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NC GROWING TOGETHER
Connecting Local Foods to Mainstream Markets

Wholesale and Retail Product Specifications: Guidance and Best Practices for Fresh Produce

For Small Farms and Food Hubs

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http://www.ncgrowingtogether.org

USDA United States Department of Agriculture National Institute of Food and Agriculture

PURPOSE

A key objective of the North Carolina Growing Together Project (NCGT), a Center for Environmental Systems Initiative, is to provide information and support to producers and organizations to facilitate sales into retail and wholesale markets. This guide was developed to assist growers in meeting product specifications specific to NCGT project partners.[1] The pack sizes here are the most commonly used, but are subject to change. It is recommended that growers contact buyers directly to confirm specifications.

The grade standards system is a key tool used in fresh produce marketing to simplify transactions in the marketplace. Agricultural products can have highly variable characteristics, including variation in weight, size, shape, density, firmness, tolerance to insect damage, cleanliness, color, taste, and blemishes. Agreed-upon standards that establish acceptable criteria for each of these characteristics allow buyers and sellers to connect and do business more efficiently.

The United States Department of Agriculture (USDA) is the source of industry standards. Failure to meet these standards results in buyer rejection of product with the seller often charged for shipping. Rejections hit small farms particularly hard because they may result in a large portion of the crop being sold at a loss or not sold at all. Many small farms throughout North Carolina have been subjected to rejection and, ultimately, loss of income because of failure to meet industry standards.

This manual has been developed to assist individual growers and grower-based distributors and food hubs by (1) outlining a clear set of descriptive guidelines for quality, size, labeling, packaging and USDA grade classification; and (2) providing guidance on how to improve the presentation of produce in the marketplace in order to enhance sales to retailers and wholesalers.

[1] This guide was prepared by Patricia "Trish" Tripp, Wholesaler Liaison, NC Growing Together project; Reviewed by L. George Wilson, Ph.D., Professor, Horticultural Science Department, North Carolina State University. For more information see ncgrowingtogether.org.

HOW TO USE THIS GUIDE

This guide is intended to be a resource for the day-to-day handling of fresh produce and as a training guide for small to mid-sized producers and food hubs. It provides relevant information for NCGT grower and distributor partners. At times, a retailer or wholesale buyer may request a unique characteristic or pack size for a product; it is important for producers to contact buyers to confirm that the recommended pack sizes in this guide are appropriate.

WHAT ARE THE GRADES FOR FRUITS AND VEGETABLES?

Fruit and vegetable grade standards are set by the USDA. The purpose of the standards is to describe, in a uniform language, the quality and condition of commodities traded in the produce industry. Fruits and vegetables are graded for fresh markets and for processing, with each fruit and vegetable having its own set of standard grades and terminology. This guide will focus on US #1 grade for fresh markets (wholesale and retail).

The USDA maintains a list of fruits and vegetables and their specific grades: http://www.ams.usda.gov/AMSv1.0/freshmarketvegetablestandards

MAINTAINING THE QUALITY OF YOUR PRODUCT

When entering commercial markets it is important to ensure that the quality of your product is maintained for the shelf life anticipated by the buyer. The shelf life of a vegetable is how long a product is usable/saleable postharvest. Unlike selling from a roadside stand or the farmers' market, where the consumer takes immediate possession of the product, it takes time for wholesalers and retailers to transport product to the end user.

If proper harvesting, storage and distribution protocols are not followed, the seller is at higher risk of the buyer returning/rejecting the product. If the product is not marketable, chances are high that the wholesaler and/or retailer will ask the producer to credit them what they previously paid for this product. Producers selling "locally" need to match (or exceed) the quality of existing wholesale options, especially if producers are trying to obtain premium prices for their product.

Here are a few tips to assist you in increasing the quality and safety of the products that you grow or sell.

Harvesting

Harvest early in the morning when the temperature of the produce is cooler. Once the product is harvested, place harvest boxes or bins under loose covers for shade if the produce cannot be quickly removed from the field. Produce left out in the sun absorbs heat and may also become sunburned, reducing quality and shelf life. Provide shade while transporting your produce. Keeping the produce as cool as possible will result in the longest shelf life.

The most effective practice to maximize shelf life is pre-cooling to remove field heat. This can be accomplished by placing harvested produce in a cooling room or walk-in cooler. Pre-cooling provides several benefits, including slowing down the rate of respiration, minimizing susceptibility of harmful microorganisms and reducing water loss of your product.

Temperature Management

Fresh horticultural commodities can be seen as unique packages of water that continue living after harvest. Most notable is respiration and the release of heat. Cooling slows down respiration and lengthens the usable "life" of the product for consumption. Respiration rates are 2-4 times greater at typical field temperatures then at recommended storage and cold chain holding temperatures. The descriptive guidelines in this manual list pre-cooling options by product, with the preferred pre-cooling method listed first.

Optimal storage temperatures vary by commodity. Several commodities are sensitive to even non-freezing temperatures and will develop chilling injuries, such as surface pitting, shriveling and off flavor if held too long below their threshold temperature. It is recommended that chill-sensitive products not be stored in the same facility as those that have an optimum temperature that is near freezing.

Sorting, Grading and Packing

Buyers seek consistency of size and color in each case of product. Sorting, grading and packing can be done in the field, not just in the packing shed. Sorting is done on the basis of size and color, while grading is based on defect, both of which determine if a product is marketable. Handle fruits and vegetables no more than absolutely necessary and field pack whenever possible.

