



DEFENSE SUPPLY CENTER PHILADELPHIA

# *Department of Defense Produce Tips*



# DEPARTMENT OF DEFENSE TRAINING PROGRAM FOR HANDLING AND STORAGE OF FF&V

Produce is *alive* and *breathing*. From the time produce is harvested, the life of the product starts to decline. In a perfect world you would have to have many storage areas with different temperatures to get the maximum shelf life and quality *YOU* desire. We all know this is impossible as storage space and temperatures are limited. However, there are variables we can control that will help us get the maximum use and quality out of our produce. Here are some *key* variables to maximize produce life.

**Temperature** is the **MOST** important variable in maximizing the life and quality of your produce. Poor maintenance of the cold chain is the number one reason for produce losses. For every *ten* degrees above ideal storage temperature, a produce item will lose up to half its life expectancy. This holds especially true for items that will be served uncooked. An example of this would be *salad mixes* and *broccoli florets*. Even short periods of time outside of the cooler can result in a significant loss of shelf life and quality. Once the damage is done, putting the product into the cooler can't fix the damage already sustained. It is extremely important that you store your produce as soon as you get it in. Coolers need to be set at/or about 38-40 degrees or colder. This should hold your produce for the seven days you need to meet your needs.

**Rotation** is another variable *you* can control. It is essential that all produce be dated the day it is received. Should any product be left in your cooler when your new order arrives, place your new product under or behind the older product to assure the oldest is used first. This is called **(FIFO) First in – First out**.

**Storage** practices are very important. As we talked earlier, we don't have ideal storage areas for all of your produce. The temperature in your cooler will fluctuate throughout the day as doors are opened and closed. Temperatures in the front of your cooler will be warmer than the temperatures in the middle or back. I know your coolers are very small, but **some items need**

to be stored in certain areas *always*. Following are some examples and suggestions for future storage:

In the *front* of your cooler, you should store your cabbage, apples, melons, starfruit, citrus, cucumbers, onions, pears, peppers, plums, radishes and *RIPE* tomatoes. These items have a longer shelf life and can handle the fluctuating temperatures to give you the needed life to meet your weekly needs.

In the *middle* section of your cooler, you should store your items such as bunched broccoli (sprinkle with ice), whole head cauliflower, grapes, green onions (sprinkle with ice), kiwi fruit, mushrooms and parsley (also sprinkle parsley with ice to prolong shelf life).

The *back* of your cooler will be your coolest area. Store your most perishable items there. These items will be sprouts, berries, carrots, all pre-cut items such as carrot sticks, sweet potato sticks, celery sticks, salad mixes, coleslaw, head lettuce, leafy lettuces, ripe peaches and nectarines. All greens such as collards, kale and mustard can be sprinkled with ice to lengthen the life of the product as the slowly melting ice will replace any moisture loss in the product.

**Note:** There are *always* exceptions to the rules. As noted, you should store ripe tomatoes in the front of the cooler. In actuality, they should never be stored in a cooler, as the cooler will take all the taste out of the product. Tomatoes should be received in a firm condition with a pink to light red color. However, when they reach their ripeness and feel a little soft, they may need to go in the cooler to slow the ripening process until you are ready to use them. Potatoes need to be stored outside the cooler also. The ideal temperature to store potatoes is between 45 to 50 degrees. Potatoes stored below 40 degrees will convert the starches to sugar. This will result in the potato turning dark when fried. Also never store potatoes under direct light. This will result in the potato turning green and will have a bitter taste. New crop apples generally have a shelf life of up to or exceeding a month when stored under ideal conditions. With the shortage of cooler space, it may be an option to store them in the back room, as they will give you two weeks life easily. With controlled (CA) atmosphere apples, you may not want to risk it.

