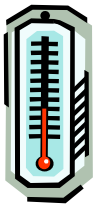
Handling and Storage of Fresh Fruits and Vegetables

Produce is alive and breathing. At the time produce is harvested, the life of the product starts to decline. In a perfect produce world, one would need to have many storage areas with different storage temperatures to receive the maximum shelf life and quality desired. This would be quite a challenge as storage space and temperatures are limited in most school cafeterias. However, there are variables that can be controlled that will enable food service staff to preserve the quality of produce and are also essential to optimizing produce quality, safety and yields. Key variables to maximize produce life include temperature, rotation, and storage practices.

Temperature



- Single most important factor in maintaining and maximizing life and quality of produce.
- Storing at *incorrect* temperatures is the primary cause for produce loss.
- For every ten degrees above ideal storage temperature, a produce item will lose up to half its life expectancy, especially for items served uncooked.
- Store produce immediately upon delivery.
- Coolers should be set at 38º - 40º F or cooler to hold most produce for seven days.

Rotation

- Proper rotation practices must be followed in order to keep produce fresh and prevent waste.
- Date all produce the day it is received.
- Practice FI/FO by placing new product under or behind the older product to ensure that the oldest produce is used first.

Storage

- Temperatures fluctuate during the day as the door is opened and closed.
- Temperature in the front of the cooler will be warmer than in the middle and back.
- Temperatures should be checked and recorded daily to ensure optimal product life and efficiency of cooler.

Fresh Fruit and Vegetable Ripening Guide

Ripening Guide

Some fresh fruits continue to ripen after they have been harvested while others do not. Whether or not a fruit continues to ripen is a key factor in determining its storage and shelf life. Fruits that require additional ripening should be stored at room temperature until they become ripe. Fruits that do not ripen after harvesting should be stored in a cool area until they are used.

Fruits that ripen after harvest	Fruits that don't ripen after harvest
Apricots	Apples
Avocados	Berries
Bananas	Cherries
Cantaloupe	Grapefruit
Carambola	Grapes
Honeydew	Lemons
Kiwifruit	Limes
Nectarines	Mandarins
Papaya	Oranges
Peaches	Pineapple
Pears	Strawberries
Plantains	Watermelons
Plums	
Tomatoes	

Ethylene Gas: Benefits and effects of harmful exposure

Fruit can be ripened quickly by introducing ethylene gas into a controlled environment. For example, it is often used to ripen bananas, tomatoes, and avocadoes. Certain fruits can be placed in a closed bag and the fruit's natural ethylene can speed the softening process.

While ethylene is great for ripening some fruits, the gas can cause premature decay of other fruits and vegetables that are sensitive to it. To avoid deterioration or rapid ripening of sensitive commodities, avoid holding them in the same storage room or refrigerator compartment with products that emit a great deal of ethylene gas. Diseased or injured fruits generate substantially increased levels of ethylene, so remove injured produce right away. If only one cooler is available, keep lids on storage boxes, store sensitive commodities as far away as possible from ethylene producers, and rotate product properly. If produce inventory turns quickly, ethylene should not cause quality problems

Fruits that produce large amounts of ethylene	Fruits/Veggies that are sensitive to ethylene	
Apples Apricots Avocados Cantaloupe Honeydew Kiwifruit (ripe) Mangos Papayas Peaches Pears Plums	Bananas Beans Broccoli Brussels Sprouts Cabbage Carrots Cauliflower Cucumbers Eggplant Greens	Kiwifruit (unripe) Lettuce Nectarines Okra Peas Peppers Spinach Summer Squash Sweet Potatoes Watermelon

Ideal Storage temperatures for fresh fruits and Vegetables

32º to 40º F

Apples Apricots Artichokes Asparagus Beets Berries Broccoli Brussels Sprouts Cabbage Cantaloupe Carambola Carrots Cauliflower Celery Cherries Coconuts	Corn Cranberries Garlic Grapes Greens Green Onions Herbs (except basil & oregano) Iceberg Lettuce Kale Kiwifruit All Leaf Lettuce Mushrooms Nectarines Onions Oranges (Florida & Texas)	Parsley Parsnips Peaches Pears (Fresh-Cut) Peas Pineapple (Fresh-Cut) Plums Radishes Rhubarb Rutabagas Spinach Sprouts Strawberries Turnips Watercress