Storing

When produce is at its peak harvest, it may be necessary to store the product instead of delivering it immediately to your customer. If this is the case, storing product at optimal storage temperatures is important. This guide provides optimal storage temperatures for specific crops.[2]

Labeling

Most wholesalers and retailers require some sort of label for your product. If you sell your product by the case, then each case should be labeled. If you sell your product by the pallet, then each pallet should be labeled. At a minimum, the label should include a unique lot number, the farm name and location, the product name, pack-size and the words "Product of the USA". This label will satisfy the traceability requirements of most wholesalers and retailers. However, the buyer may also request a GS1 barcode label. GS1 is an internationally used set of numbers applied to products, companies and services to allow for supply chain tracking.

For information on GS1 Company Index numbers, visit:
http://www.gs1us.org/get-started/im-new-to-gs1-us

If selling into the retail market, the buyer may require that a PLU (Produce Look-up) sticker be placed on individual products. Industry-wide item numbers are assigned to specific products. For example, broccoli is assigned code #4060.

[2] Detailed information from the USDA for postharvest storage of horticultural commodities can be found in *The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks* here: www.ba.ars.usda.gov/hb66/contents.html

For more information, visit: http://plucodes.com/docs/users_guide.pdf

The Produce Traceability Initiative (PTI) is an initiative to improve traceability of products. If you are GAP (Good Agricultural Practices) certified, you are required to maintain a traceability plan, "one step back" (internal to your operation) and "one step forward" (external to your operation). The PTI uses a Global Trade Item Number (GTIN) to achieve external traceability. This item number will be specific to the crop you are growing. In addition, if your buyer requests a GS1 barcode label, you will need to register for a GS1 number, which is unique to your farm and will need to be added to every barcode and/or identification number that you create for your products.

For more information on the Produce Traceability Initiative, visit: http://www.producetraceability.org

Delivery

Many produce crops require cooling and/or cool transport to maintain product quality and safety. Maintaining a 100% cold supply chain not only increases product shelf life, but also decreases microbial contamination risks. Documenting a 100% cold supply chain is a requirement to sell into many wholesale and retail markets, and even if not required will make your product much more competitive and desirable to wholesalers and retailers.

Price Data

The North Carolina Department of Agriculture & Consumer Services (NCDA&CS) collects wholesale fruit and vegetable price data daily from select wholesalers located at the Raleigh Farmers Market. These daily reports can be obtained on the Market News page within the Markets Division on the NCDA&CS website. Another no-cost source of pricing information can be found here: http://www.thepacker.com.

In response to producers' interest in historical market prices the NC Growing Together Project collected and digitized NCDA&CS prices for the years 2008 through 2013 for the products in this manual, recording prices from each Thursday report. This pricing data can be downloaded here: http://www.cefs.ncsu.edu/ncgt/raleigh-fm-wholesale-prices-2008-2013.xlsx

More Information

For more information on selling into retail and wholesale markets, including a visual guide on the process of warehouse receiving and distribution of fresh produce at a regional distribution center, visit:
http://www.ncgrowingtogether.org/for-producers/

Also visit the NC Local Food Web Portal for links to additional resources:
http://localfood.ces.ncsu.edu/

Product Reference List

Apples

General Characteristics:	**Quality apples are fairly well formed, little to no bruising, good color and firm.**
Harvest Guidance:	
• **Daily, early morning harvest is recommended** • **To ensure maximum storage life, apples should be harvested when mature but not yet fully ripe or overripe**	
Postharvest Guidance:	
Pre-Cooling	Forced air (room cooling is acceptable) to 32-36 degrees F.
Washing/Processing	Brushed or washed (Do not wash for long-term storage)
U.S. #1 Size/Appearance	Uniform sizing and fairly well formed, little to no bruising, good color. Must be free from visible watercore. Some russeting may be tolerated (refer to USDA for acceptable defects). Diameters: 2 ¾ inches - 125 ct. and 3 ½ inches – 100 ct.
Packing	***Wholesale:*** Bushel apple box, 40 lbs. Tray Pack 100-125 ct Bushel apple box, 40 lbs. loose – 100-125 ct (113 ct preferred) ***Retail:*** Bushel apple box, 40 lbs. Tray Pack 100-125 ct; PLU required. *Note: Certain specialty varieties may be packed in smaller case packs at the request of the customer.*
Optimal Storage	Temp 30° – 40° F; Humidity 90-95%
Shelf Life	100-230 days

Asparagus – Green

General Characteristics:	**Quality asparagus will be dark green with a tightly closed and compact tip. Early season asparagus can exhibit more of a purple tinged tip and a paler, apple green stalk. The asparagus should be sized fairly consistently within the case.**
Harvest Guidance:	
• **Daily, early morning harvest is recommended.** • **Break off the stalk near the soil surface, taking care to not break the crown of the plant buried beneath the spear. The asparagus should break fairly easy when ready to harvest. If needed you may need to break the asparagus off higher, moving further away from the woody part of the plant.** • **Harvested stalks should be 8-11" in length with a stem diameter that should be over ¼"; It is recommended that you avoid woody stems.** • **Harvest into sturdy clean containers placing the cut end of the spears in 1" of cool potable water.** • **Keep in shaded area.**	
Postharvest Guidance:	
Pre-Cooling	Rapid hydro-cooling is recommended; Keep stalks standing upright in 1" of water; Keep shaded
Washing/Processing	Trim spears to uniform height; gently rinse with potable water as needed
U.S. #1 Size/Appearance	8"-11" stalks with closed bracts; grade by stem diameter into 2 distinct sizes; Unless otherwise specified, requires a ½ inch minimum diameter.
Packing	***Wholesale:*** 24 x 1 lb. banded bunches (upright) 1 1/9 bushel box ***Retail:*** 24 x 1 lb. banded bunches (upright) 1 1/9 bushel box
Optimal Storage	Temp 32° F – 35° F; Humidity 95-99%
Shelf Life	14-21 days