Cafeteria managers have decisions to make at each and every delivery. One good habit to have is always look at your delivery when it arrives. Items such as mangos, kiwi fruit, peaches and nectarines need to be examined for ripeness or lack thereof. If these items come in and are hard to the touch and will not yield to slight pressure, place them in the store room and inspect daily. Move them into the cooler when they reach the right stage of ripeness that will allow you to start serving them to your students. By placing them in the storage area, the ripening process will speed up considerably. **Make a special note to look at your bananas.** If they are slightly green and you need them to use soon, you need to leave the covers in place and wrap them up to hold all the ethylene gas and heat in the box to speed up the ripening process. If they are yellow and you are not going to use them for a day or two, take the lid off and peel back the plastic liner to let the gas escape and the heat out. This will slow the ripening process.

**Ordering** is a very important task that will help to make sure you always have the best possible produce on hand and will eliminate loss. Maintain an inventory control record to help show you exactly what you are using each week. Over a period of time, you will master each items usage. Make copies of the form handed out and post it on your cooler door weekly. This form will take only a couple of minutes each week to fill out and it will show you exactly what you used, and thus, what you need to order.

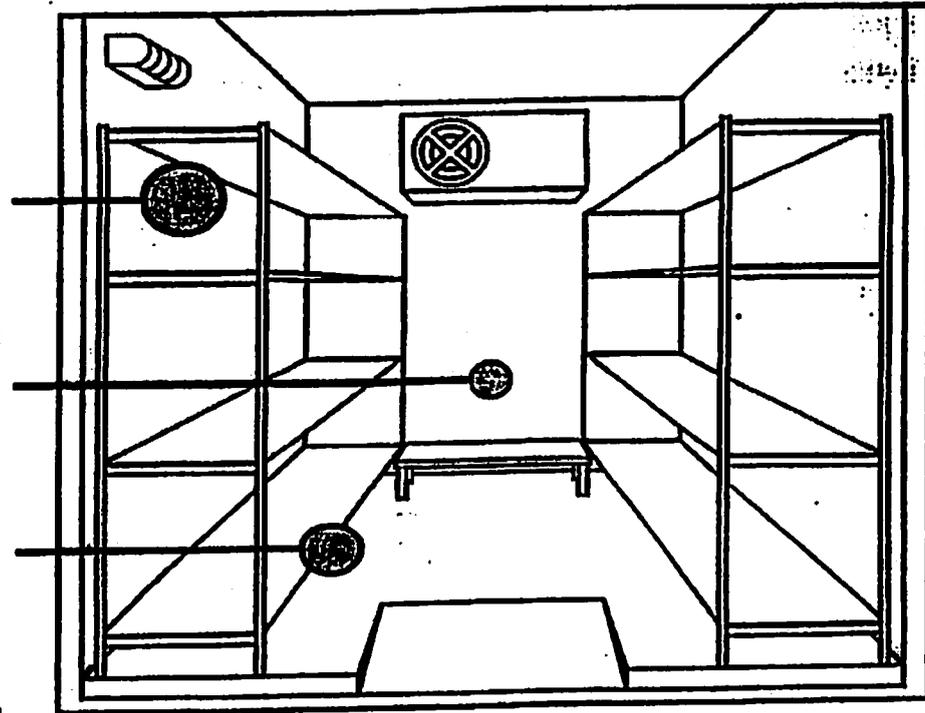
# FRESH FRUITS AND VEGETABLES STORAGE AREAS



**Front of Cooler:** cabbage, apples, melons, cukes citrus, peppers, plums, radishes, RIPE tomatoes, RIPE soft fruit, RIPE pears.

**Back of Cooler:** All precuts, sprouts, berries, all salad mixes, all lettuces, peeled potatoes.

**Middle of Cooler:** Broccoli crowns & bunches, green onions, parsley, whole head cauliflower, grapes, kiwi, mushrooms, and whole carrots.



## STORAGE TIPS FOR POTATOES

**Cool** - dark and well ventilated

**Ventilation** - Store on a pallet to enhance ventilation. This limits spoilage by allowing potatoes to breathe oxygen and give off carbon dioxide

**Temperature** - Between 45 and 50 F is ideal. 50+ will result in sprouting, increased flabbiness and faster decay. Potatoes below 40 will convert starches to sugar. This will cause potatoes to turn dark when fried.