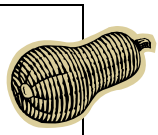
40º to 50º F

Avocados (Ripe) Basil (Fresh) Beans Cucumbers Eggplant Ginger Root Honeydews	Jicama Lemons Mandarins Melons Okra Oranges (California) Oregano (Fresh)	Papaya Peppers Pineapples Potatoes Squash (Summer) Tomatoes (Ripe)*

***Will lose flavor at this temperature during prolonged storage**

Leave Out of Cold Room

Avocados (Unripe) Bananas Grapefruit Limes	Mangos Pears (Unripe) Plantains Pumpkins Shallots	Squash (Winter) Sweet Potatoes Tomatoes (Green) Watermelons (Whole)



Storage Hints to Prolong Life of Fresh Fruits and Vegetables

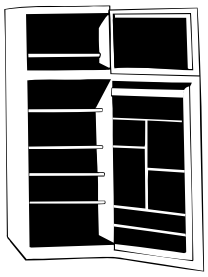
Temperature fluctuates from front to back of the cooler due to the location of the cooling unit and frequency of the door being opened. Items stored in the front of the cooler have a longer shelf life and can handle the fluctuating temperatures. The middle section of the cooler is for items that are less hardly with a more delicate peel or skin. Items in this area including broccoli, green unions and parsley may be sprinkled with crush ice. The slowly melting ice will replace moisture loss and help prevent wilting thus prolonging their shelf life. The back of the cooler is the coolest area and best suited for the ripest or most perishable items. Sprinkling crushed ice on greens such as collards, kale and mustard can also help lengthen the life of these products. Consider dividing the cooler into three areas and store produce as noted below:

FRONT	Apples Basil Cabbage Cantaloupes Citrus Carambola Cucumbers Eggplant	Garlic Honeydews Jicama Limes Okra Onions Papayas Pears	Peppers Pineapples Plums Radishes Rhubarb Ripe Tomatoes Zucchini
MIDDLE	Artichokes Asparagus Beets Broccoli Cauliflower	Cherries Coconuts Grapes Green Onions Kiwifruit	Mushrooms* Parsley Peas Turnips Watercress
BACK	Alfalfa Sprouts* Apricots Bean Sprouts* Berries Carrots	Corn Fresh-Cut Salad Greens Head Lettuce Herbs Kale	Leaf Lettuce Parsnips Ripe Nectarines Ripe Peaches Spinach

*****Store as far away from light as possible usually on lower shelf

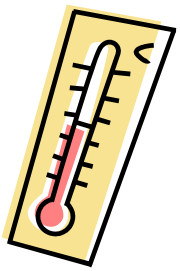
Please note there are always exceptions to the rules. Tomatoes should not be stored in the cooler. They should be received in a firm state and stored at room temperature to ripen. However, once they have reached maximum ripeness, they should be stored in the front of the cooler to slow further ripening until used. In addition, potatoes should also be stored out of the cooler. Ideally, potatoes – white potatoes and sweet potatoes should be stored at 45º - 50º F. Potatoes stored at or below 40º F will convert starches into sugar causing the potato to darken when cooked. Also, protect potatoes from direct light for this will cause them to turn green and cause a bitter taste.

Food Service personnel have decisions to make regarding every produce delivery. Practicing good habits such as checking all produce upon arrival and immediately placing product in the appropriate storage area will help preserve the quality of the product for when utilized.



Storage Information for Value Added Produce

If Product Reaches This Temperature	Product Will Stay Fresh For:
70º F (21º C)	4 hours
60º F (16º C)	1 day
50º F (10º C)	4 days
45º F (7º C)	9 days
40º F (4º C)	14 days
35º F (2º C)	17 days



Safe Handling Practices for Fresh Produce for Foodservice

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Purchasing and Receiving

Purchase food from known safe sources (reputable suppliers) and maintain its safety from time of receiving through service.