Beans, Green or Snap

General Characteristics:	**Quality/ripe beans should be relatively straight and snap easily when bent. Immature beans will appear thin and very dark in color while over-mature beans appear very plump and pale in color, which are not marketable.**

Harvest Guidance:

- **Early morning harvest is recommended every 2-4 days**
- **Typically harvested 15-18 days following full bloom**
- **Harvest when the pods are firm, crisp and fully elongated, but before the seed within the pod has developed significantly**
- **Keep stem end intact when harvesting**
- **Harvest when dry**
- **Keep in shaded area**

Postharvest Guidance:	
Pre-Cooling	Forced air, room cooling; *Caution: Beans are sensitive to chilling injury.*
Washing/Processing	If washing is needed air dry completely; Fans may be used.
U.S. #1 Size/Appearance	4-6” in length, free of damage, firm, tender and fairly straight; Clean; Any russeting will increase when product is kept at room temperature, so any russeting is considered a defect and will not be graded as U.S.#1.
Packing	***Wholesale:*** 25 - 30 lb. - 1-1/9 Bushel Box ***Retail:*** 25 - 30 lb. – 1-1/9 Bushel Box; loose or 5-5lb. bags
Optimal Storage	Temp 40° – 45° F; Humidity 95% - 100% *(chill sensitive)*
Storage Life	10-14 days

Beets

General Characteristics:	**Quality beets should be of uniform shape and size, firm and fairly smooth with intense uniform color typical of the variety. Bunched beets or beets with short-trimmed tops shall have tops that are fresh and free from decay and/or discoloration.**
Harvest Guidance:	
• **Bunched beets should be harvested at 50-70 days.** • **Bunched beets should be 1-1/4 lb. per bunch (3-5 beets) and can be bunched in the field.** • **Topped beets should be harvested before they reach full maturity.** • **Use clean knife to top and tail beets. Leave at least ½ inch of the long root.** • **Use a bucket of cold water or a refrigerated truck to immediately cool beets.**	
Postharvest Guidance:	
Pre-Cooling	**Topped:** Room cooling **Bunched w/tops:** Hydro-cool in water as quickly as possible.
Washing/Processing	Wash or brush the root if needed;
U.S.#1 Size/Appearance	Unless otherwise specified, beets should be at least 1-1/2 inches in diameter. Bunches must weigh at least 1.1 lb. and must contain at least 3 beets.
Packing	***Wholesale:*** **Topped:** 25 lb. loose in poly bag; 40 lb. in a 1-1/9 waxed carton **Bunched (using rubber band or ties) w/tops:** 12 bunches in a 1-1/9 carton; 24 bunches per case in a leafy greens waxed box. ***Retail:*** Bunched w/tops: 12 bunches in a 1-1/9 carton; 24 bunches per case in a leafy greens waxed box.
Optimal Storage	Temp 32° F (bunched) 33° F - 36° F (topped); Humidity 98%
Shelf Life	Topped: 3-5 months; Bunched: 10-14 Days

Bell Pepper
Red, Yellow & Green

General Characteristics:	**Quality bell peppers should be of uniform shape, size and color typical of the variety. Peppers should also be sweet.**
Harvest Guidance:	
• **Early morning harvest is recommended** • **Harvest when dry** • **Use clean knife or clippers to cut stem** • **Cut stem short**	
Postharvest Guidance:	
Pre-Cooling	Rapid cooling to no lower than 45° F. Forced air or room cooling.
Washing/Processing	Brush clean if needed
U.S. #1 Size/Appearance	Good green or red color, correct size (approx. 3" diameter and 3 ½ inch length) fairly good shape, firm bright skin, free from defects; Colored peppers should have at least 50% intended coloration. Tolerance 10% (5% for serious damage and 2% for decay)
Packing	***Wholesale:*** Green bell; 25 lb. -1 1/9 bushel wax box (36 ct minimum) Colored bell; 5/9 bushel wax box ***Retail:*** Green bell; 1 1/9 bushel wax box (36 ct minimum) w/PLU stickers; Colored bell 5/9 bushel wax box w/PLU stickers
Optimal Storage	Temp 45° F – 48° F; Humidity 90-95% *(chill sensitive)*
Shelf Life	2-3 weeks

Blueberries

General Characteristics:	**Blueberries should be fully ripe (blue) and firm. Berries should be free of decay and injury.**
Harvest Guidance:	
• **Early morning harvest is crucial and product should be cooled immediately to remove field heat.** • **Detach all stems.** • **Do not harvest when wet.** • **Keep in shaded area**	
Postharvest Guidance:	
Pre-Cooling	Forced air cooling upon harvest.
Washing/Processing	Washing is not recommended
U.S. #1 Size/Appearance	Clean, well colored for variety, not overripe, crushed, split, leaking, or wet. All stems must be detached (tolerance of 10%); Green berries are not allowed; Must be free of mold or decay (tolerance of 1%).
Packing	***Wholesale:*** 12-4.4 oz. or 12-6 oz. clamshell containers per flat ***Retail:*** 12-1 pint containers per flat ***Note****: The industry is starting to package blueberries in larger clamshells due to industry demand. Confirm this with your buyer.*
Optimal Storage	Temp 32° F - 37° F; Humidity 90-100%
Shelf Life	2-4 weeks

