified

Cooling:

Forced-air cooling – most effective when pre-moistened

Cleaning:

Not recommended

Carton Sizes:

Weights:

- 25-lb. (11 kg) cartons

Sizes:

- Diameter should be 1-2.5"

Materials:

Plastic liners are often used in cartons with loose sprouts to reduce moisture loss. In addition, polyethylene bags are sometimes used in place of the plastic containers for consumer units.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-100%.
- Respiration: 10-20 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5-10% CO₂, 3-5% O₂.
- Ethylene producer: 0.25 µL/kg hr, increasing tenfold with prolonged storage. Very sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 3-5 weeks (with recommended refrigeration).



CABBAGE

HANDLING/PACKING

Grades:

Sep. 1, 1945

- U.S. No. 1: One variety or similar varietal characteristics, which are of reasonable solidity, and are not withered, puffy, or burst and are free from soft rot, seedstems, and from damage caused by discoloration, freezing, disease, insects or mechanical or other means. Stems shall be cut so that they do not extend more than ½" beyond the point of attachment of the outermost leaves. Tolerance: 10%.
- U.S. Commercial: Meet the requirements for U.S. No. 1 grade except for an increased tolerance for defects, and the heads shall be reasonably firm. Tolerance: 25%.

Cooling:

Forced-air cooling during storage

Cleaning:

Not recommended

Carton Sizes:

Weights:

- 45 to 50-lb. in 1 3/4 or 1 7/8 bushel waxed cabbage containers.
- Heavy fiberboard bulk pallet bins holding 500-1000 lb.

Sizes: (Classification optional)

- Pointed (oxheart) cabbage:
 - Small: < 1.5 lb.
 - Medium: 1.5-3 lb.
 - Large: > 3 lb.
- Domestic and Danish (green) types:
 - Small: < 2 lb.
 - Medium: 2-5 lb.
 - Large: > 5 lb.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 98-100%.
- Respiration: 2-3 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 4-5% CO₂, 2-3% O₂.
- Ethylene producer: Low. Sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 1-6 months.



CANTALOUPE

HANDLING/PACKING

Grades:

Mar 10, 2008

- U.S. Fancy: Meets the requirements of U.S. No. 1 grade except that the cantaloupes have very good internal quality and have uniform appearance. Tolerance: Defects at shipping point: 8% (4% for serious damage, 0.5% for decay or mold). Defects en route or at destination: 12% (8% for permanent defects, 6% for serious damage, 4% for serious damage by permanent defects and 2% for decay).
- U.S. No. 1: Mature and have good internal quality but are not overripe or soft or wilted, are well formed, well netted, and free from decay, wet slip and sunscald and free from damage caused by liquid in the seed cavity, sunburn, hail, dirt, surface mold or other disease, aphid or other insects, scars, cracks, sunken areas, ground spot, bruises, or mechanical or other means. Tolerance: Defects at shipping point: 8% (4% for serious damage, 0.5% for decay or mold). Defects en route or at destination: 12% (8% for permanent defects, 6% for serious damage, 4% for serious damage by permanent defects and 2% for decay).
- U.S. Commercial: Mature but not overripe or soft or wilted, are well formed and fairly-well netted, and free from decay, wet slip and sunscald and free from damage caused by liquid in the seed cavity, sunburn, hail, dirt, surface mold or other disease, aphid or other insects, scars, cracks, sunken areas, ground spot, bruises, or mechanical or other means. Tolerance: Defects at shipping point: 16% (12% for condition defects, 4% for serious damage, 0.5% for decay or mold). Defects en route or at destination: 24% (16% for permanent defects, 12% for condition defects, 8% for serious damage, 4% for serious damage by permanent defects and 2% for decay).
- U.S. No. 2: Mature but not overripe or soft or wilted, are fairly well-formed and fairly-well netted, free from decay, wet slip and sunscald and free from serious damage caused by liquid in the seed cavity, sunburn, hail, dirt, surface mold or other disease, aphid or other insects, scars, cracks, sunken areas, bruises, or mechanical or other means. Tolerance: Defects at shipping point: 8% (0.5% for decay or mold). Defects en route or at destination: 12% (8% for defects of a permanent nature and 2% for decay).
- Unclassified

Cooling:

Forced-air cooling

Cleaning:

Dry brushing in the field, or brush wash if harvested in muddy conditions. If washed, sanitizer must be used in the water.

Carton Sizes:

Weights:

- 40-lb. cardboard shipping box

Sizes:

- Number of uniformly sized fruit that fit in a standard 40-lb. box
- 9, 12, 15, 18, 23, 30

Materials:

Harvest and packing equipment should be padded to reduce scuffing of netting. Melons are easily injured and should not be dropped.

STORAGE

- Temperature: 40°F if harvested at half-slip; 36°F if harvested at full slip.
- Humidity: 95%.
- Respiration: 2.5-3 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 10-20% CO₂, 3-5% O₂.
- Ethylene producer: 10-100 µL/kg hr.; sensitive to ethylene exposure.
- Damage potential: Less mature fruits are more sensitive to chilling-injury.
- Shelf life: 10-14 days.



CARROTS

HANDLING/PACKING

Grades

Sep. 18, 1954: Bunched Carrots

- U.S. No. 1: Similar varietal characteristics, roots that are firm, fairly clean, fairly-well colored, fairly smooth and well formed, and free from soft rot and from damage caused by freezing, growth cracks, sunburn, pithiness, woodiness, internal discoloration, oil spray, dry rot, other disease, insects, or mechanical or other means. Bunches shall have tops which are fresh and free from decay and free from damage caused by freezing, seedstems, yellowing or other discoloration, disease, insects or mechanical or other means. Unless otherwise specified, the bunches shall have full tops and the length of tops shall be not more than 20". Tolerances: 10% for defects, 25% for off-length tops, 5% for smaller-sized carrots, 10% for larger-sized carrots.
- U.S. Commercial: Same as U.S. No. 1, but with an increased (20%) tolerance for root defects.
- Unclassified

Dec. 20, 1965: Topped Carrots

- U.S. Extra No. 1: Similar varietal characteristics and are well trimmed, firm, clean, fairly-well colored, fairly smooth and well formed. Shall be free from secondary new top growth and soft rot and free from damage caused by freezing, growth cracks, sunburn, pithiness, woodiness, internal discoloration, oil spray, dry rot, other disease, insects, or other means. Tolerance: 10% (5% for serious damage and 1% for soft rot).
- U.S. No. 1: Similar varietal characteristics and are well trimmed, firm, fairly clean, fairly-well colored, fairly smooth and fairly-well formed. Shall be free from soft rot and from damage caused by freezing, growth cracks, sunburn, pithiness, woodiness, internal discoloration, oil spray, dry rot, other disease, insects, or other means. Tolerance: 10% (5% for serious damage and 2% for soft rot).
- U.S. No. 1 Jumbo: Same as U.S. No. 1 except for size.
- U.S. No. 2: Similar varietal characteristics which are well trimmed, firm, not excessively rough, and not seriously misshapen. Shall be free from soft rot and from serious damage caused by dirt, freezing, growth cracks, sunburn, pithiness, woodiness, internal discoloration, oil spray, dry rot, other disease, insects, or other means. Tolerance: 10% (2% for soft rot).
- Unclassified

Sep. 18, 1954: Short trimmed tops:

- U.S. No. 1: Similar varietal characteristics, roots that are firm, fairly clean, fairly-well colored, fairly smooth, well formed, and that are free from soft rot and free from damage caused by freezing, growth cracks, sunburn, pithiness, woodiness, internal discoloration, oil spray, dry rot, other disease, insects or mechanical or other means. The carrots shall have leaf stems that are free from decay and free from damage caused by freezing, seedstems, yellowing or other discoloration, disease,

insects, or mechanical or other means. The leaf stems shall be cut back to not more than 4" in length. Tolerance: 10% for defects, 5% for smaller sized carrots, 10% for larger sized carrots.

- U.S. Commercial: Same as U.S. No. 1, but with an increased (20%) tolerance for root defects.
- Unclassified

Cooling:

- Bunched green top carrots
 - Hydrocool in water with sanitizer after roots have been spray cleaned.
 - Crushed ice.
- Topped carrots
 - Room cool.
 - Crushed ice optional.

Cleaning:

- Bunched green top carrots
 - Wash bunched carrots with sprayer on screen table. Pressure washer can be used on roots only. Can be packed damp.
- Topped carrots
 - Barrel wash.
 - Clean with a sprayer or pressure washer on screen table or in harvest tote.

Carton Sizes:

Weights:

- 25-lb in 5/9 waxed carton with perforated polyethylene liner or 50 lb. in 1 1/9 bushel.

Length:

- Topped: 5+" (U.S. No. 2: 3+)

Diameters:

- Bunched: At least 3/4"
- Short-trimmed tops: At least 3/4"

Topped:

- U.S. Extra No. 1: 3/4"-1 1/2"
- U.S. No. 1: 3/4"-1 1/2"
- U.S. No. 1 Jumbo: 1"-2 1/2"
- U.S. No. 2: 1"-3"

STORAGE

- Temperature: 32-33.8°F (0-1°C).
- Humidity: 98-100%.
- Respiration: 5-10 mL/kg hr. at 32°F (0°C)
- Atmosphere composition: Not important. >5% CO₂ and <3% O₂ promotes decay.
- Ethylene producer: Very low. Exposure to ethylene causes a bitter flavor.
- Damage potential: Low.
- Shelf life: 5-6 months.



CAULIFLOWER

HANDLING/PACKING

Grades:

Mar. 15, 1968

- U.S. No. 1: Basic requirements for curds: clean, compact, color – white, creamy white, or cream; size – not less than 4" in diameter. Basic requirements for jacket leaves: fresh, closely trimmed, unless otherwise specified, fairly clean. Free from soft or wet decay. Free from damage caused by bruising, cuts, discoloration, enlarged bracts, fuzziness, hollow stem, insects, mold, riciness, wilting, and other means. Free from serious damage by any cause. Tolerance: 10% (5% for serious damage).
- U.S. Commercial: Same as for U.S. No. 1, but with increased tolerances. Tolerance: 20% (10% for serious damage).
- Unclassified

Cooling:

- Top-ice
- Forced-air cooling

Cleaning:

Wash if necessary.

CELERIAC

HANDLING/PACKING

Grades:

No grading for Celeriac in the U.S.

Cooling:

Celeriac would benefit from pre-cooling since it retains quality best when stored at 32°F (0°C). However, since Celeriac has a relatively low respiration rate, the benefits of pre-cooling must be balanced with the desired storage time before marketing.

Cleaning:

- Green top
 - Wash with sprayer on drain table, pressure washer can be used on roots only; allow to dry before packing.
- Bulk roots
 - Celeriac for storage should have tops removed and should not be washed until after storage.
 - Clean with a sprayer or pressure washer on screen table or in harvest tote.
 - Barrel wash

Carton Sizes:

- 24 in a 1 1/9 bushel box
- 25 lb. in a 5/9 waxed carton

Carton Sizes:

Weights:

- Single layer 25-lb. cabbage box
- 20-lb. 1 1/9 bushel box

Sizes:

- Variation in curd size is not more than 1 1/2" in any individual container.

Materials:

Use leaves to wrap heads, and then buyer will need to trim and plastic wrap. This is called a "green jacket pack".

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-98%.
- Respiration: 8-9 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Modest benefits. 3-5% CO₂, <2% O₂ delays leaf yellowing, but low O₂ may cause injury.
- Ethylene producer: Very low. Very sensitive to ethylene exposure.
- Damage potential: Medium.
- Shelf life: Up to 3 weeks, much less if kept warmer than 32°F (0°C).

Materials:

Boxes should be unlined.

STORAGE

- Temperature: 32°-36°F (0-2°C).
- Humidity: 97-98%.
- Respiration: 2.5-4 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Not very effective; 2-3% CO₂, 2% O₂.
- Ethylene producer: Low. Somewhat sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 6-8 months.



CELERY

HANDLING/PACKING

Grades:

Apr. 7, 1959

- U.S. Extra No. 1: Similar varietal characteristics and are well developed, well formed, clean, well trimmed, compact, and which are free from blackheart, brown stem, soft rot, doubles, and free from damage caused by freezing, growth cracks, horizontal cracks, pithy branches, seedstems, suckers, wilting, blight, other disease, insects, or mechanical or other means. Stalks shall be green unless specified as fairly-well blanched, or mixed blanch. The average midrib length of the outer whorl of branches shall be not less than 7". Unless otherwise specified in connection with the grade, stalks shall be of such length as to extend from one side, end, or bottom of the container to within 1 ½" of the corresponding opposite side, end, or top of the container. Such measurement shall not include the bulge. In any container when stalk length is specified, it shall be the minimum length in terms of whole inches of even number, such as 12", 14", etc. Tolerance: 10% for defects, 5% for off-length stalks, 5% for off-length midribs.
- U.S. No. 1: Similar varietal characteristics and are fairly-well developed, fairly-well formed, well trimmed, fairly compact, and free from blackheart, soft rot, and from damage caused by freezing, growth cracks, horizontal cracks, pithy branches, seedstems, suckers, dirt, doubles, wilting, blight, other disease, insects, or mechanical or other means. Stalks shall be green unless specified as fairly-well blanched, or mixed blanch. Unless otherwise specified, the average midrib length of the outer whorl of branches shall be not less than 6". Unless otherwise specified in connection with the grade, stalks shall be of such length as to extend from one side, end or bottom of the container to within 1 ½" of the corresponding opposite side, end, or top of the container. Such measurement shall not include the bulge. In any container when stalk length is specified, it shall be the minimum length in terms of whole

inches of even number, such as 12", 14", etc. Same tolerances as U.S. Extra No. 1.

- U.S. No. 2: Similar varietal characteristics and are reasonably well developed, reasonably well formed, fairly well trimmed, and free from blackheart and soft rot, and from serious damage caused by freezing, growth cracks, horizontal cracks, pithy branches, seedstems, dirt, doubles, wilting, blight, other disease, insects or mechanical or other means. Stalks shall be green unless specified as fairly-well blanched, or mixed blanch. Same tolerances as U.S. No. 1.
- Unclassified

Cooling:

Prompt pre-cooling to 32°F (0°C) is critical

- Hydrocooling with chilled water spray

Cleaning:

Trim before washing. Barrel wash line with pressure wash at the end.