When fresh produce is received, follow supplier recommendations, if provided, regarding handling, storage temperatures, "use by" dates and other recommendations for the produce.

Avoid receiving or using damaged and partially decayed produce.

Maintain purchasing records of fresh produce.

Storage

Store raw produce so that it does not contaminate other foods with soil, etc.

Store any fresh produce, whole or cut, where other products – especially raw meat and poultry – cannot cross-contaminate it.

Segregate fresh produce from other refrigerated foods in refrigeration units by using a separate set of storage racks or separate cooler, if possible.

Cover and store washed cut produce above unwashed, uncut fresh produce.

Store all produce off the floor. Remember keep all foods 6” off the floor.

The Nebraska Food Code requires that melons and tomatoes, that are cut in any way, be held at 41^0F or below. To maintain quality of other cut, peeled or prepared fresh fruits and vegetables, refrigerate at 41^0F or below or hold on a salad bar at 41^0F or below.

Food Handler

Wash hands thoroughly with soap and warm running water before and after handling fresh produce.

Avoid bare hand contact when preparing and serving fresh produce – use gloves, tongs, deli tissue or other appropriate utensils.

Make sure that food employees are reporting illness and are not working while sick.

Preparation

Wash, rinse and sanitize all sinks, utensils, cutting boards, slicers and food preparation surfaces before use with fresh produce. If possible, designate specific cutting boards and utensils for use with fresh produce.

Remove outer leaves, stems and hulls from produce like cabbage, head lettuce, berries and tomatoes.

Always wash fresh produce under running, potable water before use.

Do not use soap or detergent for washing produce as these products are not food grade. Produce washes that are designated for use with produce can be used but are not necessary for produce safety.

Rinse fresh fruits and vegetables under running tap water. Scrub firm fruits and vegetables like potatoes and carrots with a vegetable brush under running tap water.

Soaking produce or storing produce in standing water or ice is not recommended for most types of fresh produce.

Commercial, “fresh-cut” carrots, salad greens and other produce have already been washed before processing and should be considered ready-to-eat with no further need for washing unless the label says otherwise.

Refrigerate foods prepared with fresh produce ingredients at 41^0F or below.

Label and date all foods prepared with fresh produce ingredients. If not used within 7 days, discard prepared fresh produce.

Freshly prepared juice on site requires a HACCP plan.

Service

On self-serve and salad bars, use small batches of fresh produce and monitor self-service units.

Fresh produce should not be held directly on ice.

Provide appropriate utensils for self-service of fresh produce.

Do not re-serve freshly prepared dishes containing any raw produce, including dishes made with raw tomatoes, cilantro and hot peppers such as salsa and guacamole.

Throw away fresh fruits and vegetables that have not been refrigerated (41^0F or below) within 4 hours of cutting, peeling or preparation.

Cutting Vegetables

1. **Julienne**
Peel vegetables and trim ends.
Slice vegetable into slices.
Stack the slices and cut into lengthwise 1/4-inch strips.

2. **Mince**
Roughly chop vegetable on cutting board with a large knife.
Continue to chop until vegetables are very finely chopped.

3. **Dice**
Slice vegetable into slices.
Stack slices and slice into 1/4-inch vertical slices.
Hold slices tightly with hand and cut crosswise into 1/4-inch intervals

4. **Cube**
Slice vegetables into slices.
Stack slices and slice into 1/2-inch vertical slices.
Hold slices tightly with hand and cut pieces into 1-inch pieces**.**

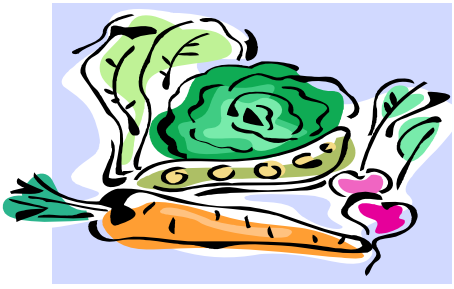
5. **Slice**
Peel vegetables and trim ends.
Slice vegetable on the diagonal at 1/2-inch intervals.