**Light** - Too much light causes potatoes to turn green (also causes a bitter taste). It is recommended that the potato section be covered during off hours.

- Store RIPE peaches, nectarines, and pears in back of cooler.

- Sprinkle broccoli, green onions, leafy greens, leafy lettuces, corn in husk and parsley with ice for extra life.

- Store bananas outside cooler.

- Store tomatoes outside cooler until fully ripe.

INVENTORY CONTROL LIST FOR SCHOOLS							
			What you have in your cooler Monday a.m. before you start	What you will receive on this weeks order	Total of what you started with plus what you ordered	What you have left after lunch is served on Friday (Can post this number on 1st column for next week)	What you used for this School Week
ITEM	CODE	WGT	QUANTITY IN COOLER	+ CASES ORDERED	= TOTAL CASES	- CASES REMAINING	= TOTAL USED
APPLE GOLD DEL 138 SZ	14T84	40					
APPLE RED DEL 138 SZ	14T81	40					
BANANA #3 PETITE	14P45-3	40					
BROCCOLI FLORETS 3#	16P24-1	3					
BROCCOLI FLORETS 4/3#	16P24	12					
CABBAGE GREEN 25#	16P47-3	25					
CANTALOUPE 18 COUNT	14P02	35					
CARROT BABY 72/3 OZ	16B60-7	14					
CARROT STICKS 4/5#	16B60-2	20					
CAULIFLORETS 3#	16P25-1	3					
CAULIFLORETS 2/3#	16P25	12					
CELERY 24 SZ 1 STALK	16P06-3	1					
CELERY STICKS 4/5#	16B59	20					
COLESLAW MX 4/5#	16P51	20					
COLESLAW 5#	16P51-1	5					
CUKES SELECT 5#	16P09	5					
GRAPES RED SEEDLESS	14P36	18					
HONEYDEWS 6/8 CT	14P04	25					
LETT ICEBERG TRWH	16P32	35					
LETTUCE TRWH 6 CT	16P32-2	15					
LETTUCE SHREDDED 5#	16P34-1	5					
ONIONS YELLOW 5# BAG	16P36-3	5					
ONIONS YELLOW 25#	16P36-4	25					
ONIONS DICED 5#	16P13	5					
ORANGES 138 CT	14P10-2	35					
PARSLEY 1 DOZ	16P59-1	1					
PEPPER SWT GRN 5#	16P38-1	5					
POTATO BAKING 120 CT	16P17	50					
POTATO SWEET 100/110 CT	16P16	40					
PUMPKIN FALL DECOR KIT	16P21-2						
RADISH 1# BAG	16P41-2	1					
SALAD TOSSED 4/5#	16P29	20					
SALAD TOSSED 5#	16P29-1	5					
SALAD ROMAINE BLEND 5#	16P56-1	5					
STRAWBERRIES	14P14	8					
TANGELOS	14P15	35					
TANGERINES 120-180	14P16	35					
TOMATO CHERRY 6 PINTS	16P46-1	5					
TOMATOES RED LARGE 25#	16P18	25					
TOMATOES RED LARGE 10#	16P18-2	10					
TOMATOES GRAPE	16P18-5	9					
TOMATO ROMA	16B66	25					
WATERMELON EACH	16P19	15					



# Handling Tips for Everyday Use Of FRESH CUT Produce

**KEEP ALL PRODUCTS COLD** (under 40 degrees) until ready to use.

To store unused portions for later use:

**Salad Lettuce** – partially used bags can be kept for about 12 hours by pushing all the air out of the bag, twisting top of bag closed and stored cold. Air is what turns cut lettuce brown. Once lettuce is put into a bowl on the salad bar, that portion can not be kept for later use.

To rehydrate lettuce, you can toss either newly opened or “leftover” lettuce in *tepid* water – not cold. The lettuce will rehydrate as it chills. Recipe: ½ cup tepid water to 5# lettuce.

**Shred Lettuce** – can not be rehydrated – store unused portions same as salad lettuce.

**Carrot and Celery Sticks** – Store in clean containers of water. Change water daily. You may use these directly from the bag, or Store this way.

