THE UNIVERSITY OF GEORGIA
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Postharvest Handling and Transportation of Fruits and Vegetables

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Georgia is one of the main fruit and vegetable producing states in the eastern United States, with shipments going throughout the eastern United States and Canada. Growers and handlers must be aware of issues concerning the shelf life and shipping requirements of produce to ensure quality and minimize loss.

Temperature, humidity and ethylene production affect internal quality, the tendency of fruit to rot, and dehydration. Some products will generate ethylene, potentially damaging other products in the same load. So load compatibility is an important consideration when shipping produce. Many of the products listed in Table 2 (page 3) are not grown in Georgia but may be part of a load if the trucking company handles shipments from different areas. In addition, Groups 1 and 2 have the same environmental conditions but are listed separately because they have storage incompatibility concerning ethylene.

Many commodities may be handled differently than suggested in this publication. For example, onions may be handled differently because of onion type or level of maturity. Shallots may be top iced, causing higher relative humidity, then listed in Group 3. For a more complete description of storage conditions for a particular commodity, consult the USDA publication *The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks.*

Sources

Barton, K. (ed.) 2003. *The Packer Source Book 2003*. Lenexa, Kansas: Vance Publishing Corp.

Gross, K.C., C.Y. Wang, and M. Saltveit (eds.) 2002. *The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks.* USDA Handbook No. 66. (draft copy).

McGregor, B.M. 1989. *Tropical Productions Transport Handbook.* USDA Handbook No. 668.

Mitchell, F.G., R. Guillou, and R.A. Parsons. 1972. *Commercial Cooling of Fruits and Vegetables.* University of California. Man. 43.

Table 1. Postharvest shelf life, optimum temperature, humidity and top ice requirements.

Item	Shelf Life (days)	Optimum Temperature (degrees F)	Relative Humidity (%)	Top or Package Ice
Apples	90-240	32-34	90-95	No
Artichokes	10-16	33-38	95-100	Yes
Beans, Snap	7-14	40-45	95	No
Beans, Lima	7-14	37-41	95	No
Beans, Pole	7-14	37-41	95	No
Blackberries	7-14	32	90-95	No
Blueberries	10-21	32	90-95	No
Broccoli	10-14	32	95-100	Yes
Cabbage	90-180	32	98-100	Yes
Cantaloupe	10-14	35-40	90	No

Table 1 (continued)

Item	Shelf Life (days)	Optimum Temperature (degrees F)	Relative Humidity (%)	Top or Package Ice
Carrots, topped	28-180	32	98-100	Yes
Cauliflower	14-21	32	90-98	No
Chinese Cabbage	60-90	32	95-100	Yes
Corn, Sweet	4-10	34-38	85-90	Yes
Cucumbers	10-14	45-50	90-95	No
Cucumbers, seedless	10-14	50-55	85-90	No
Daikon	120	32-34	95-100	Yes
Eggplant	10-14	46-54	90-95	No
Elephant Garlic	90-210	32-34	65-75	No
Endive/Escarole	14-21	32	90-95	Yes
Figs	7-10	32	90-95	No
Garlic	90-210	32-34	65-75	No
Grapes, Bunch	56-180	32	95	No
Grapes, Muscadine	7-21	32	95	No
Honeydew*	14-21	45-50	90-95	No
Kale	10-14	34-36	95-100	Yes
Kiwifruit	90-150	32	90-95	No
Leeks	60-90	32	95-100	Yes
Lettuce	14-21	34-36	98-100	Yes
Melons, mixed	14-21	50	90-95	No
Mushrooms	5-7	34-38	85-90	No
Okra	7-10	43-45	85-95	No
Onions, Dry Bulb	30-180	32	65-70	No
Onions, Green	7-10	32	95-100	Yes
Peaches	14-28	31-32	90-95	No
Pears, Asian	150-180	34	90-95	No
Pears, European	60-90	32	90-95	No
Peas, English	7-10	32-35	85-95	Yes
Peppers, Bell	14-21	45-50	85-90	No
Peppers, Hot	14-21	38-44	60-70	No
Persimmon	35-84	48-50	90-95	No
Plums	14-28	32	90-95	No
Potatoes, Early	10-14	45-50	90	No
Potatoes, Late	56-140	45-50	90	No
Pumpkins	84-160	50-60	50-75	No
Quince	60-90	31-32	90	No
Radicchio	14-21	32-34	95-100	No
Radish	10-21	32	95-100	Yes
Romaine	14-21	32	95	Yes