Broccoli

General Characteristics:	**Quality broccoli has either a dark or bright green color with no flowering and a cleanly cut stalk with compact heads with close beads.**

Harvest Guidance:

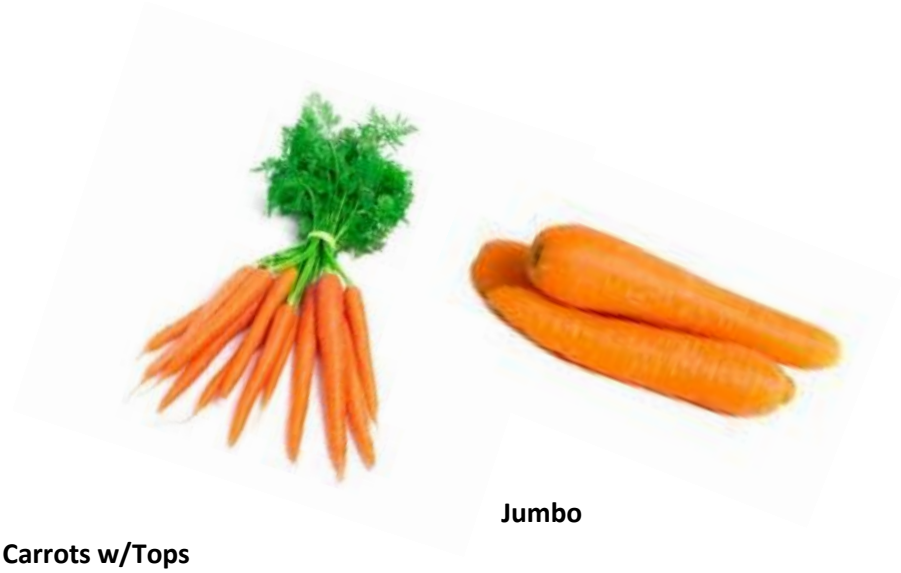
- **Early morning harvest is crucial and product should be cooled immediately to remove field heat.**
- **Use a clean, sharp knife**
- **Harvest with care to avoid damaging the florets leading to increased decay.**
- **Water consistently during head formation for higher quality and sweetness.**
- **Keep in shaded area**

Postharvest Guidance:	
Pre-Cooling	Hydro-cooling, top icing, forced-air, and room-cooling
Washing/Processing	Only wash if broccoli will become wet during the cooling process; Remove excess leaves. Note: If care is taken while harvesting broccoli, it should not have to be washed.
U.S. #1 Size/Appearance	Fairly uniform heads, no hollow stems, good green color, no flowering heads
Packing	***Wholesale:*** Bunched (2-3 heads): Approx. 21 lb waxed box (14 or 18 bunches); Crown cuts: Loose in 20 lb. box; Side Shoots: 11 lb. plastic bag ***Retail:*** Bunched (2-3 heads): Approx. 21 lb waxed box (14 or 18 bunches)
Optimal Storage	Temp 32° F - 35° F; Humidity 98-100%
Shelf Life	2-3 weeks

Cabbage

General Characteristics:	**Quality cabbage will be crisp and firm with a good green color and compact head. Should be easy to harvest and should not have loose leaves intact.**
Harvest Guidance:	
• **Harvesting can take place any time of day.** • **Harvest large, tight un-split heads free of insects or decay.** • **1 to 2 wrapper leaves (some buyers require 3-4) should be left to protect the head.** • **The wrapper leaves can have insect damage as long as the head does not.** • **Keep in shaded area.**	
Postharvest Guidance:	
Pre-Cooling	Forced air, room cooling
Washing/Processing	Cleaning is not recommended.
U.S. #1 Size/Appearance	Heads should be firm, tight and heavy for its size with the absence of insects and dirt and free of decay. Cut several cabbages in half to ensure it is worm free. Tolerance is 10% (2% for soft decay). Stems should be cut to not extend more than ½ inch beyond the point of attachment of the outermost leaves. *Tip: The heads are crisp and fresh if they squeak when rubbed together.*
Packing	***Wholesale:*** 45-50 lbs. packed in 1 3/4 or 1 7/8 bushel waxed cabbage containers or 50 lb. cabbage bag. ***Retail*** : 50 lb. wax box
Optimal Storage	Temp 32 – 35 F; Humidity 98-100%
Shelf Life	1-6 months

Carrots



Bunched Carrots w/Tops

Jumbo

General Characteristics:	**Quality carrots are firm, straight smooth with little "hairiness," no signs of cracking or sprouting**
Harvest Guidance:	
• **Dig roots instead of pulling directly by green tops to reduced damage.** • **Harvest when the roots are at least ½ to ¾ inch in diameter** • **Remove any carrots that appear misshapen, forked, are green on top, or excessively hairy, which are too bitter for market.** • **Harvest carrots before they are over mature**	
Postharvest Guidance:	
Pre-Cooling	**Jumbo:** room cooling (icing is optional) **Bunched:** hydro-cooling or icing
Washing/Processing	Wash carrots to remove as much soil as possible, free of blemishes, trim tops (if applicable)
U.S. #1 Size/Appearance	**Jumbo (topped)** - Unless otherwise specified, U.S. #1 requires a minimum length of 5 inches and a diameter, not less than 1 inch or more than 2-1/2 inches. **Bunched:** At least ¾ inches in diameter and a minimum length of 5 inches
Packing	***Wholesale:*** **Jumbo**: Loose -25# or 50# poly bag **Baby w/tops**: Bunched -1 1/9 bushel wax box with 12 bunches (5 carrots per bunch tied with a rubber band or tie) ***Retail:*** B1 1/9 bushel box
Optimal Storage	Temp 32 – 35 F; Humidity 98-100%
Shelf Life	Topped: 5-6 months; Bunched: 10-14 Days (w/tops)