**Sliced Radishes** – Store in clean containers filled with water.

**Onions** – Keep in bag, or put into closed containers.

**Shredded Carrots** – Keep in bag, or put into closed containers.

**Broccoli and Cauliflower Florettes** – Store in their own bags, or in a covered container.

**Peppers** – Store in their own bags under refrigeration. This product may appear dry (a little white-ish) – that is good! A wet pepper indicates temperature abuse.

**Spinach** – Keep in re-sealable bag until used.

**Tomato Wedges** – Avoid temperature fluctuation. Remove 1 tub from cooler at a time, or however many tubs you will use within a

½ hour period.

**Sliced Tomatoes** – Remove from cooler only the amount needed to prep sandwiches. Temperature fluctuation will kill the shelf life of this product. There are approximately 80 slices per tray. If you have unused slices, wrap tray in plastic wrap and return to cooler. If they haven't been out of refrigeration too long, you might get an additional 12 – 24 hours out of them.

**PLEASE NOTE** – All fresh cut items are ready to use; directly from the bag. There is no need to rinse any product before use. They are safe and ready to go!

**KEEP IT COLD!  
HEAT KILLS!**

**NONE LIKE IT HOT!**

Probably right behind sanitation, temperature is the most important factor affecting pre-cut product. For every degree over 40° to which pre-cut produce is exposed, you lose one day of shelf life.

## COMMON QUESTIONS

### **Do we use chemical or preservatives?**

No! We wash all produce in a chlorinated water bath to kill bacteria that affect shelf life and health issues. **This is not residual chlorine on fresh cut produce.**

### **What's that smell when I open the lettuce bag?**

- a. It is not a preservative. It's the lettuce breathing in the bag. If product has been temperature abused (anything over 40 degrees) this odor will be stronger than usual.
- b. Open the bag & fluff it out. The odor will dissipate.
- c. To rehydrate lettuce: Put contents of bag into a bowl or lexan tub. Pour 1 cup of lukewarm water over it and toss well. Cover. You can then put into walk-in to chill or place directly onto salad bar. (Cold water shocks the lettuce, causing it to wilt sooner.)
- d. What's the shelf life of an open bag of lettuce? 24 hours – Push all air out of bag and twist tightly.

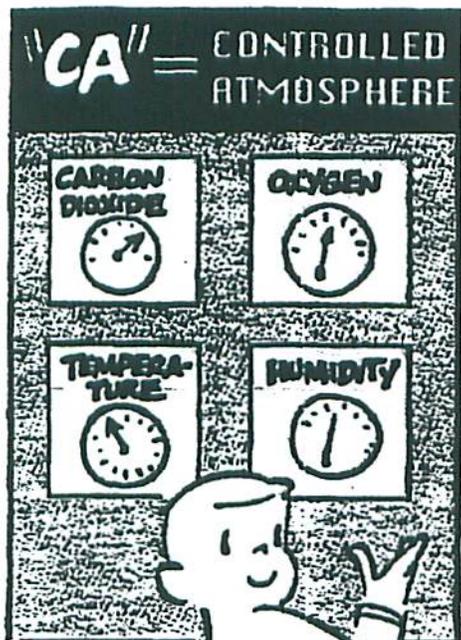
### **What is HACCP?**

HACCP is an internal monitoring program manufacturers use to identify crucial areas within their systems where potential food safety problems could occur. All aspects of manufacturing are considered and sanitation guidelines are applied to each step along the way.

*As producers of ready-to-eat food products, we have an obligation to use every step available to insure the sanitary handling of your produce items. HACCP is a food safety tool we use to monitor the procedures of our production work force.*



# CONTROLLED ATMOSPHERE (CA) STORAGE AND APPLES



Just as we do, apples take in oxygen from the air to keep them alive. Apples can be stored in cold storage units to extend their life or to keep them fresh for a longer period of time, but cold air only slows down the ripening process; it doesn't completely stop it. In order to keep the fruit from getting too ripe, we must lower the oxygen content in the air where the apples are stored.