Carton Sizes:

Weights:

- 60-lb. cartons with 48 stalks
- 7 size grades with 18-96 stalks per crate
- Celery hearts – (8, 10, or 12" in length) – 18 or 28-lb. cartons

STORAGE

- Temperature: 32°F (0°C).
- Humidity: > 95%.
- Respiration: 5-10 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 3-5% CO₂, 2-4% O₂.
- Ethylene producer: Low. Sensitive to ethylene exposure at temperatures above 41°F (5°C)
- Damage potential: Low
- Shelf life: 5-7 weeks (with refrigeration)

CHARD

HANDLING/PACKING

Grades:

Chard is not graded in the U.S.

Cooling:

- Hydrocool in water with sanitizer
- Top-ice

Cleaning:

Wash in water tank with sanitizer.

Carton Sizes:

Leafy greens or cabbage box; 24 bunches to a box.

Materials:

Using plastic films to cover packaging reduces water loss.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-98%.
- Respiration: 9-10 mL/kg hr. at 36°F (2°C).
- Atmosphere composition: 2-3% CO₂, 10% O₂ and temperature of 31°F (-0.5°C) can increase storage to 1 month.
- Ethylene producer: Very low. Very high sensitivity to ethylene exposure.
- Damage potential: High. Sensitive to dehydration and warm temperatures.
- Shelf life: 1-2 weeks.

CHERRIES

HANDLING/PACKING

Grades:

May 7, 1971

- U.S. No. 1: Similar varietal characteristics, mature, fairly-well colored, well formed, and clean. Free from decay, insect larvae or holes caused by them, not soft, overripe, or shriveled, no undeveloped doubles or sunscald. Free from damage by any other cause. Tolerance: 8% (4% for serious damage and 0.5% for decay).
- U.S. Commercial: Same as U.S. No. 1, except for increased tolerances: 16% (4% for serious damage and 0.5% for decay)

Cooling:

Cherries should be cooled to less than 41°F (5°C) by 4 hr. after harvest.

- Hydrocooling
- Room cooling
- Forced-air cooling

CORN

HANDLING/PACKING

Grades:

Feb. 12, 1992

- U.S. Fancy: Similar varietal characteristics and are well trimmed and well developed. Free from smut, worms, insect or worm injury, and decay. Free from injury caused by rust, discoloration, birds, worms, insects, disease, and mechanical or other means. Cobs must be fairly-well filled with plump and milky kernels and fairly-well covered with fresh husks. Cob must be at least 6". May not be clipped. Tolerance: 10% (2% for decay).
- U.S. Fancy, Husked: Same as U.S. Fancy, except for amount of covering, trimming, clipping, and length. Must be at least 5". Tolerance: 10% (2% for decay).
- U.S. No. 1: Similar varietal characteristics and are well trimmed and well developed. Free from smut, decay, rust, discoloration, and damage from birds, worms, insects, disease, and mechanical or other means. Cobs must be fairly-well filled with plump and milky kernels and fairly-well covered with fresh husks. Cob must be at least 5". Tolerance: 10% (2% for decay).
- U.S. No. 1, Husked: Meets U.S. No. 1 standards except for covering, trimming, clipping, and length of cob. Must be husked, properly trimmed, may be clipped (but well-clipped), and at least 4" long. Tolerance: 10% (2% for decay).
- U.S. No. 2: Similar varietal characteristics and are fairly-well trimmed and fairly-well developed. Free from smut and decay. Free from serious damage caused by birds, worms, insects, disease, mechanical, or other means. At least moderately filled with plump and milky kernels, and fairly-well covered with fresh husks. May be clipped, but only properly. Tolerance: 10% (2% for decay).

Cleaning:

Cherries are not generally washed.

Carton Sizes:

Weights:

- 20-lb. cartons
- 10-lb. cartons

STORAGE

- Temperature: 32°-36°F (0-2°C).
- Humidity: 80-90%.
- Respiration: 3-5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5-20% CO₂, 1-5% O₂.
- Ethylene producer: Very low. Sensitive to ethylene exposure.
- Damage potential: Pitting and bruising.
- Shelf life: 2-4 weeks (with refrigeration)

Cooling:

Sweet Corn is highly perishable and must be cooled as quickly as possible to 32°F (0°C) to 35.6°F (2°C). Maximum quality is retained by pre-cooling.

- Hydrocool in cold water with sanitizer. Top with crushed ice after cooling.
- Package ice and top-ice.
- Forced air. Be careful of dehydration; wetting down leaves can help.

Cleaning:

Not necessary but may be washed.

Carton Sizes:

48 ears in 1 1/9 bushel box, or wire-bound wooden crates.

Materials:

Waxed fiberboard cartons and returnable plastic containers are less commonly used. Some corn is pre-packaged in PVC film-overwrapped trays.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-98%.
- Respiration: 15-25 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Avoid <2% O₂ or >15% CO₂.
- Ethylene producer: Trace. Very high concentrations of ethylene can yellow the husks.
- Damage potential: High. Sensitive to overheating. Cool quickly.
- Shelf life: 4-6 days.



CRANBERRIES

HANDLING/PACKING

Grades:

Aug. 26, 1971

- U.S. No. 1: Of one variety or have similar varietal characteristics and are clean, mature, firm, and not soft or decayed. Free from damage caused by moisture, bruises, freezing, smothering, scarring, sunscald, foreign material, disease, insects, or mechanical or other means. Color: Individual cranberries shall be at least fairly-well colored, and the cranberries in the container shall be fairly uniform in color. Tolerance: 5% (3% for soft or decayed berries [5% at destination] and 5% for uniform color).

Cooling:

Forced-air cooling, if necessary.

Cleaning:

Washing is not necessary for cranberries.

Carton Sizes:

Weights:

- Cartons containing 24 12-oz. polybags

CUCUMBERS

HANDLING/PACKING

Grades:

Mar. 1, 1958

- U.S. Fancy: Well colored, well formed, not overgrown, and fresh, firm, and free from decay and sunscald. Shall be free from injury caused by scars and from damage caused by yellowing, sunburn, dirt or other foreign material, freezing, mosaic or other disease, insects, cuts, bruises, or mechanical or other means. Tolerance: 10% (1% for decay).
- U.S. Extra No. 1: Combination of U.S. Fancy and U.S. No. 1, where at least 50% must meet the criteria for U.S. Fancy.
- U.S. No. 1: Fairly-well colored, fairly-well formed, not overgrown, and fresh, firm, and free from decay and sunscald, and free from damage caused by scars, yellowing, sunburn, dirt, or other foreign materials, freezing, mosaic or other disease, insects, cuts, bruises, or mechanical or other means. Tolerance: 10% (1% for decay).
- U.S. No. 1 Small: Meets the requirements of U.S. No. 1 except for size.
- U.S. No. 1 Large: Meets the requirements of U.S. No. 1 except for size.
- U.S. No. 2: Moderately colored, not badly deformed, not overgrown, and fresh, firm, free from decay and free from damage caused by freezing, sunscald, cuts and from serious damage caused by scars, yellowing, sunburn, dirt or other foreign material, mosaic or other disease, insects, bruises, or mechanical or other means. Tolerance: 10% (1% for decay).
- Unclassified

- 20-, 25-, and 30-lb. cartons
- Wood totes, for bulk sales

Sizes:

- Minimum diameter: 13/32"

STORAGE

- Temperature: 35.6°F (2°C). Red color can be increased by storing at 44.6-50°F (7-10°C) for a few weeks after harvest.
- Humidity: 90-95%.
- Respiration: 2 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Not Used.
- Ethylene producer: Low.
- Damage potential: Chilling-sensitive; chilling-injury can be reduced by warming to 69.8°F (21°C) for 1 day per month.
- Shelf life: 2-4 months.



Cooling:

Forced-air cooling

Cleaning:

Brush washer

Carton Sizes:

Weights:

- 40-lb. in 1 1/9 bushel cartons and crates
- 20-lb. in 5/9 bushel cartons
- 24-count cartons

Diameter:

- U.S. No. 1 Small: 1 1/2"-2"
- U.S. No. 1 Large: Minimum 2 1/4"
- All others: Maximum: 2 3/8"

Length:

- U.S. Fancy: Minimum 6"
- U.S. No. 1: Minimum 6"
- U.S. No. 1 Small: No requirements
- U.S. No. 1 Large: Minimum 6"
- U.S. No. 2: Minimum 5"

STORAGE

- Temperature: 50-54.5°F (10-12.5°C).
- Humidity: 95%.
- Respiration: 12-15 mL/kg hr. at 50°F (10°C).
- Atmosphere composition: Not particularly beneficial.
- Ethylene producer: Low. Very sensitive to ethylene exposure.
- Damage potential: Very chilling sensitive.
- Shelf life: 14 days or less.



CULINARY HERBS (EXCLUDING BASIL)

HANDLING/PACKING

Grades:

Perennial herbs are not graded in the U.S.

Cooling:

Forced Air

Cleaning:

Herbs should not be washed.

Materials:

Herbs are bunched and tied with rubber bands or twist-ties. They are packaged in plastic bags or clamshell containers, and then packed in corrugated cartons. Perforated polyethylene liners should be used.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 90-95% (95-100% for chives).
- Respiration: 10-27 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Not generally used.
- Ethylene producer: Low High sensitivity to ethylene exposure.
- Damage potential: Low.
- Shelf life: 1-2 weeks for marjoram, tarragon, and oregano; 2-3 weeks for most others.



DATES

HANDLING/PACKING

Grades:

Aug. 26, 1955

- U.S. Grade A or U.S. Fancy: Whole or pitted dates of one variety that possess practically uniform color. For dates that are predominantly light amber in color, there may be not more than 5% that are dark amber in color, and for those dark amber in color, there may be not more than 5% that are light amber. Shall be practically uniform in size where not more than 10%, by weight, may be conspicuously larger or smaller than the approximate average size of the dates in the container. Shall be practically free from defects. For pitted dates there may be not more than one whole pit or two pit fragments for each 25-oz. of pitted dates. Dates shall possess a good character where not less than 75%, by weight, are well developed, well fleshed, and soft, or at the time of packing are in a state of ripeness that within 15 days will develop into such character. The remainder may possess reasonably good character, including not more than a total of 2% possessing semi-dry calyx ends, and none may possess dry calyx ends. Dates may not score less than 90 points when scored in accordance with the scoring system outlined in the standard.
- U.S. Grade B or U.S. Choice: Whole or pitted dates (other than whole dry dates for processing) that are one variety and possess color reasonably uniform for the type. For dates that are predominantly light amber in color, there may be not more than 10% that are dark amber; and for those dark amber in color, there may not be more than 10% that are light amber. Dates shall be reasonably uniform in size where not more than 15%, by weight, of the whole or pitted dates may be conspicuously larger or smaller than the approximate average size of the dates in the container. Shall be reasonably free from defects. For pitted dates there may be not more than one whole pit or two pit fragments for each 25 oz. of pitted dates. Dates shall possess reasonably good character. Dates shall be pliable with not less than 75% that are reasonably well developed and reasonably well fleshed, or at time of packing are in a state of ripeness that within 15 days will develop into such character. The remainder may possess fairly good character including not more than 10% possessing semi-dry calyx ends and dry calyx ends, provided, not more than 2% possess dry calyx ends. Dates may not score less than 80 points.
- U.S. Grade B (Dry) or U.S. Choice (Dry): Whole dry dates for processing that are of one variety, possess reasonably good color, are reasonably uniform in size, are reasonably free from defects and possess a reasonably good character. Reasonably good character means that the dates may be firm and dry, that not less than 75%, by weight, are reasonably well developed and reasonably well fleshed and that the remainder are fairly-well developed and fairly-well fleshed. May not score less than 80 points.
- U.S. Grade C or U.S. Standard: Whole or pitted dates (other than whole dry dates for processing) that are of one variety or of date pieces or macerated dates that possess fairly good color. For whole or pitted dates that are predominantly light amber in color, there may be not more than 20% that are dark amber in color, and those dark amber in color, there may be not more than 20% that are light amber. For macerated or date pieces, the color may be variable throughout the mass, may be slightly dull but not off-color, and must be typical of properly prepared dates of these styles. Dates shall be fairly uniform in size except for date pieces or macerated dates. Not more than a total of 20%, by weight, of the whole or pitted dates may be conspicuously larger or smaller than the approximate average size of the dates in the container. Dates shall be fairly free from defects. For pitted dates, fairly free from defects means not more than one whole pit or two pit fragments for each 25 oz. of pitted dates may be present. For macerated or date pieces, not more than one whole pit or two pit fragments for each 25 oz. of pitted dates may be present and the mass shall consist of clean and sound date material, fairly free from defects that seriously affect the appearance, edibility, or keeping quality of the product. Dates shall be of fairly good character. May be firm but are pliable, may possess semi-dry calyx ends and not less than 80%, by weight, are fairly-well developed and fairly-well fleshed, or at time of packing are in a state of ripeness that within 15 days will develop into such character. The remainder may fail to possess such fairly good character or may possess dry calyx ends. For macerated or date pieces, the character may be variable throughout the mass but not seriously affected by dry calyx end material or inedible portions of dates. May not score less than 70 points.



- U.S. Grade C (Dry) or U.S. Standard (Dry): Whole dry dates for processing that are of one variety, that possess fairly good color, are fairly uniform in size, are fairly free from defects and possess a fairly good character. Dates may be firm and dry but are fairly-well developed and fairly-well fleshed. May not score less than 70 points.
- Substandard: Fail to meet the requirements of U.S. Grade C or U.S. Standard or U.S. Grade C (Dry) or U.S. Standard (Dry), whichever is applicable.

Cooling:

Forced-air cooling is recommended.

- Hydro-cooling can be used to cool khadal dates to near 32°F (0°C) in 10-20 min. but requires effective sanitizing of water and removal of excess moisture before packing.