Table 1 (continued)

Item	Shelf Life (days)	Optimum Temperature (degrees F)	Relative Humidity (%)	Top or Package Ice
Rutabagas	120-180	32	98-100	No
Satsumas	56-84	37-39	85-90	No
Shallots	180-240	32	95-100	Yes
Spinach	10-14	32	95-100	No
Squash, Summer	7-14	41-50	95	No
Squash, Winter	30-180	50-55	70-75	No
Strawberries	7-14	32	95	No
Sweetpotato	120-210	55-60	85-90	No
Tomato, mature-green	21-28	62-68	85-88	No
Tomato, pink	4-7	62-68	85-88	No
Tomatillos	21	55-60	85-90	No
Turnip greens	10-14	34-36	95-100	Yes
Turnip roots	120	32	90-95	No
Watermelon	14-21	50-60	90	No

*Treated with ethylene.

Table 2. Produce load compatibility.

Group 1. Temperature 32-36 degrees F, Relative Humidity 90-95%*			
Apples	Figs[b]	Mushrooms	Pomegranates
Apricots	Grapes[c]	Nectarines	Prunes
Asian Pears	Horseradish	Oranges[d]	Quinces
Beets, topped	Kohlrabi	Parsnips	Radishes
Berries[a]	Leeks	Peaches	Rutabagas
Cashew apples	Longans	Pears	Turnips
Cherries	Loquats	Persimmons	
Coconuts	Lychees	Plums	

Group 2. Temperature 32-36 degrees F, Relative Humidity 90-95%			
Amaranth	Cauliflower	Jerusalem artichoke	Radishes
Anise	Celeriac	Kiwifruit	Rhubarb
Artichokes	Celery	Kohlrabi	Rutabagas
Bean sprouts	Cherries	Leeks[e]	Scorzonera
Beets	Corn	Lettuce	Salsify
Belgian endive	Daikon	Lo bok	Snow peas
Berries[a]	Endive	Mushrooms	Spinach
Bok choy	Escarole	Parsley	Turnips
Broccoli	Grapes[c]	Parsnips	Water chestnuts
Brussel sprouts	Green onions[f]	Peas	Watercress
Cabbage	Greens	Pomegranates	
Carrots	Horseradish	Radicchio	

Table 2 (continued)

Group 3. Temperature 32-36 degrees F, Relative Humidity 65-75%[g]			
Garlic	Onions	Shallots	
Group 4. Temperature 40 degrees F, Relative Humidity 90-95%			
Cactus pears	Clementines	Lychees	Tamarillos
Caimito	Cranberries	Mandarins[d]	Tangelos[d]
Cantaloupe	Kumquats	Oranges[d]	Tangerines[d]
Cassavas	Lemons	Pepino melons	Uniq fruit[d]
Group 5. Temperature 50 degrees F, Relative Humidity 90-95%[h]			
Beans	Eggplant	Okra	Squash
Calamondin	Haricot vert	Peppers	Tamarindos
Chayotes	Kiwanos	Potatoes	Taro root
Cucumbers	Malangas	Pummelos	
Group 6. Temperature 55-60 degrees F, Relative Humidity 85-90%[h]			
Atemoyas	Cherimoyas	Lemons[d]	Potatoes, new
Avocados	Coconuts	Limes[d]	Pumpkins
Babaco	Feijoas	Mamey sapote	Rambutan
Bananas	Ginger root	Mangoes	Santol
Bitter melons	Granadillas	Mongosteen	Soursop
Black sapotes	Grapefruit	Melons[i]	Sugar apples
Boniato	Guavas	Papayas	Tomatillos
Breadfruit	Jaboticabas	Passion fruit	Tomatoes, ripe
Canistel	Jackfruit	Pineapple	Winter squash
Carambolas	Langsat	Plantains	
Group 7. Temperature 65-70 degrees F, Relative Humidity 85-90%			
Jicama	Sweetpotato[j]		Watermelon[j]
Pears (for ripening)	Tomatoes, mature-green		White sapote

* Items in this group can produce high levels of ethylene that can be detrimental to items in Group 2.
[a] Except cranberries.
[b] Not with apples.
[c] No sulfur dioxide.
[d] Citrus treated with biphenyl may develop odors that other produce can absorb.
[e] Not with figs or grapes.
[f] Not with grapes, figs, mushrooms, rhubarb or corn.
[g] High moisture will damage these items.
[h] Sensitive to chilling injury.
[i] Except cantaloupes.
[j] Not with pears or tomatoes.

Learning for Life