We can do this in Controlled Atmosphere (CA) Storage. Air normally contains about 20% oxygen. In CA Storage the oxygen level is dropped to 1.5% and the temperature is kept between 32-38 degrees Fahrenheit. This process puts the apple to sleep! The apple gives off carbon dioxide that keeps it from ripening anymore. The humidity in CA Storage is kept at about 95% and this keeps the fruit from losing moisture and drying out.

Even after months of "sleeping" in CA Storage, the apples can come out as crisp and fresh as they were during harvest. CA Storage has become very important to the apple industry. It allows the growers to extend the life of their fruit so they can stretch out sales through the winter months.



Source: US Apple Association



## ***ONIONS***

### ***STORAGE TIPS***

- Store onions in a cool, dry, well ventilated area. Use high volume fans to keep onions dry.
- Store onions at 34°F to 45°F (1.1°C to 7° C) with 65% to 70% humidity.
- Place onions one foot away from walls and other pallets for better air movement.
- **DO NOT** store whole onions in plastic bags or use plastic pallet wrap as lack of air circulation reduces storage life.
- **DO NOT** store onions with potatoes or other produce that gives off moisture.
- Onion orders can be absorbed by apples, celery and pears. Onions can absorb odors produced by apples and pears.

**Why Fresh Fruit & Vegetables are so good for you**

NUTRITION	FUNCTION	VEGETABLE	FRUIT
Carotenoid	Converted into Vitamin A in the body. Stimulates the growth of new cells and keeps them healthy. Important as antioxidant or free radical fighters.	Orange and dark green coloured vegetables. eg. pumpkin, carrots, Kumara, spinach, parsley and broccoli.	Yellow and orange fruits- especially apricots, peaches, nectarines, paw paw mango.
Vitamin B group	Releases energy from food. Promotes a healthy nervous system.	Green Vegetables	Avocado
Vitamin C	Fights against infection and is used in tissue repair and general health. Helps the body absorb iron from food.	Excellent: Red, green peppers and parsley. Very good: Brussel sprouts, broccoli, cabbage, spinach, cauliflower & radishes. Good: Leeks, lettuce, spring onions, kumara, tomatoes, turnips, peas, beans, asparagus and potatoes.	All fruit - especially citrus fruit, kiwifruit, paw paw and mango
Vitamin K	For clotting of the blood.	Leafy green vegetables, turnips, broccoli, lettuce, cabbage, spinach, asparagus, watercress, peas and beans.	nil
Calcium	Essential for healthy teeth and bones.	Spinach, parsley, broccoli, celery, leeks spring onions, cabbage, turnips and carrots.	Rhubarb, blackcurrants, blackberries
Iron	An important part of red blood cells. Helps carry oxygen around the body. *Extremely important for brain function and learning.	Spinach, silverbeet, parsley, leeks carrots and potatoes.	Avocado
Potassium	Controls the working of muscles and nerves. Appears important in preventing high blood pressure. Essential component of every cell.	All vegetables.	All fruit - especially avocado, banana, blackcurrants
Fibre	Maintains a healthy digestive system. Decreases the risk of heart disease and	All vegetables.	All fruit.

**Table 8: Products that are ethylene producers or ethylene sensitive**

**Ethylene Producers:**

apples  
 apricots  
 avocados  
 bananas, ripening  
 cantaloupes  
 cherimoya  
 figs  
 guavas  
 honeydew melons  
 kiwifruit, ripe  
 mamey  
 mangoes  
 mangosteen  
 nectarines  
 papayas  
 passion fruit  
 peaches  
 pears  
 persimmons  
 plantains  
 plums  
 prunes  
 quinces  
 rambutan  
 tomatoes

**Ethylene Sensitive:**

bananas, unripe  
 belgian endive  
 broccoli  
 brussel sprouts  
 cabbage  
 carrots  
 cauliflower  
 chard  
 cucumbers  
 cut flowers  
 eggplant  
 florist greens  
 green beans  
 kiwi fruit, unripe  
 leafy greens  
 lettuce  
 okra  
 parsley  
 peas  
 peppers  
 potted plants  
 spinach  
 squash  
 sweet potatoes  
 watercress  
 watermelon  
 yams

**Odor Sensitivity:** Never transport or store odorous products with products that will absorb the odors. Table 9 lists products that produce odors with products that can absorb them.