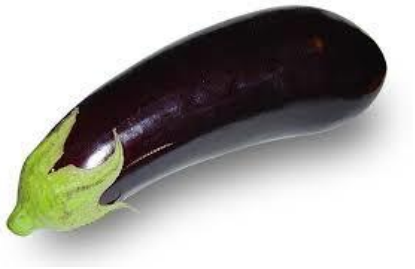
Cauliflower

General Characteristics:	**Quality cauliflower should be white to cream in color, firm and compact with heads greater than (4 in) in diameter, with no browning or decay.**
Harvest Guidance:	
• **Tolerates wet or hot harvest conditions** • **Use sharp clean knife** • **Handle with care to protect against bruising (bruising shows up 1 day later)** • **Keep in shaded area**	
Postharvest Guidance:	
Pre-Cooling	Hydro-cooling, top icing, forced-air cooling or room cooling
Washing/Processing	Wash if necessary.
U.S. #1 Size/Appearance	Heads should be white, firm, compact and > 4 inches in diameter. No hollow stems, trim excess leaves. Must be free from soft or wet decay. Variation in curd size is not more than 1 ½ inches in any individual container. Tolerance is 10% (5% for serious damage).
Packing	***Wholesale:*** ½ bushel wax box, 6 heads per box (9ct. and 12 ct. are also accepted). ***Retail:*** 12 ct. wax box
Optimal Storage	Temp 32° F – 34° F; Humidity 95-99%
Shelf Life	Up to 3 weeks at 32° F

Cucumbers

General Characteristics:	**Quality cucumbers are oblong in shape, with small tubercles. Slicing cucumbers should be dark green, firm and glossy with good color and free from decay and sunscald. If yellowing occurs, the fruit is overripe and the seeds become hard, which should be avoided.**
Harvest Guidance:	
• **Harvest throughout the day, every other day** • **Harvest when dry to reduce disease risks** • **Avoid twisting and turning the fruit** • **Keep in shaded area**	
Postharvest Guidance:	
Pre-Cooling	Forced-air, room cooling (Avoid chilling injury)
Washing/Processing	Wash only if needed; Use brush washer
U.S. #1 Size/Appearance	Large: Minimum 2 1/4 inches in diameter and 6 to 8 inches in length (minimum of 6”). Straight, Good green color, good shape, no shrivel or sunken ends, no pitting; Tolerance 10% (1% for decay).
Packing	***Wholesale:*** 40 lb. - 1 1/9 bushel wax box; 20 lb. – 5/9 bushel waxed carton ***Retail:*** 24 ct. wax cartons
Optimal Storage	Temp 50° F – 55 ° F; Humidity 95% *(chill sensitive)*
Shelf Life	14 days or less

Eggplant



General Characteristics:	**Quality eggplant is uniformly egg to globular shaped, has a fresh green calyx, firm flesh and a dark purple skin and a glossy appearance.**
Harvest Guidance:	
• **Early morning harvest is recommended** • **Use clean sharp scissors and keep stem short** • **Harvest gently** • **Harvest when dry** • **Keep in shaded area**	
Postharvest Guidance:	
Pre-Cooling	Forced air, room cooling, hydro-cooling. *Note: DO NOT ICE*
Washing/Processing	Wash if necessary.
U.S.#1 Size/Appearance	Fairly well colored and formed, firm, clean, and free from decay, worm holes, injury from scars, freezing, and disease. Should be 7 to 9.5 inches long and still glossy and be consistent in sizing.
Packing	***Wholesale:*** 25 lb. in 1 1/9 bushel box ***Retail:*** 25 lb. in 1 1/9 bushel box w/ PLU label
Optimal Storage	Temp 50° F - 53° F; Humidity 90-95% *(chill sensitive)*
Shelf Life	14 days or less

Greens - Cooking

General Characteristics:	**Quality greens' leaves should be of similar varietal characteristics, fresh, fairly tender and clean, free from decay, discoloration, freezing injury, and of characteristic color for the variety or type of greens.**
Harvest Guidance:	
• **Early morning harvest is recommended** • **Snap leaves off the stalks quickly, leaving long stalks on the leaves** • **Harvest when dry** • **Field bunching is fine, however they must be bunched at least 4 inches up the stalk where the leaf starts.** • **Keep in shaded area**	
Postharvest Guidance:	
Pre-Cooling	Rapid hydro-cooling or icing.
Washing/Processing	Gently wash with water; triple wash
Size/Appearance	Mature, tender leaves with good green color free of damage debris
Packing	***Wholesale:*** 24 ct (1 lb. bunches) 1 1/9 bushel wax leafy greens box (to avoid tightly packing, alternate side-to-side as your are packing (best practice is to pack four groups of six) ***Retail:*** 24 ct (1 lb. bunches) 1 1/9 bushel wax leafy greens box (to avoid tightly packing, alternate side-to-side as your are packing (best practice is to pack four groups of six)
Optimal Storage	Temp 32° F – 33° F; Humidity 95-98%
Shelf Life	2 weeks (3 weeks for kale)