Cleaning:

May be washed in sanitized water. Can be cleaned with a damp cloth.

Carton Sizes:

Types:

- Some are marketed in 15-lb. (6.8kg) flats of fiberboard or wood, others in 5- or 10-lb. (2.3 or 4.5kg) cartons.

Sizes for U.S. Medjool dates:

- Jumbo: <10 dates per lb. (0.45 kg)
- Mixed: 10-15 dates per lb.
- Conventional: >15 dates per lb.

Materials:

Large, reinforced cartons are used for packing of dry dates, especially for export. Consumer packages are made in a number of sizes and shapes, including bags of transparent film or trays over wrapped with films. Round fiberboard cans with metal tops and bottoms containing 1.1-2.2 lb. (500-1000g) are also used as well as rigid transparent plastic containers with a capacity of 0.44-0.66 lb. (200-300g).

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 70-75%.
- Respiration: Very low, < 5 mg CO₂ /kg hr. at 68°F (20°C) at the khalal stage, and < 2 mg /kg hr. at the rutab and tamr stages.
- Atmosphere composition: No CA information given.
- Ethylene producer: Low. Ripe dates are not sensitive to ethylene exposure.
- Damage potential: Ripe dates at rutab or tamr stages are not sensitive to chilling and freezing temperatures. Freezing temperatures can injure dates at early stages of kimri and khalal. Some varieties may develop sugar spots or crystals during storage.
- Shelf life: Partially dried dates: one year at 32°F (0°C). Fully mature soft and firm 'Deglet Noor' dates: more than one year when stored at 0°F (-17.5°C). Dry dates: many years at 68°F (20°C).

EGGPLANT

HANDLING/PACKING

Grades:

Oct. 29, 1953

- U.S. Fancy: Similar varietal characteristics, well colored, firm, clean, well shaped, and free from decay and worm holes and from injury caused by scars, freezing, disease, insects, or mechanical or other means. Tolerance: 10% (1% for decay).
- U.S. No. 1: Similar varietal characteristics, fairly-well colored, firm, clean, fairly-well shaped, and free from decay and worm holes and from damage caused by scars, freezing, disease, insects, or mechanical or other means. Tolerance: 10% (1% for decay).
- U.S. No. 2: Firm, free from decay and from serious damage caused by freezing, disease, insects, or mechanical or other means. Tolerance: 10% (1% for decay).
- Unclassified

Cooling:

Rapid cooling to 50°F (10°C) immediately after harvest is necessary.

- Hydrocooling
- Forced-air cooling
- Room cooling after washing (less effective)
- Do Not Ice

Cleaning:

Can be washed in water tank with sanitizer or dry brushed to remove field dust.

ELDERBERRIES

HANDLING/PACKING

Grades:

Elderberries are not graded in the U.S.

Cooling:

Quick cooling after harvest to recommended storage temperature is desirable

- Forced-air

Cleaning:

Not recommended

Carton Sizes:

Since fresh market volumes are not large, container sizes and packaging tend to be those used for similar, but more common berries, e.g., raspberries.

Carton Sizes:

Weights:

- 25-lb. in 1 1/9 bushel cartons

Sizes: Length; count (number of fruit/box)

- Small: 4.75-5.5"; 32
- Medium: 7.5-8.25"; 24
- Large: 8.25-9.5"; 18
- Extra Large: 9.5-10.25"; 16

Materials:

Cartons are generally waxed fiberboard or wire-bound crates. Fruit may be individually wrapped in paper.

STORAGE

- Temperature: 50-53.6°F (10-12°C).
- Humidity: 90-95%.
- Respiration: 32-41 mL/kg hr. at 54.5°F (12.5°C).
- Atmosphere composition: Not beneficial.
- Ethylene producer: 0.1-0.7 µL/kg hr.. Sensitive to ethylene exposure.
- Damage potential: Chilling-injury.
- Shelf life: 14 days or less.



STORAGE

- Temperature: 31.1-32°F (- 0.5-0°C).
- Humidity: 95%.
- Respiration: No data available.
- Atmosphere composition: No known information on the effect of CA on elderberries.
- Ethylene producer: Low. Low sensitivity to ethylene.
- Damage potential: Not chilling-sensitive.
- Shelf life: 5-14 days

ENDIVE AND ESCAROLE

HANDLING/PACKING

Grades:

Oct. 1, 1964

- U.S. No. 1: Similar varietal characteristics and are fresh, well trimmed and fairly-well blanched, free from decay and from damage caused by seedstems, broken, bruised, spotted, or discolored leaves, wilting, dirt, disease, insects, or other means. Tolerance: 10% (5% for serious damage, 2% for decay).
- Unclassified

Cooling:

Hydrocooling

Cleaning:

Wash in water tank with sanitizer; drain upside down.

FENNEL

HANDLING/PACKING

Grades:

Fennel is not graded in the U.S.

Cooling:

Hydrocooling

Cleaning:

Can be washed.

Materials:

Plastic or cardboard boxes. Should be top-iced to keep leafy top crisp.

FIGS

HANDLING/PACKING

Grades:

Figs are not graded in the U.S.

Cooling:

Expedited forced-air cooling to 32°F (0°C) is strongly recommended.

Cleaning:

Not recommended.

Materials:

Figs are hand-picked and packed in a one-layer box because fully mature fresh figs are soft, easily bruised, and highly perishable.

STORAGE

- Temperature: 30-32°F (-1-0°C).
- Humidity: 90-95%.
- Respiration: 2-4 mL/kg hr. at 32°F (0°C).

Carton Sizes:

Weights:

- 30-40 lb. cartons or crates
- 1 1/9 bu. carton or crate

Materials:

Cartons can be packed with ice.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-100%.
- Respiration: 22.5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: None recommended.
- Ethylene producer: Very low. Sensitive to ethylene exposure.
- Damage potential: Sensitive to overheating.
- Shelf life: 2-3 weeks.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 90-95%.
- Respiration: 9-10 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: None has been reported.
- Ethylene producer: Low.
- Damage potential: Low.
- Shelf life: 2 weeks.

- Atmosphere composition: 15-20% CO₂ and 5-10% O₂ is effective in decay control, firmness retention, and reduction of respiration and ethylene production.
- Ethylene producer: Low. Ethylene may stimulate softening and decay, especially if kept at 41°F (5°C) or higher.
- Damage potential: Not chilling-sensitive. Extended storage in controlled atmospheres can result in loss of characteristic flavor. Figs exposed to < 2% O₂ and/or > 25% CO₂ develop off-flavors due to fermentation.
- Shelf life: 1-2 weeks in air and 3-4 weeks in controlled atmosphere for California-grown Black Mission and Calimyrna figs.



GARLIC

HANDLING/PACKING

Grades:

Sep. 4, 1944

- U.S. No. 1: Similar varietal characteristics, mature and well cured, compact, with cloves well filled and fairly plump, free from mold, decay, and shattered cloves, and from damage caused by dirt or staining, sunburn, sunscald, cuts, sprouts, tops, roots, disease, insects, or mechanical or other means. Each bulb shall be fairly-well enclosed in its outer sheath. Tolerance: 10% (2% for decay).
- Unclassified

Cooling:

Not necessary

Curing:

Cure in bundles of 10-12 heads in a warm ventilated environment for 10 days. Can be hung to cure or laid on a screen.

Cleaning:

After curing, remove outer 1-2 layers of skin. Stem-end should be cut with at least 1" remaining.

Carton Sizes:

Weights: Packed loose

- 5-, 10-, 22-, 30-lb. cartons
- Smaller bags or trays for retail

Sizes:

- Minimum diameter: 1.5"

STORAGE

- Temperature: 68-86°F for curing or short-term storage (<2 months); 30-32°F (-1-0°C) for long-term storage.
- Humidity: 60-70%.
- Respiration: 2-6 mL/kg hr. at 32°F (0°C).
- Modified atmosphere: 5-15% CO₂ (15% may cause a yellowing on some cloves after 6 months).
- Ethylene producer: Low. Not sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 1-2 months for curing; 9+ months for long-term storage.



GINGER

HANDLING/PACKING

Grades:

Ginger is not graded in the U.S.

Cooling:

- Forced-air
- Room cooling

Cleaning:

Hand or brush wash immediately to get a pale color.

Carton Sizes:

Sold in full telescoping 30-lb. (13.6kg), 20-lb. (6.8kg) fiberboard cartons or 5-lb. (1.7kg) cartons with film bags.

STORAGE

- Temperature: 54-57°F (12-14°C).
- Humidity: 85-90%.
- Respiration: 3.1-3.8 µL/kg hr. at 72°F (22°C).
- Atmosphere composition: No published recommendations.

- Ethylene producer: Very low. Not sensitive to ethylene exposure.
- Damage potential: Superficial mold growth can occur if condensation occurs on rhizomes. Mature ginger is chilling-sensitive if held below 54°F (12°C). Symptoms include loss of skin color and pitting of the skin. In severe cases there is internal breakdown. Dehydration is the most common problem and shriveling becomes pronounced after the loss of about 10% of harvest weight.
- Shelf life: 60-90 days.



GOOSEBERRIES AND CURRANTS

HANDLING/PACKING

Grades:

Gooseberries and currants are not graded in the U.S.

Cooling:

Forced-air

Cleaning:

Gooseberries and currants should not be washed.

Carton Sizes:

Weights:

- Trays holding 12 half-pint containers

Materials:

- Vented clamshell containers are standard.

GRAPES

HANDLING/PACKING

Grades:

Sep. 8, 1983

- U.S. Fancy Table Grapes: Of one variety (except when designated as assorted varieties) that are mature and well colored. The berries are firm, firmly attached to capstems, and are not split, shattered, crushed, dried, or wet, and are free from decay, mold, mildew, berry moth, russeting, and hail, and from damage caused by freezing, disease, insects, or other means. Tolerance: 10% (10% for size, 5% for serious damage, 2% for dried berries or berries affected by berry moth, and 1% for decay or mold).
- U.S. No. 1 Table Grapes: Of one variety (except when designated as assorted varieties) that are mature and fairly-well colored. The berries are firm, firmly attached to capstems, and are not split, shattered, crushed, dried, or wet, and are free from decay, mold, and berry moth, and from damage caused by freezing, russeting, hail, mildew, other disease, insects, or other means. Tolerance: 10% (10% for size, 5% for serious damage, 2% for dried berries or berries affected by berry moth, and 2% for decay or mold).
- U.S. No. 1 Juice Grapes: Of one variety (except when designated as assorted varieties) that are mature and fairly-well colored. The berries are firm, firmly attached to capstems, and are not split, shattered, crushed, dried, or wet, and are free from mold, decay and berry moth, and from serious damage caused by freezing, russeting, hail, mildew, other disease, insects, or other means. Tolerance: 15% (6% for serious damage, 2% for dried berries or berries affected by berry moth, and 3% for decay or mold).
- Unclassified

STORAGE

- Temperature: 31-32°F (-0.5-0°C).
- Humidity: 95%.
- Respiration: 2.5-3.5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Gooseberry – 10-15% CO₂, 1.5% O₂; Red currant – 18-20% CO₂, 2% O₂.
- Ethylene producer: No data available.
- Damage potential: Low.
- Shelf life: 2 ½ to 3 weeks.

Cooling:

Forced-air cooling to less than 35.6°F (2°C) within a day of harvest.

Cleaning:

Grapes should not be washed.

Carton Sizes:

Weights: No standard packaging

- Lugs
- Quart-sized ventilated plastic containers
- 2-lb. plastic slit bags

Sizes:

- Minimum diameter of 9/16" for U.S. Fancy and U.S. No.1 Table Grapes.

STORAGE

- Temperature: 31-32°F (-0.5-0°C).
- Humidity: 85-90%.
- Respiration: 1.5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Not used.
- Ethylene producer: Low. Gray mold growth can occur in the presence of ethylene.
- Damage potential: Low.
- Shelf life: 4-7 weeks.



GREENS - COLLARD, KALE, MUSTARD AND TURNIP

HANDLING/PACKING

Grades:

Jul. 21, 2005: Kale

- U.S. No. 1: Kale of one type that are well trimmed, not stunted, free from decay and from damage caused by yellow or discolored leaves, seedstems, wilting, bud burn, freezing, dirt, disease, insects, or mechanical or other means. Tolerance: 10% (1% for wet decay).
- U.S. Commercial: Same as U.S. No. 1, except for a tolerance for slightly yellowed or bronze edges to leaves, provided the edges are not dried.

Apr. 16, 1953: Collard

- U.S. No. 1: Collard greens of similar varietal characteristics that are fresh, fairly tender, fairly clean, well trimmed, and of characteristic color for the variety or type, which are free from decay and from damage caused by coarse stalks and seedstems, discoloration, freezing, foreign material, disease, insects, or mechanical or other means. Tolerance: 10% (5% for serious damage and 2% for decay).
- Unclassified

Mar. 8, 1953: Mustard or Turnip Greens:

- U.S. No. 1: Mustard greens or turnip greens of similar varietal characteristics that are fresh, fairly tender, fairly clean, and which are free from decay and free from damage caused by seedstems, discoloration, freezing, foreign material, disease, insects, or mechanical or other means. Tolerance: 10% (5% for serious damage and 2% for decay).
- Unclassified

Cooling:

Field heat should be removed as quickly as possible.

- Hydrocooling
- Liquid icing
- Package icing (2.2-lb. of ice per 4-lb. of product)
- Top-icing

Cleaning:

Clean via hydrocooling

Carton Sizes:

24 bunches packed in waxed leafy greens box or 1 3/4 bu. carton. Alternate side-to-side four groups of six.

Materials:

Collard, kale, mustard and turnip greens are typically bunched with a twist tie or rubber band – approximately 1-lb. per bunch. Waxed fiberboard cartons are commonly used.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-98%.
- Respiration: 9-11 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5-10% CO₂, 7-10% O₂.
- Ethylene producer: Low. Very sensitive to ethylene exposure.
- Damage potential: Sensitive to overheating.
- Shelf life: 2 weeks (3 weeks for kale).