Source: www.russianfoods.com/russian-cooking/article0000A/default.asp

Flavor Intensity of Vegetables

The strength or intensity of the flavor of certain vegetables is due to their sulphur content.

	Mild Flavored Vegetables	Stronger Flavored Vegetables
Leaf Vegetables:	Spinach Swiss or red chard Beet greens Lettuce	Curly kale Mustard greens Cabbage Brussels sprouts
Seed Vegetables:	Corn Peas Black-eyed peas Beans	
Fruit Vegetables:	Tomatoes Eggplant Summer squash Winter squash	Green peppers Hot peppers
Flower Vegetables:	Artichokes	Cauliflower Broccoli
Stem Vegetables:	Celery	Asparagus
Root Crops:	Carrots Beets Sweet potatoes Parsnips	Turnips Rutabagas Onions



Garden Salad-to-Go

2 cups lettuce
4 tomato wedges (use ½ tomato)
2 slices cucumber
1 radish sliced
2 small broccoli florets
3-4 carrot sticks

1. Place lettuce pieces in a clear plastic-lidded 20-ounce container.
2. Place tomato wedge in each of the four corners, diagonal with each corner.
3. Place two cucumber slices overlapping in the center of the container.
4. Arrange the radish slices on each side of the tomato wedges.
5. Place the two broccoli florets on the left and right side of the container.
6. Top with carrot sticks.

Spinach Salad-to-Go

2 cups spinach
1 mushroom sliced
2 cherry tomatoes

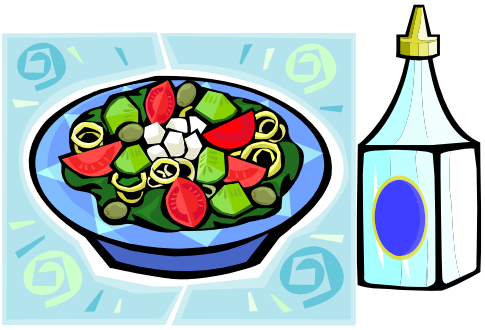
1. Place spinach pieces in a large clear plastic lidded container.
2. Arrange mushroom slices on the spinach.
3. Place a cherry tomato on each side of the container.

Comparison of Ranch Dressings

Suggestions for Use of Salad Dressings:

- Encourage use of non-fat or low-fat dressings.
- Serve only dressings with 12 grams of fat or less per ounce or per serving. Less is better.
- Limit the amount served by pre-portioning, using packets, serving dressings to students, setting pumps on ½ oz per squirt, and/or serving salad dressings less often.

Per 2 Tbsp Serving	Calories	Fat (gm)	Sat. Fat (gm)	Cholesterol (mg)	Sodium (mg)	Carbo-hydrate (gm)	Protein (gm)
Regular, Bottled							
Pocahontas Buttermilk Dressing	**170**	**18**	**2.5**	**5**	**280**	**1**	**0**
Mrs. Clarks Ranch Dressing	**130**	**14**	**4.0**	**15**	**110**	**2**	
Hidden Valley Ranch Original	**140**	**14**	**1.5**	**10**	**260**	**1**	**1**
Made From Mix							
Hidden Valley Ranch from regular mix with mayonnaise	**104**	**11**	**1.3**	**9**	**226**	**1**	**0.7**
Hidden Valley Ranch from regular mix with Miracle Whip	**75**	**7**	**1**	**5**	**238**	**3**	**0.5**
Bottled, Reduced Fat							
Hellman's' Low fat Ranch Dressing	**80**	**7**	**1**	**15**	**340**	**4**	**0**
Mrs. Clark's Reduced Calorie Ranch Dressing	**70**	**7**	**0.0**	**15**	**150**	**0.0**	**0.0**
Kraft Light Done Right	**70**	**4**	**0.5**	**10**	**350**	**6**	**0**
Made From Scratch							
USDA Tool Kit Recipe	**34**	**2.1**	**0.7**	**4**	**152**	**3**	**1**
Bottled, Non-Fat							
Wishbone Fat Free Ranch	**30**	**0**	**0**	**0**	**280**	**7**	**0**