Lettuce

General Characteristics:	**Quality lettuce should have crisp leaves loosely arranged on the stalk with the tops of the leaves bright green or similar varietal characteristics.**
Harvest Guidance:	
• **Early morning harvest is recommended** • **All damaged or discolored leaves should be removed** • **Use clean sharp knife cutting above ground (wipe if it comes into contact with soil)** • **Cut open heads to ensure there is not tip burn, russett spotting or decay** • **Pack in ax box with cut end up, at an angle, 2 deep to avoid damage to outer leaves** • **Keep in shaded area**	
Postharvest Guidance:	
Pre-Cooling	Hydro-cooling
Washing/Processing	Wash to remove debris (hydro-cooling)
U.S. #1 Size/Appearance	Must have similar varietal characteristics, fresh, green, and free from decay, russet spotting and doubles. Free from tip burn, downy mildew, freezing, and discoloration. 4-6” in length, free of damage, firm, straight
Packing	***Wholesale:*** Leaf Lettuce: 24-28 lb. (24 ct.) cartons; Iceburg: 24 count cartons; Butterhead/Boston: 24 ct.. cartons; Bibb/greenhouse grown: 12 ct. (in clamshell). ***Retail:*** Leaf Lettuce: 24-28 lb. (24 ct.) cartons; Iceburg: 24 count cartons; Butterhead/Boston: 24 ct. cartons; Bibb/greenhouse grown: 12 ct. cartons (in clamshell).
Optimal Storage	Temp 32° F; Humidity 98% - 100%
Shelf Life	1-2 weeks (3 weeks for ‘living’ Bibb lettuce)

Potatoes

General Characteristics:	**Quality potatoes will be fairly well shaped, skin will resist abrasion and be free of damage and sprouts (reds, whites and yellows) and will be brightly colored.**
Harvest Guidance:	
• **Early morning harvest is recommended.** • **Harvest potatoes after vines have died for potatoes that will be placed in storage to allow them to cure in the ground** • **Be careful not to damage potatoes when digging** • **If harvesting new potatoes, hand dig and gently wash (tender skin)**	
Postharvest Guidance:	
Pre-Cooling	N/A
Washing/Processing	Wash and remove dirt and debris (do not wash potatoes for storage; if they are extremely dirty, wipe off excess dirt or clay with single use towel)
Size/Appearance	Firm, free from damage, skin is in good condition, fairly uniform size depending on variety. Size A – greater than 1 7/8". Not more than 3% of 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 ¼" in diameter or 5-oz. or more in weight. Not more than 10% may be larger than any required or specified maximum size for US#1 grade standard.
Packing	***Wholesale:*** 50 lb. minimum loose packed in 1 1/9 bushel potato box; packed by count in 50 lb. 1 1/9 bushel potato box ***Retail:*** 5 or 10 lb. plastic or paper bags in box or bin equivalent to 50 lbs.
Optimal Storage	Curing: 1-2 weeks at 68° F; Humidity 80-100% (min. decay) Storage: 45° F - 50° F; Humidity 95-100%; Avoid light!
Shelf Life	2-12 months

Summer Squash

General Characteristics:	**Quality Summer squash should be shiny, tender, firm, completely yellow or green and not too large. Small squash is more desirable.**
Harvest Guidance:	
• **Early morning harvest is recommended.** • **Harvest when small and tender being careful not to scratch the squash.** • **Gloves are recommended to reduce scratching and bruising.** • **Use sharp knife or shears** • **Usually ready to harvest 4-8 days after flowering** • **Keep in shaded area.**	
Postharvest Guidance:	
Pre-Cooling	Forced-air, room cooling
Washing/Processing	Gently wipe clean with single use towels (if necessary)
U.S. #1 Size/Appearance	5-7” in length for green and yellow squash and crookneck; patty pan should be 3-4” in diameter; Well formed, free of damage (cuts, bruises, scars) and decay, and firm with stems or portions of the stems attached. Should be fairly young and tender. Dark green types should be entirely green. A dull surface and loss of firmness is due to water loss. Tolerance is 10% (5% for serious damage and 1% for decay or breakdown)
Packing	***Wholesale:*** 20 lb. 5/9 bushel wax box – preferred size is market determinate. Pack with stem ends facing the walls. ***Retail:*** 20 lb. 5/9 bushel wax box – preferred size is market determinate. Pack with stem ends facing the walls. If shrink wrap is requested, a PLU label is required.
Optimal Storage	Temp 41° F – 50° F; Humidity 95% *(chill sensitive)*
Shelf Life	< 2 weeks

Sweet Corn

General Characteristics:	**Quality sweet corn has uniform size and color (yellow, white or bicolor); sweet, plump, tender, well-developed kernels; fresh, tight, green husks and free from insects and injury. Sweetness is the most important factor in consumer satisfaction.**
Harvest Guidance:	
• **Early morning harvest is recommended** • **Keep in shaded area or put directly in cooler (sensitive to overheating)** • **Can be iced in the field** • **Can be field packed** • **Husks do not protect corn from bruising, so do not toss.** • **The faster corn is cooled, the sweeter it will be.**	
Postharvest Guidance:	
Pre-Cooling	Icing or rapid hydro-cooling *Note: Avoid dehydration; wetting down husks can assist with this if forced air must be used.*
Washing/Processing	Wash only if needed.
Size/Appearance	Well trimmed and well developed for variety; Husks should be fresh and green; Kernels should be well filled, plump and milky with the stalks trimmed. Free from damage or decay. Cob must be at least 5" in length and stalk must be less than 6" (most markets prefer shorter stalk). Tolerance is 10% (2% for decay)
Packing	***Wholesale:*** 1 bushel wood crate 48 ears per crate ***Retail:*** 1 bushel wood crate 48 ears per crate
Optimal Storage	Temp 32°F – 35°F; Humidity 95-99%
Shelf Life	4-6 days