HONEY DEW AND HONEY BALL MELONS

HANDLING/PACKING

Honey dew fruit have no federal marketing standard for SSC except for May 1 through June 20, when all honey dew melons, regardless of grade, must be at 8% minimum.

Grades:

Apr. 1, 1967

- U.S. No. 1: Consists of honey dew or honey ball-type melons that are mature, firm, well formed, free from decay and from damage caused by dirt, aphid stain, rust spots, bruises, cracks, broken skin, sunscald, sunburn, hail, moisture, insects, disease, or other means. Tolerance: 10% (5% for defects and 1% for decay).
- U.S. Commercial: Meets the requirements of U.S. No. 1 grade except for the increased tolerances for defects. Tolerance: 20% (5% for defects and 1% for decay).
- U.S. No. 2: Consists of honey dew or honey ball-type melons which are mature, firm, fairly-well formed, free from decay and from serious damage by any cause. Tolerance: 10% (1% for decay).
- Unclassified

Cooling:

Honey dew melons cut from the vine need not be pre-cooled. Full-slip melons should be pre-cooled to 50-60°F (10-15°C) soon after harvest.

- Hydrocooling
- Forced-air cooling

Cleaning:

Wash through hydrocooling if necessary.

Carton Sizes:

Type:

- The number of fruit (based on a uniform fruit diameter and weight) per box to achieve a standard weight of 30-lb. (13.6kg).

Size classes:

- 4s, 5s, 6s, 8s and 9s.

STORAGE

- Temperature: 50°F (10°C), 45°F (7°C) for ethylene ripened honey dew melons and full-slip honey dew melons.
- Humidity: 90-95%, 95% for ethylene-ripened honey dew melons and full-slip honey dew melons.
- Respiration: 4.1 mL/kg hr. at 41°F (5°C).
- Atmosphere composition: Limited commercial use.
- Ethylene producer: Very low. There is benefit, at time of shipping, from exposure to 100 µL/L ethylene at 55-77°F (12.5-25°C) for up to 24 hr. Full-slip honey dew melons should not be gassed with ethylene.
- Damage potential: Chilling-injury can occur at <45°F with riper melons being less susceptible. Symptoms include patchy, long surface lesions, pitting and darkening.
- Shelf life: 3 weeks. Ethylene-ripened honey dew melons can be held for 7-10 days.



HORSERADISH

HANDLING/PACKING

Grades:

Jul. 27, 1936

- U.S. Fancy: Firm, well trimmed, well shaped, fairly smooth, free from decay and hollow heart, and free from damage caused by dirt, sunburn, cuts, cracks, internal discoloration, mold, freezing, insects, mechanical or other means. Each root shall have good head formation. Tolerance: 10% (5% for hollow roots and 2% for decay).
- U.S. No. 1: Firm, well trimmed, fairly-well shaped, not excessively rough, and are free from decay and hollow heart and from damage caused by dirt, sunburn, cuts, cracks, internal discoloration, mold, freezing, insects, mechanical, or other means. Each root shall have fairly good head formation. Tolerance: 10% (5% for hollow roots and 2% for decay).
- U.S. No. 2: Firm, well trimmed, free from decay and hollow heart, and free from serious damage caused by dirt, sunburn, cuts, cracks, internal discoloration, mold, freezing, insects, mechanical or other means. Tolerance: 10% (5% for hollow roots and 2% for decay).
- Unclassified

Cooling:

- Roots should be pre-cooled immediately after harvest to 39-41°F (4-5°C) or placed in storage at the recommended temperature and humidity.
- Forced-air cooling

Cleaning:

- Barrel-washer or pressure washer.
- Wash after storage.

JICAMA

HANDLING/PACKING

Grades:

Jicama are not formally graded in the U.S. However, two grades are recognized in Hawaii based on size and freedom from defects including dirt, discoloration, growth cracks, roughness, insect damage, and mechanical injury.

Cooling:

Jicama roots that are to be kept in storage or which require wound healing should be cured by holding at 68-77°F with 95-100% RH for >1 week.

Cleaning:

Dry brush or wash after storage and partially dry for market.

Carton Sizes:

Typically packed in wooden crates of 20+ lbs. (9+kg) or in carton boxes of about 10-lb. (4.5kg) for export

Carton Sizes:

Weights:

- 44-55 lb. (20-25kg) sacks
- 2.2 lb. (1kg) packages
- For storage: 33lb. (15kg) polyethylene-lined crates
- For storage: 660-1,100 lb. (300-500kg) containers

Sizes:

- U.S. Fancy: 1.5"+ diameter and 8"+ length
 - Diameter may be 1/16" less for each half inch over 8" in length; but diameter may not be less than 1-¼"
- U.S. No. 1: 1-¼"+ diameter and 6"+ length
 - Diameter may be 1/16" less for each half inch over 6" in length; but diameter may not be less than 1"
- U.S. No. 2: Minimum 4" length and 1" diameter.

Materials:

For long term storage, use plastic-lined bins or crates.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 98-100%.
- Respiration: 4 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Little benefit from controlled atmosphere.
- Ethylene producer: Very low. Not sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 8-12 months.

STORAGE

- Temperature: 54-59°F (12.5-15°C)
- Humidity: 80-90%.
- Respiration: 2-4 mL/kg hr. at 32°F (0°C) for intact roots and fresh cut pieces.
- Atmosphere composition: No information available for intact roots. Decay development and discoloration of fresh-cut pieces was reduced by 5-10% in CO2 atmospheres.
- Ethylene producer: Low. Not sensitive to ethylene exposure.
- Damage potential: May develop symptoms of chilling-injury (external decay, internal discoloration and loss of crisp texture) after 1-3 weeks at 50°F (1°C).
- Curing: Wound curing can be achieved by holding roots at 68-77°F (20-25°C) with 95-100% RH for at least a week.
- Shelf life: 2-4 months. Leaf and stem sprouts may develop after 2 months with loss of weight and juiciness of the pulp.



KOHLRABI

HANDLING/PACKING

Grades:

Kohlrabi is not graded in the U.S.

Cooling:

- Hydrocool in water with sanitizer
- Ice
- Forced-air cooling

Cleaning:

Wash with sprayer. Pressure washer can be used on roots only

Carton Sizes:

Weights:

- 1-1/9 bu. box – 24 bunches
- With tops: bunched like beets, with 3-5 kohlrabi per bunch

LEEKs

HANDLING/PACKING

Grades:

Leeks are not graded in the U.S.

Cooling:

- Hydrocool in water with sanitizer.
- Package icing

Cleaning:

Wash/peel tunnel. Spray wash or pressure-wash the roots to remove dirt.

Carton Sizes:

Weights:

- 10-lb. 1/3 bu. cartons or wire-bound crates
- 12-count leafy greens carton

Sizes:

- At least 1" in diameter

Sizes:

- 2-2 1/2" for early to mid-season kohlrabi
- 4-5" for fall-grown kohlrabi

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 98-100%.
- Respiration: 5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: No benefit to controlled atmosphere.
- Ethylene producer: Very low. Low sensitivity to ethylene.
- Damage potential: Low.
- Shelf life: 2-4 weeks with tops; 2-3 months without tops.



STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-100%.
- Respiration: 5-10 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 2-5% CO₂, 1-3% O₂.
- Ethylene producer: Very low. Moderately sensitive to ethylene exposure.
- Damage potential: Low
- Shelf life: 2-3 months (with ice).

LETTUCE

HANDLING/PACKING

Grades:

Dec. 1, 1975

- U.S. Fancy: Similar varietal characteristics, fresh, green, not soft, and not burst. Free from decay, russet spotting, and doubles. Free from injury by tip burn, downy mildew, field freezing, discoloration, and not damaged by any other cause. Each head shall be fairly well trimmed unless specified as closely trimmed. Tolerance at shipping point: 8% (5% for soft heads, 4% for serious damage, and 1% for decay on any part exclusive of the wrapper leaves).
- U.S. No. 1: Similar varietal characteristics, fresh, green, not soft, and not burst. Free from decay and doubles. Not damaged by any other cause. Each head shall be fairly well trimmed unless specified as closely trimmed. Tolerance at shipping point: 8% (5% for soft heads, 4% for serious damage, and 1% for decay on any part exclusive of the wrapper leaves).
- U.S. No. 2: Similar varietal characteristics, not burst, free from decay, and not seriously damaged by any other cause. Unless otherwise specified each head shall be reasonably trimmed. Tolerance at shipping point: 8% (3% for decay on any part exclusive of the wrapper leaves).

Cooling:

Hydrocool in water with sanitizer; set heads upside-down to drip dry. Water left in head lettuce fosters decay.

LONGON

HANDLING/PACKING

Grades:

Longons are not graded in the U.S.

Cooling:

- Room cooling
- Forced-air cooling
- Hydrocooled (in plastic baskets)

Carton Sizes:

One piece fiberboard crates are used, either 10-lb. (4.5kg) or 5-lb. (2.25kg) with plastic liners, if not already packed in polystyrene containers.

STORAGE

- Temperature: 41-46°F (4-7°C).
- Humidity: 90-95%. Desiccation rapidly leads to a dull brown skin color.
- Respiration: 1.8-5.8 mL CO₂/kg hr. at 41°F (5°C)

Cleaning:

Wash in water tank with sanitizer; set head upside-down to drip dry. Water left in head lettuce fosters decay.

Carton Sizes:

Pack 24 heads in waxed leafy greens or 1 3/4 bu. carton.

Weights:

- Crisphead: 24-count cartons
- Leaf lettuce: 20-25-lb. cartons
- Butterhead/Boston: 20-lb. cartons
- Bibb/greenhouse-grown: 10-lb. cartons

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 98-100%.
- Respiration: 3-8 mL/kg hr. at 32°F (0°C) for head lettuce; 9-13 mL/kg hr. for leaf lettuce.
- Atmosphere composition: 1-3% O₂.
- Modified atmospheres: lettuce is damaged by CO₂ >3%.
- Ethylene producer: Low. Can be damaged by ethylene exposure.
- Damage potential: Do not allow to overheat.
- Shelf life: 2 weeks maximum.



- Atmosphere composition: No controlled atmosphere studies have been reported.
- Ethylene producer: Low. There are no reports on ethylene sensitivity.
- Damage potential: The dark brown peel that develops at very low temperatures is regarded as chilling-injury. Occurs at 32°F (0°C) in non SO₂-fumigated longans. At storage temperatures <41°F (5°C), a slight off-flavor can develop after 1 week.
- Shelf life: 2-3 weeks although skin becomes brown over time.

MUSHROOMS

HANDLING/PACKING

Grades:

Jul. 15, 1966

- U.S. No. 1: Similar varietal characteristics (should be of the same general color), mature, with the mushroom being firm and well developed (the veil area may be stretched but not broken) and at least fairly well shaped where the cap is not flattened, scalloped, indented or otherwise deformed to an extent which materially detracts from the appearance. Shall be well trimmed with stems smoothly cut, free from rough fleshy butts, with the flared portion of the butt removed and the remaining portion of the stem not exceeding the depth of the cap. Shall be free from open veils exposing the gills or underside of the cap, disease, spots, pitted or discolored areas, insect injury, decay and damage by any cause. Tolerances: Defects at shipping point: 5% (1% for disease, spots or decay). Defects en route or at destination: 10% for open veils, 5% for remaining requirements (1% for disease, spots or decay). For off-size: 10%.
- U.S. No. 2: Same as for U.S. No. 1 except a greater tolerance for open veils and defects is allowed. Tolerances: Defects at shipping point: 10% for open veils, 10% for remaining requirements of the grade (1% for disease, spots or decay). Defects en route or at destination: 25% for open veils, 10% for remaining requirements (1% for disease, spots or decay). For off-size: 10%.
- Unclassified

Cooling:

Pre-cool to 32-39°F (2-4°C) immediately after harvest. Mushrooms have a greater shelf life if immediately packed and vacuum-cooled and then transported at a low temperature.

- Hydrocooling
- Forced-air cooling
- Vacuum-cooling

Cleaning:

Not recommended.

Sizes:

Diameter

- Small to medium: up to 1.625"
- Large: >1.625"

Materials:

Pack in trays or cartons with a perforated polyethylene film over-wrap to reduce moisture loss. It is important to avoid water condensation inside packages.

STORAGE

- Temperature: 32-33.8°F (0-1°C)
- Humidity: 95%. Essential to prevent desiccation, loss of glossiness, stipe blackening and veil opening.
- Respiration: 14-22 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5-15% CO₂, 3-21% O₂. Low O₂ and high CO₂ inhibits cap opening, internal browning and stipe elongation, but may cause yellowing of the cap surface.
- Modified atmospheres: although mushrooms respond well to modified atmospheres, atmosphere modification is not allowed due to potential risk of *Clostridium botulinum* poisoning.
- Ethylene producer: Very low. Ethylene exposure causes browning of mushroom caps.
- Damage potential: Not chilling-sensitive, but will freeze below 31°F (-0.6°C) resulting in water-soaked and extremely soft caps.
- Shelf life: 7-9 days (12-15 days under CA conditions) for fresh mushrooms.



NAPA (CHINESE) CABBAGE

HANDLING/PACKING

Grades:

Chinese cabbages are not graded in the U.S.

Cooling:

Pack into shipping containers and quickly cool.

- Vacuum-cooling and hydro-vacuum cooling
- Hydrocooling
- Forced-air cooling

Cleaning:

Not recommended.

Carton Sizes:

Weights:

- 2.2-9.9 lb. (1-4.5 kg).

Materials:

- Shipped in wax-coated corrugated cardboard cartons and wire-bound crates of various sizes. Water loss can be reduced and storage-life extended if heads are stored in perforated polyethylene bags.