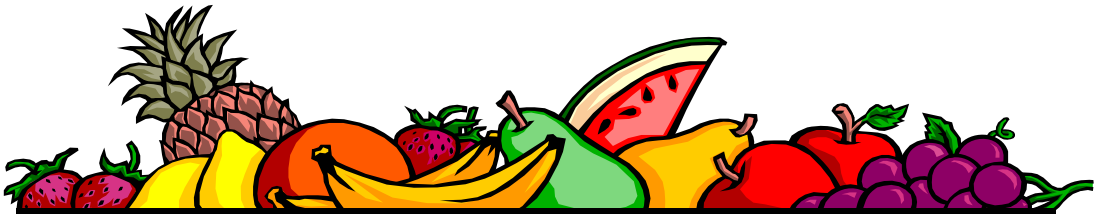
Tips to Remember for Your Fruit Salads-To-Go

Offering fresh fruits in an attractive and appetizing manner will encourage your customers to choose a nutritious selection to accompany their main entrée.

1. Use colored trays for fruit soufflé cups or a two-inch steam table pan in a refrigerated unit (single layer).
2. Do not stack trays; place only one tray at a time.
3. Use 4 oz. plastic soufflé cups with lids for canned fruits. Use 4 oz. unlidded plastic soufflé cups for fresh fruit.
4. Use a colored tray for bananas.
5. Keep cut apples or bananas from turning brown by dipping in a cup of lemon or lime juice or pineapple juice (drained) from canned pineapple.
6. For a colorful fruit alternative, place together a half apple and a half orange and serve in a soufflé cup. The orange prevents the apple from discoloring.
7. Don't use metal pans for serving fresh fruit.
8. Try serving fresh whole fruits in a wicker basket for an attractive serving alternative.

Fruit Salad Bowl-to-Go

4-5 1-inch chunks of cantaloupe
4-5 1-inch chunks of honeydew
4-5 1-inch chunks of watermelon
4-5 1-inch chunks of pineapple
1 strawberry with stem



Tip to Remember for Fruit and Vegetable Cups

1. Use 4 ounce clear plastic soufflé cups with lids to package individual fruit and vegetable servings.
2. When offering more than one serving choice for fruits and vegetables, keep like-colored items separated. Instead, line different colored items next to each other. [Place strawberries next to pears or place carrots next to celery.

Pre-packed Fruit Cups

Pack fruit cups with single servings of fresh or canned fruit, or with fruit cup mixtures. Both choices provide customers with exciting and appetizing options to meet part of the entire ¾ cup fruit/vegetable component.

Try offering:

- Strawberries and blueberries
- Strawberries and bananas
- Cantaloupe and watermelons
- Cantaloupe and honeydew
- Apples and orange slices
- Apples with blueberries
- Cantaloupe, honeydew and Watermelon
- Papaya and mangos
- Grapes and watermelon
- Half a grapefruit with a cherry
- Peaches and bananas
- Cherries and bananas
- Blueberries and pears
- Apples and bananas
- Orange and apple slices
- Kiwi fruit and grapes

Pre-packed Vegetable Cups

Pack vegetable cups with single servings of fresh vegetables or vegetable mixtures. Both choices provide customers with exciting and appetizing options to meet part or the entire ¾ cup fruit/vegetable component.

Try offering

- Celery and carrot sticks
- Celery or Carrot sticks with ranch dip
- Lettuce and tomato mixture
- Broccoli with ranch dip
- Broccoli and cauliflower with ranch dip

Pre-packed Fruit and Vegetable Combinations

Pack fruit and vegetable combination cups with fresh fruit and vegetable mixtures. This choice provides customers with exciting and appetizing options to meet all or part of the ¾ cup fruit/vegetable component.

Try offering:

- Apples with celery sticks
- Raisins and celery sticks with peanut butter
- Grapes with carrot sticks
- Apples with carrot sticks
- Banana with carrot sticks