**Table 9: Products which produce or absorb odors**

**Odor produced by**

**Will be absorbed by:**

apples	cabbage, carrots, celery, figs, onions, meat, eggs, dairy products
avocados	pineapples
carrots	celery
citrus fruit	meat, eggs, dairy products
ginger root	eggplant
grapes fumigated w/sulfur dioxide	other fruits and vegetables
leeks	figs, grapes
onions, dry	apples, celery, pears
onions, green	corn, figs, grapes, mushrooms, rhubarb
pears	cabbage, carrots, celery, onions, potatoes
potatoes	apples, pears
peppers, green	pineapples
"strongly scented vegetables"	citrus fruit

**Chill Sensitivity**

Most tropical products are subject to chilling injury when transported or stored at lower than recommended temperatures. This damage often becomes apparent after the products warm up. Products injured may show pitting, discoloration, water soaked areas, decay and failure to ripen. The following Table 5 lists tropical and other products that sensitive to this injury.

# FRESH PRODUCE STORAGE and HANDLING GUIDE

PRODUCE	OPTIMAL STORAGE TEMPERATURE DEGREES F/C	RELATIVE HUMIDITY %	OPTIMAL HUMIDITY %	WATER SPRINKLE	SENSITIVE TO ETHYLENE
ASPARAGUS	45-50/7-10	90-95	85-95	No	Yes
BANANA	38-45/3-7	90-95	85-95		Yes
BROCCOLI	38-42/3-6	90-95	90-95	No	No
CARROT	36-38/2-3	90-95	90-95	No	Yes
CORN	45-50/7-10	90-95	90-95	No	Yes
CUCUMBER	40-45/4-7	90-95	90-95	No	Yes
EGGPLANT	45-50/7-10	90-95	85-95	No	Yes
KALE	40-45/4-7	90-95	90-95	No	No
KIWI	40-44/4-7	90-95	90-95	No	No
LAVENDER	45-50/7-10	90-95	90-95	No	Yes
LETTUCE	45-50/7-10	90-95	90-95	No	No
MELON	41-50/5-10	90-95	90-95	No	No
POTATO	45-50/7-10	90-95	85-90	No	Yes
SPINACH	45-50/7-10	90-95	90-95	No	Yes
SWISS CHARD	40-44/4-7	90-95	90-95	No	No

# FRESH PRODUCE STORAGE and HANDLING GUIDE

COMMODITY	OPTIMAL STORAGE TEMPERATURE DEGREES F/C	RELATIVE HUMIDITY %	OPTIMAL HUMIDITY %	WATER SPRINKLE	ETHYLENE SENSITIVE	SENSITIVE TO ETHYLENE	REMARKS
APPLES	32-35/0-2		90-95	No	Yes	Yes	Some varieties require a special low humidity and low ethylene
APRICOTS	32-35/0-2		90-95	No	Yes	Yes	
AVOCADOS	32-35/0-2		90-95	OK	No	No	
BANANAS	34-36/1-2		90-95	OK	No	Yes	
BROCCOLI	32-35/0-2		90-95	No	Yes	No	
BUTTER BEANS	32-35/0-2		90-95	OK	No	Yes	
CAULIFLOWERS	32-35/0-2		90-95	OK	No	Yes	
CARROTS	32-35/0-2		90-95	OK	No	Yes	
CASHEWS	32-35/0-2		90-95	OK	No	Yes	Preferential storage in a dry atmosphere
CELERY							
CELERY STALKS	32-35/0-2		90-95	OK	OK	Yes	
CHERRIES	32-35/0-2		90-95	OK	No	Yes	Preferential storage in a dry atmosphere
CUCUMBERS							
CUCUMBERS	32-35/0-2		90-95	No	No	Yes	
CUCUMBERS	32-35/0-2		90-95	No	No	No	
CUCUMBERS	32-35/0-2		90-95	OK	OK	No	
EGGS							
EGGS	32-35/0-2		90-95	OK	OK	No	
EGGS							
EGGS	32-35/0-2		90-95	No	No	No	
EGGS	32-35/0-2		65-75	No	No	No	