NECTARINES

HANDLING/PACKING

Grades:

Mar. 29, 2004

- U.S. Fancy: Of one variety that are mature but not soft or overripe, that are well formed, clean, and free from decay, broken skins that are not healed, worms, and worm holes, and free from injury caused by bruises, growth cracks, hail, sunburn, sprayburn, scab, bacterial spot, scale, split pit, scars, russetting, other disease, insects, or mechanical or other means. Each nectarine shall have not less than 1/3 of its surface showing the red color characteristic of the variety. Tolerance at shipping point: 8% (4% for serious damage and 0.5% for decay).
- U.S. Extra No. 1: Of one variety that are mature but not soft or overripe, that are well formed, clean, and free from decay, broken skins that are not healed, worms, and worm holes, and free from injury caused by split pit, and damage caused by bruises, growth cracks, hail, sunburn, sprayburn, scab, bacterial spot, scale, scars, russetting, other disease, insects, or mechanical or other means. At least 75% of the nectarines in any lot shall show some blushed or red color including therein at least 50% of the nectarines with not less than 1/3 of the fruit surface showing the red color characteristic of the variety. Tolerance at shipping point: 8% (4% for serious damage and 0.5% for decay).

STORAGE

- Temperature: As close as possible to 32°F (0°C) without freezing.
- Humidity: 98-100%.
- Respiration: 3-7 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 0-5% CO₂, 1-2% O₂ depending on cultivar, temperature and storage duration. If conditions are optimized, green color, ascorbate and sugar content in leaves is retained and decay development is decreased.
- Ethylene producer: Very low. Highly sensitive to ethylene exposure.
- Damage potential: Cultivars differ in chilling sensitivity. "Brown midrib" may develop injury after prolonged storage at 32°F (0°C). Elevated levels of CO₂ can increase decay and offensive odors.
- Shelf life: 3-6 months depending on cultivar.

- U.S. No. 1: Of one variety that are mature but not soft or overripe, that are well formed, clean, and free from decay, broken skins that are not healed, worms, and worm holes, and from injury caused by split pit, and from damage caused by bruises, growth cracks, hail, sunburn, sprayburn, scab, bacterial spot, scale, scars, russetting, other disease, insects, or mechanical or other means. Tolerance at shipping point: 8% (4% for serious damage and 0.5% for decay).
- U.S. No. 2: Of one variety that are mature but not soft or overripe, that are not badly misshapen, that are clean and free from decay, broken skins that are not healed, worms, and worm holes, and free from serious damage caused by bruises, growth cracks, hail, sunburn, sprayburn, scab, bacterial spot, scale, split pit, scars, russetting, other disease, insects, or mechanical or other means. Tolerance at shipping point: 8% (4% for sunscald or serious damage by insects or heat injury and 0.5% for decay).

Cooling:

Cooling to 41-50°F (5-10°C) is adequate if packing occurs the next day. Otherwise fruit should be cooled to 32°F (0°C).

- Forced-air cooling
- Hydrocooling (conveyor type hydro-cooler, or in situ)

Cleaning:

May be washed in sanitized water.



Carton Sizes:

- 2-layer tray boxes (yellow-fleshed)
- 1-layer tray boxes (white-fleshed)

Materials:

Fruit should be handpicked into bags, baskets or totes. If totes are used, they should be placed directly in bins.

STORAGE

- Temperature: 30-32°F (-1-0°C).
- Humidity: 80-85%.

OKRA

HANDLING/PACKING**Grades:**

Dec. 18, 1928

- U.S. No. 1: Pods of okra of similar varietal characteristics that are fresh, tender, not badly misshapen, free from decay, and from damage caused by dirt or other foreign matter, disease, insects, mechanical or other means. Tolerance: 10% (5% for serious damage and 1% for decay).
- Unclassified

Cooling:

Okra should be marketed within 36 hr. of harvest and shipped under refrigeration. Storage in unventilated containers without refrigeration can cause degradation of color. Some growers use hydrocooling or forced-air cooling.

Cleaning:

Okra should not be washed.

Carton Sizes:**Weights:**

- 1-lb. clamshell boxes
- Bulk weight or volume-filled 25-lb. bins

- Respiration: 2-3 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 3-5% CO₂, 1-2% O₂.
- Ethylene producer: 0.01-5 µL/kg hr; exposure to ethylene may help ripen mature stage fruit.
- Damage potential: Moderately susceptible to chilling-injury.
- Shelf life: 1-3 weeks.

**Sizes:**

- Fancy: <3 1/2"
- Choice: 3 1/2"-4 1/4"
- Jumbo: >4 1/4"

STORAGE

- Temperature: 45-50°F (7-10°C).
- Humidity: >90%.
- Respiration: 45-50 mL/kg hr. at 50°F (10°C).
- Atmosphere composition: 4-10% CO₂.
- Ethylene producer: Low. Moderately sensitive to ethylene exposure.
- Damage potential: Highly sensitive to chilling-injury.
- Shelf life: 7-14 days.

ONIONS

HANDLING/PACKING

Grades:

Oct. 10, 1995

- U.S. No. 1: Similar varietal characteristics, mature, fairly firm, and fairly well shaped. Free from decay, wet sunscald, doubles, bottlenecks, and scallions. Free from damage caused by seedstems, splits, tops, roots, dry sunken areas, sunburn, sprouts, freezing, peeling, cracked fleshy scales, watery scales, dirt or staining, foreign matter, mechanical, translucent scales, disease, insects, and other means. Tolerance (Defects): 10% for damage by peeling, 5% for other grade requirements (2% for decay or wet sunscald). (Off-size): 5% may be below the specified minimum size, and not more than 10% may be above any specified maximum size, as outlined in the standard.
- U.S. Commercial: Similar varietal characteristics, mature, not soft or spongy, and not badly misshapen. Free from decay, wet sunscald, doubles, bottlenecks, and scallions. Free from damage caused by seedstems, tops, roots, dry sunken areas, sunburn, sprouts, freezing, cracked fleshy scales, watery scales, mechanical, translucent scales, disease, insects, and other means. Free from serious damage caused by staining, dirt, and other foreign matter. Tolerance (Defects): 5% for grade requirements (2% for decay or wet sunscald). (Off-size): As for U.S. No. 1.
- U.S. No. 1 Boilers: Same as U.S. No. 1 except for size. Tolerance (Defects): As for U.S. No. 1. (Off-size): As for U.S. No. 1.
- U.S. No. 1 Picklers: Same as U.S. No. 1 except for size. Tolerance (Defects): As for U.S. No. 1. (Off-size): 10% may be above the maximum size specified for this grade.
- U.S. No. 2: One type, mature, and not soft or spongy. Free from decay, wet sunscald, and scallions. Free from serious damage caused by watery scales, dirt or staining, foreign matter, seedstems, sprouts, mechanical, dry sunken areas, disease, freezing, insects, and other means. Tolerance (Defects): As for U.S. Commercial. (Off-size): As for U.S. No. 1.

Curing:

Field cure for 3-5 days as long as it doesn't rain, then put in a warm ventilated area to finish curing. Curing in the greenhouse works well.

Cooling:

Dry onion bulbs for long-term storage should be pre-cooled to 32°F (0°C) immediately after curing.

Cleaning:

Dry brushing before or after storage. Trim roots and stems after curing.

Carton Sizes:

Weights:

- 20-lb. cartons
- 25-lb. or 50-lb. net bags
- Retail Pack in 3# net bags with a brand label. Packout is 16/3 lb. packed in cabbage boxes for large meshed bags.

Sizes:

- Small: 1 - 2 ¼"
- Prepacker: 1 ½ - 3"
- Medium: 2" - 3 ¼"
- Large: 3" - 3 ¾"
- Colossal: >3 ¾"

STORAGE

- Temperature: Store at 68-86°F for curing and short-term storage (< 1 month). 32°F (0°C) for long-term storage.
- Humidity: 65-75%.
- Respiration: 1.5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5% CO₂, 3% O₂ can be used.
- Ethylene producer: Very low. Not very sensitive to ethylene exposure, although high concentrations can induce sprouting.
- Damage potential: Low.
- Shelf life: 6-9 months.



PARSLEY

HANDLING/PACKING

Grades:

Jul. 20, 2007

- U.S. No. 1: Parsley of similar varietal characteristics and of good green color which is free from decay, and from damage caused or other foreign material, disease, insects, or mechanical or other means. Tolerance: 5% (0.5% for decay).

Cooling:

- Top-ice
- Hydrocool in water with sanitizer

Cleaning:

Pick clean if possible. Wash in water tank with sanitizer if necessary; set upside-down to drain dry.

PARSNIPS

HANDLING/PACKING

Grades:

Dec. 10, 1945

- U.S. No. 1: Of similar varietal characteristics that are well trimmed, fairly well formed, fairly smooth, fairly clean, fairly firm, free from woodiness, soft rot or wet breakdown, and from damage caused by discoloration, bruises, cuts, rodents, growth cracks, pithiness, disease, insects, mechanical or other means. Tolerance: 10% (5% for serious damage and 1% for soft rot or wet breakdown).
- U.S. No. 2: Well trimmed, not badly misshapen, free from woodiness, soft rot and wet breakdown, and from serious damage caused by secondary roots, dirt, discoloration, bruises, cuts, rodents, growth cracks, pithiness, wilting, disease, insects, mechanical or other means. Tolerance: 10% (1% for soft rot or wet breakdown).
- Unclassified

Cooling:

Rapid cooling to 41°F (5°C) immediately after harvest is essential.

- Forced-air on unwashed roots for long-term storage.

Cleaning:

Barrel wash for short-term storage. For long-term storage, wait until after storage to wash.

Carton Sizes:

Weights:

- 5/9-bushel box with 30 bunches.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-100%.
- Respiration: 11-16 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 8-10% CO₂, 8-10% O₂, although this may have little benefit at 32°F (0°C).
- Ethylene producer: Very low. Sensitive to ethylene exposure.
- Damage potential: Should not be allowed to overheat. Water evaporation can be a serious cause of quality loss.
- Shelf life: 2-3 weeks.



Carton Sizes:

Weights:

- 25-lb. 5/9 bushel waxed carton with perforated polyethylene liner.

Sizes:

- Minimum diameter: 1.5".

STORAGE

- Temperature: 32-34°F (0-1°C).
- Humidity: 98%.
- Respiration: 4-8 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Suspected to be of no benefit.
- Ethylene producer: Very low. Very sensitive to ethylene exposure (small amounts cause bitterness).
- Damage potential: Low.
- Shelf life: 4-6 months.



PEACHES

HANDLING/PACKING

Grades:

May 21, 2004

- U.S. Fancy: Of one variety, mature but not soft or overripe, well formed and free from decay, bacterial spot, cuts that are not healed, growth cracks, hail injury, scab, scale, split pits, worms, worm holes, leaf or limb rub injury, and from damage caused by bruises, dirt or other foreign material, other disease, insects, or mechanical or other means. In addition to the above requirements, each peach shall have not less than 1/3 of its surface showing blushed, pink or red color. Tolerance at shipping point: 10% (5% for serious damage and 1% for decay).
- U.S. Extra No. 1: Same as U.S. No. 1, provided that 50% have not less than 1/4 of the surface showing blushed, pink or red color.
- U.S. No. 1: Of one variety, mature but not soft or overripe, well formed, and free from decay, growth cracks, cuts that are not healed, worms, worm holes, and from damage caused by bruises, dirt, or other foreign material, bacterial spot, scab, scale, hail injury, leaf or limb rubs, split pits, other disease, insects, or mechanical or other means. Tolerance at shipping point: 10% (5% for serious damage and 1% for decay).
- U.S. No. 2: Of one variety, mature but not soft or overripe, not badly misshapen, and free from decay, cuts that are not healed, worms, worm holes, and free from serious damage caused by bruises, dirt or other foreign material, bacterial spot, scab, scale, growth cracks, hail injury, leaf or limb rubs, split pits, other disease, insects, or mechanical or other means. Tolerance: 10% (1% for decay).

Cooling:

Fruit in field bins can be cooled to 41-50°F (5-10°C) if packing is to occur the next day. Otherwise, fruit should be cooled to 32°F (0°C).

- Forced-air cooling
- Hydrocooling

Cleaning:

Dry brushing to remove fuzz as long as fruit is not too ripe.

Carton Sizes:

Weights:

- 2-layer tray boxes
- 10 bu. bulk box
- 1 bu. or 1/2 bu. box
- White-flesh and tree-ripened: 1-layer tray boxes

Materials:

Fruit are hand-picked into bags, baskets or totes.

STORAGE

- Temperature: 32-38°F (0-3°C).
- Humidity: 80-85%.
- Respiration: Moderate.
- Ethylene producer: 0.01-5.0 µL/kg hr. for U.S. mature fruit.
- Damage potential: Susceptible to chilling-injury.
- Shelf life: 1-3 weeks.



PEARS

HANDLING/PACKING

Grades:

Aug. 20, 1955

- U.S. No. 1: Of one variety, mature, but not overripe, carefully hand-picked, clean, fairly well formed, free from decay, internal breakdown, scald, freezing injury, worm holes, black end, and damage caused by hard end, bruises, broken skins, russeting, limb rubs, hail, scars, drought spot, sunburn, sprayburn, stings or other insect injury, disease, or mechanical or other means. Tolerance: 10% (5% for serious damage by insects and 1% for decay or internal breakdown).
- U.S. Combination: A combination of U.S. No. 1 and U.S. No. 2 may be packed. When such a combination is packed, at least 50% of the pears in any container shall meet the requirements of the U.S. No. 1 grade.
- U.S. No. 2: Of one variety, mature, but not overripe, carefully hand-picked, clean, not seriously misshapen, free from decay, internal breakdown, scald, freezing injury, worm holes, black end, and damage caused by hard end, or broken skins. The pears shall also be free from serious damage caused by bruises, russeting, limb rubs, hail, scars, drought spot, sunburn, sprayburn, stings or other insect injury, disease, or mechanical or other means. Tolerance: 10% (5% for serious damage by insects and 1% for decay or internal breakdown).

Cooling:

Pear fruit require a period of cold storage at 30.5°F (-1°C) to induce normal ripening and to develop high dessert quality upon ripening. After a period of cold storage, they should be ripened at 68°F (20°C) in air for 4-7 days, depending upon the variety.

Cleaning:

Washing is not necessary for pears.

Carton Sizes:

Weights:

- 20-30 lb. box.

Sizes: Classified by count per 20kg box.