Strawberries

General Characteristics:	**Quality strawberries have a bright red color, firm, flavorful, and free from defect and decay.**
Harvest Guidance:	

- **Early morning harvest is recommended**
- **Harvest when dry**
- **Harvest when fully ripe for best flavor**
- **Keep in shaded area**
- **Field packing is recommended (do not over handle)**

Postharvest Guidance:	
Pre-Cooling	Forced air, room cooling, no later than 1 hour after harvest.
Washing/Processing	Washing is not recommended.
U.S. #1 Size/Appearance	Fairly uniform shape, minimum ¾" in diameter, free of damage, mold and decay; shall be firm and not overripe; Each strawberry must have not less than ¾ of its surface showing a pink or red color. Tolerance is 10% (5% for serious damage and 2% for decay; 0% for mold)
Packing	***Wholesale:*** 8 – 1# clamshells packed in corrugated flat. ***Retail:*** 8 – 1# clamshells packed in corrugated flat.
Optimal Storage	Temp 32° F; Humidity 80-85%
Shelf Life	7 days

Tomatoes

General Characteristics:	**Quality tomatoes have a firm, turgid appearance, uniform and shiny color, without signs of mechanical injuries, shriveling or decay**
Harvest Guidance:	
• **Early morning harvest is recommended** • **Harvested once color has started to develop** • **Pack stem side down** • **Allow tomatoes to ripen further indoor when temperature are high** • **Communicate with the buyer on the maturity desired (Stage 1 - mature green, Stage 2 - pink, Stage 3 - ripe)** • **Avoid harvesting when wet and keep in shaded areas**	
Postharvest Guidance:	
Pre-Cooling	Forced air or room cooling
Washing/Processing	Wash only if necessary.
Size/Appearance	Firm with good color, fairly uniform size and shape, 60 - 90% of the tomato's surface is not green, pinkish to red color. Free from decay, freezing injury and sunscald. Tolerances are 10% for grade requirements (5% for defects causing very serious damage and 1% for being soft or affected by decay) Sizes: Medium - 2.23-2.78"; Large - 2.5-2.78"
Packing	***Wholesale:*** Field grown -25 lb tomato box, loose; Greenhouse grown (heirlooms)- 10lb flat box (single layer) ***Retail:*** Field grown -25 lb tomato box tray packed w/PLU labels Green house grown- 10 lb flat box- PLU labels
Optimal Storage	Optimal storage temperatures depend on the maturity stage of the tomatoes. Temp 66°F -70°F (ripening); 48°F-50°F (red tomatoes); 58°F -60°F (mature green); 90% to 95% humidity *(chill sensitive).*
Shelf Life	Green: 21-28 days; pink/red: 7-14 days; red: 2-4 days

Turnips

General Characteristics:	**Quality turnips should be of uniform shape and size, firm and fairly smooth with intense uniform color typical of the variety. Bunched turnips or turnips with short-trimmed tops shall have tops that are fresh and free from decay and/or discoloration.**
Harvest Guidance:	
• **Bunched turnips should be harvested at 50-70 days.** • **Bunched turnips should be 1-1/4 lb. per bunch (3-5 beets) and can be bunched in the field.** • **Topped turnips should be harvested before they reach full maturity.** • **Use clean knife to top and tail turnips. Leave at least ½ inch of the long root.** • **Use a bucket of cold water or a refrigerated truck to immediately cool.**	
Postharvest Guidance:	
Pre-Cooling	**Topped:** Room cooling **Bunched w/tops:** Hydro-cool in water as quickly as possible.
Washing/Processing	Wash or brush the root if needed;
U.S.#1 Size/Appearance	Unless otherwise specified, turnips should be at least 1-3/4 inches in diameter. Bunches must weigh at least 1.1 lb. and must contain at least 3 turnips.
Packing	***Wholesale:*** Topped: 25 lb. in a 5/9 waxed carton w/ polyethylene liners; 40 lb. in a 1-1/9 waxed carton Bunched w/tops: 12 bunches in a 1-1/9 carton; 24 bunches per case in a leafy greens waxed box. ***Retail:*** Bunched w/tops: 12 bunches in a 1-1/9 carton; 24 bunches per case in a leafy greens waxed box.
Optimal Storage	Temp 32° F (bunched) 33° F - 36° F (topped); Humidity 98%
Shelf Life	Topped: 3-5 months; Bunched: 10-14 Days

Watermelons

General Characteristics:	**Quality watermelons should be well formed, symmetrical and uniform in shape with a waxy, bright appearance. The fruit should be ripe for sweetness, but not overripe.**

Harvest Guidance:

- **Early morning harvest is recommended**
- **Harvest when the ground spot changes from white to pale yellow, tendrils nearest the fruit may turn brown and dry when ready to harvest**
- **Harvest every other day**
- **Temperatures should remain consistent after harvesting; do not move from cool storage to a warm display**
- **Keep in shaded area**