# FRESH PRODUCE STORAGE and HANDLING GUIDE

	OPTIMAL STORAGE TEMPERATURE DEGREES F/C		OPTIMAL HUMIDITY %		WATER SPRINKLE		SENSITIVE TO ETHYLENE	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		90-95	OK	OK		Yes	
	52-59/11-15		90-95	OK	OK		Yes	
	32-35/0-2		90-95	No	No		No	
	32-35/0-2		90-95	No	No		No	
	32-35/0-2		90-95	No	No		No	
	32-35/0-2		90-95	OK	OK		No	
	32-35/0-2		90-95	OK			No	
	32-35/0-2		90-95	OK	OK		Yes	
	32-35/0-2		90-95	No	No		No	
	32-35/0-2		90-95	OK	OK		Yes	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		65-75	No	No		No	
	32-35/0-2		90-95	No	No		No	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		90-95	No	No		Yes	
	32-35/0-2		90-95	No	No		Yes	
	32-36/0-2		90-95	No	No		No	

## FRESH PRODUCE STORAGE and HANDLING GUIDE

	OPTIMAL STORAGE TEMPERATURE DEGREES F/C		OPTIMAL HUMIDITY %		WATER SPRINKLE		SENSITIVE TO ETHYLENE
	32-36/0-2		90-95	No	No		Yes
	32-35/0-2		90-95	No	No		No
	32-35/0-2		90-95	No	No		Yes
	32-35/0-2		90-95	OK	OK		No
	32-35/0-2		90-95	No	No		No
	32-36/0-2		90-95	Ok for bulk product	Ok for bulk product		Yes
	32-35/0-2		90-95	No	No		No
	32-35/0-2		90-95	No	No		Yes
	32-35/0-2		90-95	No	No		No
	32-35/0-2		90-95	OK	OK		Yes

# FRESH PRODUCE STORAGE and HANDLING GUIDE

CULTURE	OPTIMAL STORAGE TEMPERATURE DEGREES F/C	CHILL POINT	OPTIMAL HUMIDITY %	WATER SPRINKLE	TOP ICING	SENSITIVE TO ETHYLENE	REMARKS
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**Optimal Storage Temperature:**

The ranges given are the optimal temperatures at which fruits and vegetables should be stored. Temperature ranges are given in both Fahrenheit and Celsius degrees.

**Chill Point:**

Many fruits and vegetables are susceptible to damage if stored or displayed below their chill points (34-36 F./1-13 C.) To avoid chill damage, do not store fruits and vegetables below their designated chill point.

**Optimal Humidity:**

It is important to store and display fruits and vegetables within their optimal humidity ranges to ensure product freshness and to prevent wilting or deterioration. Most items stored below 45 F (7C.) require 90-98% humidity.

**Top Ice:**

Top icing is designed to enhance the freshness and shelf life of certain commodities. Items designated with OK will benefit from top icing; however, it is not critical during short storage periods. Items designated with NO should never be top iced.

**Water Sprinkle:**

Water sprinkling is designed to enhance the freshness and shelf life of certain commodities. Items designated with OK will benefit from sprinkling; however, it is not critical during short storage periods. Items designated with NO should never be sprinkled.

**Produces Ethylene:**

Many fruits give off ethylene, a natural, colorless, and odorless gas that promotes ripening. Because different fruits give off varying amounts of ethylene, they have been designated very low, low, medium, or high producers. Commodities that produce medium to high amounts of ethylene should be stored away from items that are sensitive to ethylene and may be damaged as a result of exposure to the gas.

**Sensitive to Ethylene:**

Some fruits and vegetables are sensitive to ethylene. Exposure to ethylene may cause accelerated ripening, discoloration, and in some cases, product deterioration. Commodities that are sensitive to ethylene should be stored away from commodities that produce medium to high amounts of ethylene.