- 50, 60, 70, 80, 90, 100, 110, 120, 135, 150, 165, 180

STORAGE

- Temperature: 30.5°F (-1°C).
- Humidity: 80-85%.
- Respiration: 2-3 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 0.8-1% CO₂, 2-2.5% O₂.
- Ethylene producer: Low at harvest, up to a maximum of 200 µL/kg hr. when ripe. Ethylene can be used to induce ripening.
- Damage potential: Low.
- Shelf life: 4-7 months, depending on cultivar.



PEAS

HANDLING/PACKING

Grades:

Jun. 1, 1942: Fresh Peas

- U.S. No. 1: Similar varietal characteristics, not overmature or excessively small, not badly misshapen or watersoaked, and which are fairly well filled, fresh, firm, free from decay, and from damage caused by black calyxes, freezing, splitting, hail, dirt, leaves, or other foreign matter, mildew, or other diseases, insects, or mechanical or other means. The peas shall be at least fairly tender, free from decay, and from damage caused by split skins, disease, insects or mechanical or other means. Tolerance: 10% (5% for serious damage and 1% for soft decay).
- U.S. Fancy: Well filled and have an average of 3/4 or more by weight, of the pods in any lot, but not less than 1/2 of the pods in each container with calyxes which are of a fairly good green color, and which meet the requirements of U.S. No. 1 grade in all other respects. Tolerance: 10% (5% for serious damage and 1% for soft decay).

Jan. 22, 2007: Pea Pods

- U.S. Fancy: Similar varietal characteristics, clean, well formed, fresh, young and tender, good color, free from broken pods, decay, flabbiness, and mold, and from injury by blistering, bruising, cracks, cuts, dirt, discoloration, disease, freezing, foreign material, insects, pitted, scars, shriveling, yellowing, or mechanical or other means. Tolerance: 10% (5% for damage and 1% for decay).
- U.S. No. 1: Similar varietal characteristics, clean, fairly well formed, fresh, young and tender, fairly good color, free from broken pods, decay, flabbiness, and from damage by blistering, bruising, cracks, cuts, dirt, discoloration, disease, flabby, freezing, foreign material, insects, mold, pitted, scars, shriveling, yellowing, or mechanical or other means. Tolerance: 10% (5% for damage and 2% for decay).

Cooling:

Prompt cooling after harvest reduces flavor and sugar loss.

- Forced-air cooling (preferred method for edible-podded peas)
- Hydrocooling
- Icing

Cleaning:

Wash in water tank with sanitizer.

Carton Sizes:

Weights:

- 10 lb. 5/9 bushel cartons

Sizes:

- Snow peas:
 - U.S. Fancy: 2 1/2"+
 - U.S. No. 1: 2"+
- Snap peas: 2 1/2"-3" suggested

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-98%.
- Respiration: 15-24 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: No extensive research. 5-7% CO₂ for green peas; 2-3% CO₂, 2-3% O₂ for snow and snap peas.
- Ethylene producer: Low. Sensitive to ethylene exposure.
- Damage potential: Susceptible to damage from overheating.
- Shelf life: 1-2 weeks.



PEPPERS

HANDLING/PACKING

Grades:

Nov. 17, 2005

- U.S. Fancy: Mature green sweet peppers of similar varietal characteristics (except when more than one variety and/or color are marked on the container), that are firm, well shaped, and free from sunscald, freezing injury, decay affecting calyxes and/or walls, decay affecting stems, and free from injury caused by scars, hail, sunburn, disease, insects, mechanical or other means. Tolerance: 10% (5% for serious damage and 2% for decay).
- U.S. No. 1: Mature green sweet peppers of similar varietal characteristics (except when more than one variety and/or color are marked on the container), that are firm, fairly-well shaped, and free from sunscald and decay affecting calyxes and/or walls, decay affecting stems, and are free from damage caused by freezing injury, hail, scars, sunburn, disease, insects, mechanical or other means. Tolerance: 10% (5% for serious damage and 2% for decay).
- U.S. No. 2: Mature green sweet peppers of similar varietal characteristics (except when more than one variety and/or color are marked on the container), that are firm, not seriously misshapen, and free from sunscald and decay affecting calyxes and/or walls, decay affecting stems, and are free from serious damage caused by freezing injury, hail, scars, sunburn, disease, insects, mechanical or other means. Tolerance: 10% (5% for sunscald or decay on stems and 2% for decay elsewhere).

Cooling:

Rapid cooling to no lower than 45°F (7°C) postharvest.

- Forced-air
- Hydrocooling

Cleaning:

Brush wash.

Carton Sizes:

Weights:

- 25 lb. 1 1/9 bushel box
- 10-12 lb. 5/9 bushel box for colored peppers

Sizes:

- U.S. Fancy: 3"+ diameter, 3 1/2"+ length

STORAGE

- Temperature: 45°F (7°C).
- Humidity: 90-95%.
- Respiration: 4-8 mL/kg hr. at 50°F (10°C).
- Atmosphere composition: Not higher than 5% CO₂, 2-5% O₂.
- Ethylene producer: 0.1 µL/kg hr. Sensitive to ethylene exposure.
- Damage potential: Yes – chilling-injury below 45°F (7°C).
- Shelf life: 2-3 weeks.



PLUMS

HANDLING/PACKING

Grades:

Mar. 29, 2004

- U.S. Fancy: Plums or prunes of one variety that are well formed, clean, mature but not overripe or soft or shriveled, that are free from decay, sunscald, heat injury, sunburn, split pits and hail marks, and from damage caused by broken skins, growth cracks, drought spots, gum spots, russeting, scars, other disease, insects, or mechanical or other means. Tolerance: 8% (4% for serious damage and 0.5% for decay).
- U.S. No. 1: Plums or prunes of one variety that are well formed, clean, mature but not overripe or soft or shriveled, that are free from decay and sunscald, and from damage caused by broken skins, heat injury, growth cracks, sunburn, split pits, hail marks, drought spots, gum spots, russeting, scars, other disease, insects, or mechanical or other means. Tolerance: 8% (4% for serious damage and 0.5% for decay).
- U.S. Combination: A combination of U.S. No. 1 and U.S. No. 2 plums or prunes, provided that at least 75%, by count, meet the requirements of the U.S. No. 1 grade.
- U.S. No. 2: Plums or prunes of one variety that are not badly misshapen, that are clean, mature but not overripe or soft or shriveled, that are free from decay and sunscald, and from serious damage caused by broken skins, heat injury, growth cracks, sunburn, split pits, hail marks, drought spots, gum spots, russeting, scars, other disease, insects or mechanical or other means. Tolerance: 8% (4% for serious damage by insects or heat injury and 0.5% for decay).

Cooling:

- Forced-air cooling
- Hydrocooling
- Room cooling

Cleaning:

May be washed in sanitized water.

Carton Sizes:

Weights:

- 28-lb. volume-filled containers
- ½ bu. box

Sizes:

- Minimum diameter: 1.25" for U.S. Fancy and U.S. No. 1

Materials:

Fruit are hand-picked into bags.

STORAGE

- Temperature: around 32°F (0°C).
- Humidity: 80-85%.
- Respiration: 1-1.5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 3-5% CO₂, 1-2% O₂.
- Ethylene producer: 0.01-5.0 µL/kg hour; slow-ripening cultivars may need an application of 100 µL/L for 24 hours at 68°F (20°C).
- Damage potential: Chilling- injury.
- Shelf life: Up to 2 months depending on variety.



POTATOES

HANDLING/PACKING

Grades:

Nov. 21, 2008

- U.S. No. 1: Similar varietal characteristics, firm, fairly clean, and fairly-well shaped. Free from freezing damage, blackheart, late blight, southern bacterial wilt, ring rot, soft rot, and wet breakdown. Free from damage by any other cause. Should be Size A. Tolerance: (Defects): At shipping point: 8% (5% for external defects, 5% for internal defects, and 1% for frozen, soft rot or wet breakdown). Defects en route or at destination: 10% (7% for external defects, 7% for internal defects, and 2% for frozen, soft rot or wet breakdown). (Off-size): Not more than 3% in any lot may be smaller than the required or specified minimum size except that a tolerance of 5% shall be allowed for potatoes packed to meet a minimum size of 2 1/4" in diameter or 5-oz. or more in weight. Not more than 10% may be larger than any required or specified maximum size. When specified to be of a certain size and larger, individual samples shall have not less than 1/2 of the percentage specified, provided, that the average for the entire lot is not less than the percentage specified.
- U.S. Commercial: Same as U.S. No. 1, except shall be free from serious damage caused by dirt or other foreign matter, russet scab, and rhizoctonia. Tolerance (Defects): 20% (10% for potatoes not meeting U.S. No. 2 standards, 6% for external defects, 6% for internal defects, 1% for frozen, soft rot or wet breakdown). (Off-size): As for U.S. No. 1.
- U.S. No. 2: Similar varietal characteristics and not seriously misshapen. Free from freezing, blackheart, late blight, southern bacterial wilt, ring rot, soft rot, and wet breakdown. Free from serious damage by any other cause. Should not be less than 1.5" in diameter. Tolerance: (Defects): At shipping point: 10% (6% for external defects, 6% for internal defects, 1% for frozen, soft rot or wet breakdown). En route or at destination: 12% (8% for external defects, 8% for internal defects, and 2% for frozen, soft rot or wet breakdown). (Off-size): As for U.S. No. 1.
- Unclassified

Cooling:

Potatoes which are to be kept in long-term storage should be cured for 1-2 weeks at 68°F (20°C), or 59°F (15°C) to minimize decay, with a RH of 80-100%. After curing, temperature should be lowered by 1-2°C each day until storage temperature is reached.

Cleaning:

Hand wash, or brush wash if skins are tough enough.

Carton Sizes:

Weights:

- Bulk 50-lb. 1 1/9 bu. carton
- Bulk 25-lb. 5/9 bu. carton
- "Count" 50-lb. boxes
- 5-or 10-lb. plastic or paper bags
- 2-lb. net bags B-sized tubers

Sizes: (Diameters)

- Size A: 1 7/8"+
- Size B: 1 1/2 - 2 1/4"
- Small: 1 3/4 - 2 1/2"
- Medium: 2 1/4 - 3 1/4"
- Large: 3 - 4 1/4"

STORAGE

- Temperature: 45-50°F (7-10°C).
- Humidity: 95-99%.
- Respiration: 7-10 mL/kg hr. at 50°F (10°C).
- Atmosphere composition: Minimal usefulness.
- Ethylene producer: Very low. Not sensitive to ethylene exposure.
- Damage potential: Chilling-sensitive; store potatoes in the dark as they are sensitive to light.
- Shelf life: 2-12 months.



PUMPKINS/ JACK-O-LANTERNS

HANDLING/PACKING

Grades:

Oct. 13, 1983

- U.S. No. 1: Similar varietal characteristics, well matured, and not broken or cracked. Free from soft rot or wet breakdown. Free from damage by scars, dry rot, freezing, dirt, disease, insects, and mechanical or other means. Tolerance: 10% (2% for soft rot or wet breakdown or serious damage by dry rot).
- U.S. No. 2: Similar varietal characteristics, fairly-well matured, and not broken or cracked. Free from soft rot or wet breakdown. Free from serious damage by scars, dry rot, freezing, dirt, disease, insects, and mechanical or other means. Tolerance: 10% (2% for soft rot or wet breakdown or serious damage by dry rot).

Cooling:

No cooling necessary.

RADICCHIO

HANDLING/PACKING

Grades:

Radicchio is not graded in the U.S.

Cooling:

- Radicchio is usually placed directly in a cold room before shipping.

Cleaning:

Wash in sanitized water. Drain upside-down.

Materials:

- Packing can be in trays with shrinkable plastic film or in corrugated containers with plastic liners to avoid water loss.

Cleaning:

Rub dirt off in field with a burlap cloth.

Carton Sizes:

Weights:

- 800-900 lb. bulk containers.

STORAGE

- Temperature: 50-55°F (10-13°C).
- Humidity: 50-70%.
- Atmosphere composition: Unknown.
- Ethylene producer: Very low. Somewhat sensitive to ethylene exposure.
- Damage potential: Moderately chilling sensitive.
- Shelf life: 2-3 months.

STORAGE

- Temperature: 37-41°F (3-5°C).
- Humidity: 90%
- Respiration: 3-5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5% CO₂, 3% O₂.
- Ethylene producer: Very low. Sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 20-30 days.



RADISHES

HANDLING/PACKING

Grades:

Oct. 01, 1968

- U.S. No. 1: Similar varietal characteristics, with roots that are clean, well formed, smooth, firm, where the root is crisp and not soft, flabby or wilted. Shall be tender, free from decay and free from damage caused by freezing, growth or air cracks, cuts, pithiness, disease, insects, or other means. Bunched radishes have tops which are fresh with normal green color and not more than slightly wilted. Shall be free from decay and free from damage caused by freezing, seedstems, yellowing or other discoloration, disease, insects or other means. Unless otherwise specified, the diameter of each root shall be not less than 5/8". Tolerances (Defects): Roots: 10% (1% for decay). For tops of bunched radishes: 10% (5% for decay). For off-size roots: 10% for roots which fail to meet the specified minimum diameter, provided that when both minimum and maximum diameters are specified, an additional tolerance of 10% shall be allowed for roots which are larger than the maximum diameter specified. For excess length of tops of topped radishes: 5% for tops more than 3/8" long.
- U.S. Commercial: Same as for U.S. No. 1 except for increased tolerances. Tolerances (Defects): Roots: 20% fail to meet the grade requirements (10% for serious damage and 1% for decay). For tops of bunched radishes: 10% (5% for decay). For off-size roots: 10% for roots which fail to meet the specified minimum diameter, provided that when both minimum and maximum diameters are specified, an additional tolerance of 10% shall be allowed for roots which are larger than the maximum diameter specified. For excess length of tops of topped radishes: 10% for tops more than 3/8" long.

Cooling:

- Bunched green top radishes
 - Hydrocool in water with sanitizer after roots have been spray cleaned.
 - Top-ice
- Topped radishes
 - Room cool
 - Ice
 - Hydrocool in water with sanitizer after roots have been spray cleaned.