Postharvest Guidance:	
Pre-Cooling	N/A
Washing/Processing	Wipe clean with single use towels; use water only if necessary
Size/Appearance	The rind should be free of scars, sunburn, and abrasions with no bruising or other physical injury, free from decay, and not overripe
Packing	***Wholesale:*** **Seeded:** 2 each per case (50-60 lb. cartons) w/ inserts to support the weight ***Retail:*** Bulk 700 lb. corrugated bins
Optimal Storage	Temp 50° F – 59° F; Humidity 90% *(chill sensitive)*
Shelf Life	2-3 weeks

Winter squash

General Characteristics:	**Quality winter squash should be fully mature, with hard rinds and, except for some striped varieties, with solid external color.**
Harvest Guidance:	
• **Early morning harvest is recommended** • **Harvest whenever the fruits have turned a deep, solid color and the rind is hard** • **Harvest when dry** • **Cut with pruning clippers, leaving short stem attached** • **Use caution to not scratch other squash with the stem** • **Keep in shaded area**	
Postharvest Guidance:	
Pre-Cooling	Room-cooling
Washing/Processing	Wipe clean or mechanical brush
Size/Appearance	Fairly uniform size for the variety, well-matured and not broken or cracked; rind should resist thumbnail pressure verifying it is free from soft rot or wet breakdown. Tolerance is 10% (2% for soft rot or wet breakdown or serious damage by dry rot)
Packing	***Wholesale:*** 35 - 45 lb. - 1 1/9 bushel box ***Retail:*** 800-900 lb. bulk container
Optimal Storage	Curing 85°F -95°F Temp 50°F -55°F; Humidity 50-70%
Shelf Life	2-3 months

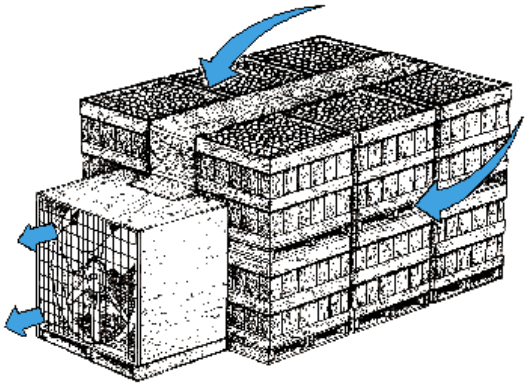
Glossary of Terms

Chilling injury threshold

Product	Internal/Probe Temperature
Beans, Cucumbers, Eggplant, Okra, Peppers	**45°F**
Melons	**45°F-50°F**
Tomato	**50°F**
Winter Squash	**50°F**
Sweet Potato	**55°F**
Basil	**45°F**

Forced-air cooling

Forced-air cooling is used in conjunction with a cooling room utilizing fans equipped with an automatic shut-off as soon as the desired temperature is reached. The movement of the air allows for faster cooling. Caution should be used to not allow movement of the air once the product is cooled to its optimum temperature to avoid freeze damage. Avoid stacking patterns that may limit the ability of airflow to remove heat from the products.



Grading

Sorting of vegetables and fruits into different grades according to the size, shape, color and volume to meet buyer product specifications and to achieve a higher price in market.

Humidity

The amount of moisture in the air, typically reported in percentage relative humidity. The higher the relative humidity, the more water in the air. You can prevent moisture loss in fruits and vegetables by keeping them cool and at the highest level of relative humidity that the particular variety can tolerate. Produce that shrinks, wrinkles or spoils quickly likely has been stored in too high or too low humidity. To increase humidity in a cooling room, wet burlap sacks and keep within the cooling room.

Hydro-cooling

A cooling method utilizing re-circulated or running water. This method can be used on fruits and vegetables that are not sensitive to wetting. Ice water can be used to control the temperature of the water. It is also recommended that a sanitizer properly labeled for washing fruits and vegetables be used following the label instructions to control potential microbial risks.

Icing (for cooling)

A method of cooling that can be used for products with a high respiration rate such as broccoli. Ice is placed directly on top of the product once it is packed in waxed boxes.

Potable water

Water that meets the standards of drinking purposes of the state or local authority having jurisdiction, or water that meets the quality standards prescribed by the U.S. Environmental Protection Agency's (EPA's) National Interim Primary Drinking Water Regulations, published in 40 CFR Part 141.

Room-cooling

The use of an insulated room equipped with refrigeration units (or a window A/C unit with a CoolBot) to cool the air. Most fruit and vegetables can tolerate room cooling, however it is a slower method to remove field heat than other cooling methods.

Shelf life

How long a product is usable/saleable. Starts at harvest, not at retail.

Tolerance

The maximum total percentage of damage and defects allowable for the commodity to meet U.S. Grade #1 standards.

Tubercles

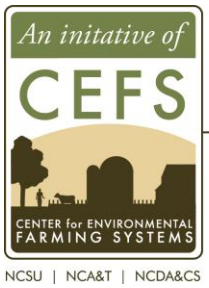
A small, firm round nodule or swelling of the outer skin of the vegetable.

U.S. Grade #1

The USDA grade standard used by most wholesale vendors for quality standards for products that they purchase.

Watercore

A physiological disorder that most often occurs in fruit, such as apples, causing them to appear translucent internally. This disorder causes the intercellular spaces to fill with a sugar-water solution causing internal damage in fruit after a period of storage. Slight watercore often disappears during storage, however, more severe watercore can cause tissue breakdown. This breakdown appears as internal browning of the tissue. Watercore is usually not detectable externally.



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Connecting Local Foods to Mainstream Markets

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