Cleaning:

- Bunched green top radishes
 - Clean bunched radishes with sprayer on screen table. Pressure washer can be used on roots portion only. After cleaning, bunched radishes can be soaked in water with sanitizer to hydro-crisp. Radishes can be packed damp.
- Topped radishes
 - Clean with a sprayer or pressure washer in harvest tote.

Carton Sizes:

Topped radishes are packed in 6-oz. (168g), 8-oz. (224g), 1-lb. (454g), 5-lb. (2.3kg), 25-lb. (11kg) and 40-lb. (18 kg) perforated plastic bags. Commonly, thirty 6-oz., twenty-four 8-oz. or fourteen 1-lb. bags are boxed together for retail, while 25-lb. (11kg) bags are used for the foodservice industry. Standard bunches of radishes shall be fairly uniform in size and radishes in the individual bunches shall not vary more than 1/2" in diameter. Not more than 10% of the bunches in any lot may fail to meet the requirements for standard bunching.

Sizes:

- Small: <3/4" in diameter
- Medium: 3/4 - 1" in diameter
- Large: > 1- 1 1/4" in diameter
- Very large/jumbo: >1 1/4" in diameter

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-100%.
- Respiration:
 - Topped Roots: Moderate.
 - Bunched Roots with Tops: High.
- Atmosphere composition: 2-3% CO₂, 1-2% O₂.
- Ethylene producer: Low. Not particularly sensitive to ethylene exposure.
- Damage potential: Not chilling-sensitive and should be stored as cold as possible without freezing. Freezing injury causes softening, shriveling and leakage of pigment for red radishes.
- Shelf life: 3-4 weeks for topped radishes. 1-2 weeks for bunched radishes (addition of top ice may help keep tops fresh). 2-4 months for winter or black radishes.



RASPBERRIES

HANDLING/PACKING

Grades:

May 29, 1931

- U.S. No. 1: Of one variety, well colored, well developed and not soft, overripe, or broken, that are free from cores, sunscald, mold, and decay, and from damage caused by dirt or other foreign matter, shriveling, moisture, disease, insects, or mechanical or other means. Tolerance: 10% (5% for serious damage and 1% for mold or decay).
- U.S. No. 2: Same as U.S. No. 1, except for tolerances. Tolerance: 10% for serious damage, 2% for mold or decay.
- Unclassified

Cooling:

Raspberries should be forced-air cooled to 34°F (1°C) as soon as possible after harvest.

Cleaning:

Raspberries should not be washed.

Carton Sizes:

Weights:

- Trays holding 12 pint or half pint containers.

RHUBARB

HANDLING/PACKING

Grades:

Feb. 1, 1966

- U.S. Fancy: Similar varietal characteristics, very well colored, fresh, tender, straight, clean, well trimmed and not pithy, free from decay and from damage caused by scars, freezing, disease, insects, or mechanical or other means. Tolerance: 10% (1% for decay).
- U.S. No. 1: Similar varietal characteristics, well colored, fresh, tender, straight, clean, well trimmed and not pithy, free from decay and from damage caused by scars, freezing, disease, insects, or mechanical or other means. Tolerance: 10% (1% for decay).
- U.S. No. 2: Similar varietal characteristics which are fairly well colored, fresh, fairly straight, clean, well trimmed and not pithy, which are free from decay, and free from serious damage caused by scars, freezing, disease, insects or mechanical or other means. Tolerance: 10% (1% for decay).
- Unclassified

Cooling:

Rhubarb petioles should be pre-cooled to 32°F (0°C).

- Forced-air cooling
- Hydrocooling

Materials:

Vented clamshell containers are standard.

STORAGE

- Temperature: around 32°F (0°C).
- Humidity: <90%.
- Respiration: 8-9 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 10-20% CO₂, 5-10% O₂.
- Ethylene producer: 1-12 µL/kg hr. Color and mold growth can be affected by ethylene exposure.
- Damage potential: Low.
- Shelf life: 2-5 days under ideal conditions.

Cleaning:

- Spray clean on screen table.
- Wash in tank in water with sanitizer.

Carton Sizes:

Weights:

- 10-, 15-, or 20-lb. cartons

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-100%.
- Respiration: 4.5-6.5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Not generally used.
- Damage potential: Low.
- Shelf life: 2-4 weeks.



RUTABAGA

HANDLING/PACKING

Grades:

Aug. 1, 1955

- U.S. No. 1: Similar varietal characteristics, roots that are well trimmed, firm, fairly smooth, fairly well shaped, fairly clean, and free from soft rot and damage caused by cuts, discoloration, freezing, growth cracks, pithiness, woodiness, watercore, dry rot, other disease, insects or rodents, or mechanical or other means. Diameter shall not be less than 1 3/4". Tolerance: 10% (5% for serious defects and 1% for soft rot).
- U.S. No. 2: Similar varietal characteristics, roots that are well trimmed, firm, not excessively rough, not seriously misshapen and which are free from soft rot and serious damage caused by cuts, dirt, discoloration, freezing, growth cracks, pithiness, woodiness, watercore, dry rot, disease, insects or rodents, or mechanical or other means. Diameter shall not be less than 1 3/4". Tolerance: 10% (5% for serious defects and 1% for soft rot).

Cooling:

If harvested when the soil or air is above 77°F (25°C), they should be cooled within 3-4 hr. to avoid loss of quality during storage.

- Forced-air cooling

SALAD GREENS

HANDLING/PACKING

Grades:

Salad greens are not graded in the U.S.

Cooling and Cleaning:

Greens for salads should be cooled to 32°F (0°C) as soon as possible after harvest. The cooling and cleaning process are combined for baby salad greens. Double tank wash in water with sanitizer and spin dry. Water should not be more than 10°F (-12.22°C) colder than greens. Use multiple tanks to "step-down" temperature. Use mesh bags to minimize handling and reduce bruising. Spin dry.

Materials:

Salad greens may be packed in fiberboard cartons lined with perforated polyethylene bags, 6-oz. sealed plastic bags, trays or clamshell containers.

Cleaning:

Barrel-wash. Wash after storage.

Carton Sizes:

Weights:

- 25-lb. 5/9 bushel cartons with perforated polyethylene liners

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 98-100%.
- Respiration: 2-3 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Not commonly used.
- Ethylene producer: Very low. Not sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 4-6 months.

STORAGE

- Temperature: 32-36°F (0-2°C).
- Humidity: 95-100%.
- Respiration: 6-21 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Generally not beneficial.
- Ethylene producer: Low. Very sensitive to ethylene exposure.
- Damage potential: Extremely high – must be maintained at consistent cold temperatures.
- Shelf life: 7-14 days.



SOUTHERN PEAS

HANDLING/PACKING

Grades:

Jul. 13, 1956

- U.S. No. 1: Similar varietal characteristics, are fairly well formed, fairly well filled, and not overmature or excessively young. Shall be free from decay, worm holes and damage caused by stems, leaves and trash, stings or other insect injury, scars, discoloration, wilting, dirt or other adhering foreign material, disease and from mechanical or other means. Each pod shall be not less than 5" in length. Tolerances: 5% for pods shorter than the minimum length, 5% for excessively young pods, 10% for other grade defects (5% for pods with worm holes or affected by decay and 1% for decay).
- U.S. Commercial: Shall meet the requirements of U.S. No. 1 grade, except that peas shall be free from serious damage caused by stems, leaves and trash. There is no requirement for minimum length. Tolerances: 10% for excessively young pods, 15% for other grade defects (5% for pods with worm holes or affected by decay and 2% for decay).
- Unclassified

Cooling:

Very prone to decay if held at room temperature.

- Forced-air cooling for unshelled peas
- Hydrocooling for shelled peas

Cleaning:

Contact with water greatly accelerates deterioration for unshelled peas.

Carton Sizes:

10-12-lb. (4.5-5.4kg) plastic bags (considered equivalent to a shelled bushel) or 1-lb. (0.45kg) bags for shelled peas. Some large operations package peas in vacuum-packed 1 and 10-lb. (0.45 and 4.5kg) bags. Pods for shelling are packed primarily in meshed bags (cabbage sacks) or wooden bushel baskets.

STORAGE

- Temperature: 39-41°F (4-5°C).
- Humidity: 95%.
- Respiration: 8.2-16.9 mL/kg hr. at 41°F (5°C) for whole pods and 50-89.4 mL/kg hr. at 68°F (20°C) for shelled peas.
- Atmosphere composition: No information available.
- Ethylene producer: Unknown. Probably sensitive to ethylene with effects characterized by yellowing of pods.
- Damage potential: Unknown.
- Shelf life: 6-8 days for unshelled peas. 24-48 hr. at 39-41°F (4-5°C) for shelled peas.



SPINACH

HANDLING/PACKING

Grades:

Dec. 27, 1946

- U.S. Extra No. 1: Leaves of similar varietal characteristics that are fairly clean, well trimmed, free from coarse stalks, seedstems, seedbuds, crowns and roots, sandburs or other kinds of burs, decay, and free from damage caused by clusters of leaves, wilting, discoloration, freezing, foreign material, disease, insects, mechanical or other means. Tolerance: 5% (1% for decay).
- U.S. No. 1: Leaves of similar varietal characteristics that are well trimmed, free from coarse stalks, seedstems, seedbuds, crowns and roots, sandburs, or other kinds of burs, decay, and free from damage caused by clusters of leaves, wilting, discoloration, freezing, dirt, or other foreign material, disease, insects, mechanical or other means. Tolerance: 10% (1% for decay).
- U.S. Commercial: Leaves of similar varietal characteristics that are well trimmed, free from coarse stalks, seedstems, seedbuds, crowns and roots, sandburs, or other kinds of burs, decay, and free from damage caused by clusters of leaves, wilting, discoloration, freezing, dirt or other foreign material, disease, insects, mechanical or other means. Tolerance: 20% (1% for decay).

Cooling and Cleaning:

Spinach should be cooled to 32°F (0°C) as quickly as possible after harvest.

- Hydrocooling
- Liquid icing
- Package icing (2.2-lb. of ice per 4-lb. of product)
- Top-icing

SPROUTS

HANDLING/PACKING

Grades:

Sprouts are not graded in the U.S.

Cooling:

Sprouts should be cooled immediately to 32°F (0°C).

- Hydrocooling
- Forced-air cooling

Cleaning:

Not necessary.

Carton Sizes:

Weights:

- Alfalfa: 4-6 oz. containers with 12 containers/case
- Mung bean: 4-6 oz. containers in 5-lb. open flats.

Baby Spinach

- The cooling and cleaning process are combined for baby spinach. Double tank wash in water with sanitizer and spin dry. Water should not be more than 10°F colder than greens. Use multiple tanks to “step-down” temperature. Use mesh bags to minimize handling and reduce bruising. Spin dry.

Bunched Spinach

- Wash and cool in water tank with sanitizer; set heads upside-down to drip-dry.

Cold Chain: Can be topped with crushed ice for further cooling and cold chain in storage and transportation.

- Package icing (2.2-lb. of ice per 4-lb. of product)
- Top-icing

Materials:

24 count waxed carton with perforated polyethylene liner.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-98%.
- Respiration: 9-11 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: 5-10% CO₂, 7-10% O₂.
- Ethylene producer: Low. Very sensitive to ethylene exposure.
- Damage potential: Sensitive to overheating. Spinach is sensitive to bruising during handling.
- Shelf life: 2 weeks

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 95-100%.
- Respiration: 11 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Increased CO₂, reduced O₂.
- Ethylene producer: Low.
- Damage potential: Highly perishable.
- Shelf life: 5-10 days.



STRAWBERRIES

HANDLING/PACKING

Grades:

Feb. 23, 2006

- U.S. No. 1: Of one variety or have similar varietal characteristics with the cap (calyx) attached. Shall be firm, not overripe or undeveloped, and be free from mold or decay and damage caused by dirt, moisture, foreign matter, disease, insects, or mechanical or other means. Each strawberry shall have not less than 3/4 of its surface showing a pink or red color. Tolerance: 10% (5% for serious damage and 2% for decay).
- U.S. Combination: A combination of U.S. No. 1 and U.S. No. 2 grades, provided that at least 80% of the strawberries meet the requirements of the U.S. No. 1 grade. Tolerance: 10% (2% for decay).
- U.S. No. 2: Free from decay and from serious damage caused by dirt, disease, insects, mechanical or other means. Each strawberry shall have not less than 1/2 of its surface showing a pink or red color. Tolerance: 10% (3% for decay).

Cooling:

Cooling should begin no later than 1 hr. after harvest.

- Forced-air cooling (recommended)
- Room cooling

SUMMER SQUASH

HANDLING/PACKING

Grades:

Jan. 6, 1984

- U.S. No. 1: Of one variety or have similar varietal characteristics, with stems or portions of stems attached, that are fairly young and fairly tender, fairly well formed, firm, free from decay and breakdown, and from damage caused by discoloration, cuts, bruises and scars, freezing, dirt or other foreign material, disease, insects, mechanical or other means. Tolerance: 10% (5% for serious damage and 1% for decay or breakdown).
- U.S. No. 2: Of one variety or have similar varietal characteristics that are not old and tough, but are firm, free from decay and breakdown, and damage caused by freezing, and free from serious damage caused by discoloration, cuts, bruises, scars, dirt or other foreign material, disease, insects, mechanical or other means. Tolerance: 10% (1% for decay or breakdown).

Cooling:

- Room cooling
- Forced-air cooling

Cleaning:

Strawberries should not be washed.

Carton Sizes:

Weights:

- Pint or quart open mesh baskets, or clear clamshell containers, held in corrugated fiberboard tray.

Sizes:

- U.S. No. 1 and Combination: 3/4" minimum diameter
- U.S. No. 2: 5/8" minimum diameter

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 80-85%.
- Respiration: 6-10 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: MAP for shipment of 10-15% CO₂.
- Ethylene producer: Very low. Not sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 7 days.



Cleaning:

No washing required other than wiping clean.

Materials:

20-lb. 5/9 bu. waxed carton. Pack like sardines, with stem-end facing the carton walls to avoid damaging other fruits.

STORAGE

- Temperature: 41-50°F (5-10°C).
- Humidity: 95%.
- Respiration: 12-13 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Not commonly used.
- Ethylene producer: 0.1-1.0 µL/kg hr.. Moderately sensitive to ethylene exposure.
- Damage potential: Chilling-injury, bruising and scratching.
- Shelf life: <2 weeks.



SWEET POTATOES

HANDLING/PACKING

Grades:

Apr. 21, 2005

- U.S. Extra No. 1: Similar varietal characteristics that are firm, smooth, fairly clean, fairly well shaped, free from freezing injury, internal breakdown, black rot, other decay or wet breakdown, and free from damage caused by secondary rootlets, sprouts, cuts, bruises, scars, growth cracks, scurf, pox (soil rot), or other diseases, wireworms, weevils, or other insects, or other means. Tolerance: 10% (5% for serious damage and 2% for soft rot or wet breakdown).
- U.S. No. 1: Of one type that are firm, fairly smooth, fairly clean, fairly well shaped, free from freezing injury, internal breakdown, black rot, other decay or wet breakdown, and free from damage caused by secondary rootlets, sprouts, cuts, bruises, scars, growth cracks, scurf, pox (soil rot), or other diseases, wireworms, weevils or other insects, or other means. Tolerance: 10% (5% for serious damage and 2% for soft rot or wet breakdown).
- U.S. No. 1 Petite: Of one type that are firm, fairly smooth, fairly clean, fairly well shaped, free from freezing injury, internal breakdown, black rot, other decay or wet breakdown, and free from damage caused by secondary rootlets, sprouts, cuts, bruises, scars, growth cracks, scurf, pox (soil rot), or other diseases, wireworms, weevils or other insects, or other means. Tolerance: 10% (5% for serious damage and 2% for soft rot or wet breakdown).
- U.S. Commercial: Same as U.S. No. 1, except for an increased tolerance for defects. Tolerance: 25% (5% for serious damage and 2% for soft rot or wet breakdown).
- U.S. No. 2: Of one type that are firm and free from freezing injury, internal breakdown, black rot, other decay or wet breakdown, and free from serious damage caused by dirt or other foreign materials, cuts, bruises, scars, growth cracks, pox (soil rot), or other diseases, wireworms, weevils or other insects, or other means. Tolerance: 10% (2% for soft rot or wet breakdown).

Curing:

Roots should be cured immediately after harvest at 82-86°F (28-30°C) and 90-97% RH for 4-7 days.

Cleaning:

Dry brushing, or gentle hand-washing and partial drying (put in perforated totes to let drain before packing).

Carton Sizes:

Weights:

- 40-lb. 1 1/9 bushel boxes

Length:

- U.S. Extra No. 1: 3"-9"
- U.S. No. 1: 3"-9"
- U.S. No. 1 Petite: 3"-7"

Diameter:

- U.S. Extra No. 1: 1 3/4" -3 1/4"
- U.S. No. 1: 1 3/4" -3 1/2"
- U.S. No. 1 Petite: 1 1/2" -2 1/4"
- U.S. No. 2: 1 1/2" minimum

Weight:

- U.S. Extra No. 1: 18-oz. maximum
- U.S. No. 1: 20-oz. maximum
- U.S. No. 2: 36-oz. maximum

Materials:

During storage, roots can be handled in 800 lb. bulk bins.

STORAGE

- Temperature: 55-59°F (13-15°C).
- Humidity: 90%.
- Atmosphere composition: Benefit does not outweigh expense.
- Ethylene producer: Exposure to ethylene should be avoided.
- Damage potential: Chilling-injury.
- Shelf life: Up to 1 year.



TOMATOES

HANDLING/PACKING

Grades:

Oct. 1, 1991

- U.S. No. 1: Similar varietal characteristics, mature, not overripe or soft, clean, well developed, fairly well formed, and fairly smooth. Free from decay, freezing injury, and sunscald. Not damaged by any other cause. Tolerance: Defects at shipping point: 10% for grade requirements (5% for defects causing very serious damage and 1% for being soft or affected by decay). Defects en route or at destination: 15% for grade requirements (5% for being soft or affected by decay, 10% for shoulder bruises or discolored or sunken scars, 10% for being otherwise defective and 5% for very serious damage by any cause, exclusive of soft or decayed tomatoes).
- U.S. Combination: Consists of a combination of U.S. No. 1 and U.S. No. 2 tomatoes, provided that at least 60%, by count, meet the requirements of the U.S. No. 1 grade. Tolerance: Defects at shipping point: 10% for U.S. No. 2 grade requirements (5% for defects causing very serious damage and 1% for being soft or affected by decay). Defects en route or at destination: 15% for U.S. No. 2 grade requirements (5% for being soft or affected by decay, 10% for serious damage by shoulder bruises or by discolored or sunken scars, 10% for being otherwise defective and 5% for very serious damage by any cause, exclusive of soft or decayed tomatoes).
- U.S. No. 2: Same as U.S. No. 1, but may be reasonably well formed, no more than slightly rough, and not seriously damaged by any other cause. Tolerance: Defects at shipping point: 10% for grade requirements (5% for defects causing very serious damage and 1% for being soft or affected by decay). For defects en route or at destination: 15% for grade requirements (5% for being soft or affected by decay, 10% for serious damage by shoulder bruises or by discolored or sunken scars, 10% for being otherwise defective and 5% for very serious damage by any cause, exclusive of soft or decayed tomatoes).
- U.S. No. 3: Same as U.S. No. 2, but may be misshapen, and may be slightly damaged by sunscald, but should not be very seriously damaged by causes other than decay and freezing injury. Tolerance: Defects at shipping point: 10% for grade requirements (5% for very serious damage by insects, 1% for being soft or affected by decay). Defects en route or at destination: 15% for grade requirements (5% for being soft or affected by decay, 10% for very serious damage by shoulder bruises or by discolored or sunken scars, 10% for being otherwise defective and 5% for very serious damage by insects). Tolerance (All grades): Off-size: 10% may be smaller than the specified minimum diameter, or larger than the specified maximum diameter. Off color: 10% may fail to meet the color specified and 5% for tomatoes which are green in color, when any term other than "Green" is specified.

Cooling:

- Room cooling
- Forced-air cooling produces best results

Cleaning:

Clean with cotton gloves in field.

Carton Sizes:

Weights:

- Lidded, 25-lb. cartons (12"x16"x9 1/2") that stack 10 cartons per layer on a 40" x 48" pallet.
- 20-lb. 2-layer
- 10-lb. one layer
- 12 pints in flat cherry carton

Diameter:

- Small: 2.13-2.28" (5.40-5.79cm)
- Medium: 2.25-2.53" (5.72-6.43cm)
- Large: 2.5-2.78" (6.35-7.06cm)
- Extra-large: at least 2.76" (7cm)

Color:

- Green: 100% green.
- Breaker: Tan, yellow, pink, or red on <10% of the surface.
- Turning: 10-30% of the surface is not green.
- Pink: 30-60% is not green.
- Light red: 60-90% is not green. Shows pinkish-red or red.
- Red: >90% not green. Red color overall.

Materials:

Containers should be padded, clean, shallow, and, have smooth bottoms. Tomatoes can be packed in one or two layers.

STORAGE

- Temperature: 66-70°F (19-21°C) for ripening; <55.4°F (13°C) retards ripening (use only for red tomatoes; can lead to chilling-injury in tomatoes that are not fully ripe); below 55.4°F (13°C) taste is adversely affected.
- Humidity: 90-95%.
- Respiration: 15.5-22.8 mL/kg hr. at 68°F (20°C).
- Atmosphere composition: 2-3% CO₂ for green-ripe and 3-5% CO₂ for red tomatoes; 3-5% O₂ for all types.
- Ethylene producer: 1-10 µL/kg hr. Exposure to 50 µL/L will help green tomatoes ripen. Breaker stage tomatoes do not need introduced ethylene.
- Damage potential: Sensitive to chilling, bruising.
- Shelf life: Dependent on maturity when picked.



TURNIPS

HANDLING/PACKING

Grades:

Aug. 1, 1955

- U.S. No. 1: Similar varietal characteristics with roots that are well trimmed, firm, fairly smooth, fairly well shaped, fairly clean, and free from soft rot and damage caused by cuts, discoloration, freezing, growth cracks, pithiness, woodiness, watercore, dry rot, other disease, insects or rodents, or mechanical or other means. Bunched turnips, or turnips with short-trimmed tops shall have tops that are fresh and free from decay and damage caused by discoloration, freezing, disease, insects, or mechanical or other means. Diameter shall not be less than 1 3/4". Tolerance: 10% (5% for serious defects and 1% for soft rot). For tops, when turnips are bunched: 10% (5% for decay).
- U.S. No. 2: Similar varietal characteristics with roots that are well trimmed, firm, not excessively rough, not seriously misshapen and free from soft rot and serious damage caused by cuts, dirt, discoloration, freezing, growth cracks, pithiness, woodiness, watercore, dry rot, disease, insects or rodents, or mechanical or other means. Bunched turnips or turnips with short-trimmed tops shall have tops that are fresh and free from decay and damage caused by discoloration, freezing, disease, insects, or mechanical or other means. Diameter shall not be less than 1 3/4". Tolerance: 10% (5% for serious defects and 1% for soft rot). For tops, when turnips are bunched: 10% (5% for decay).
- Unclassified

Cooling:

- Bunched green top turnips
 - Hydrocool in water with sanitizer after roots have been spray cleaned. Avoid a temperature differential of 50°F (10°C) or more to prevent cracking.
 - Top-ice
 - Room cool

WATERCRESS

HANDLING/PACKING

Grades:

Watercress is not graded in the U.S.

Cooling:

Hydrocooling is recommended.

Cleaning:

Wash in sanitized water.

Materials:

Sold in bunches and can be packed in waxed cartons with top-ice. Watercress can also be packaged in boxes with plastic liners.

Cleaning:

- Bunched green top turnips
 - Wash bunched turnips with sprayer on screen table. Pressure washer can be used on roots only. Can be packed damp.
- Topped turnips
 - Barrell wash or clean with a sprayer or pressure washer on screen table or in harvest tote.

Carton Sizes:

Weights:

- 25- or 50-lb. bags
- 1-lb. bags, packed 12 per carton

Sizes: (For tops)

- Bunched with tops: 6" +
- Short-trimmed: 4" maximum
- Topped: 3/4" maximum

Materials:

Can be packed in vented plastic film or mesh bags.

STORAGE

- Temperature: 32°F (0°C).
- Humidity: 90-95%.
- Respiration: 3-4.5 mL/kg hr. at 32°F (0°C).
- Atmosphere composition: Unknown.
- Ethylene producer: Extremely low. Not sensitive to ethylene exposure.
- Damage potential: Low.
- Shelf life: 4-5 months.



WATERMELON

HANDLING/PACKING

Grades:

Mar. 23, 2006

- U.S. Fancy: Mature, similar varietal characteristics, fairly well formed, and not overripe. Free from Anthracnose, decay, sunscald, and Whiteheart. Free from damage by any means. Tolerance: 8% (4% for serious damage and 1% for Whiteheart, sunscald, Anthracnose, or decay).
- U.S. No. 1: Mature, similar varietal characteristics, fairly well formed, and not overripe. Free from Anthracnose, decay, and sunscald. Free from damage by any means. Tolerance: 10% (5% for serious damage, 3% for Anthracnose and 1% for decay).
- U.S. No. 2: Mature, similar varietal characteristics, not overripe, and not badly misshapen. Free from Anthracnose, decay, and sunscald. Free from serious damage by any means. Tolerance: 10% (6% for Anthracnose and 1% for decay).

Cooling:

Watermelons are not generally pre-cooled.

- Room cooling
- Forced-air cooling

Cleaning:

Wipe off in field with gloves. Can be water washed if necessary.

Carton Sizes:

Weights:

- 700 lb. corrugated bins (not for thin-skinned melons)
- 50-60 lb. cartons

Materials:

- Cartons should have specially designed inserts to help support the weight of the fruit. Only brand new cartons should be used.

STORAGE

- Temperature: 50-59°F (10-15°C).
- Humidity: 90%.
- Respiration: 3.5 mL/kg hr. at 50°F (10°C).
- Atmosphere composition: Not beneficial.
- Ethylene producer: Low. Extremely sensitive to ethylene exposure.
- Damage potential: Chilling-injury.
- Shelf life: 2-3 weeks.



WINTER SQUASH

HANDLING/PACKING

Grades:

Oct. 13, 1983

- U.S. No. 1: Similar varietal characteristics, well matured, and not broken or cracked. Free from soft rot or wet breakdown. Free from damage by scars, dry rot, freezing, dirt, disease, insects, and mechanical or other means. Tolerance: 10% (2% for soft rot or wet breakdown or serious damage by dry rot).
- U.S. No. 2: Similar varietal characteristics, fairly well matured, and not broken or cracked. Free from soft rot or wet breakdown. Free from serious damage by scars, dry rot, freezing, dirt, disease, insects, and mechanical or other means. Tolerance: 10% (2% for soft rot or wet breakdown or serious damage by dry rot).

Cooling:

No cooling necessary.

Curing:

Can be sold immediately without curing or can be cured for longer storage. To cure, place in a warm, ventilated, dry area – greenhouses work well. Bring temperature up to 85-95°F for 8-10 days.

Cleaning:

Brush off majority of soil in field at harvest. It is generally considered best to store winter squash unwashed and wash at time of shipment to avoid disturbing the outer wax. Some farms wash at harvest in water tanks with sanitizer and then cure and store clean. Watch for future research on which is best.

- Hand brush wash in a tank of water with sanitizer.
- Wash with a mechanical wet brush washer.

Carton Sizes:

Weights:

- 35-lb. 1 1/9 bu. box
- 800-900 lb. bulk containers

STORAGE

- Temperature: 50-55°F (0°C).
- Humidity: 50-70%.
- Respiration: 22.5 mL/kg hr. at 32°F (10-13°C).
- Atmosphere composition: Unknown.
- Ethylene producer: Very low. Somewhat sensitive to ethylene exposure.
- Damage potential: Moderately chilling-sensitive.
- Shelf life: 2-3 months.






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