



POSTHARVEST HANDLING AND COOLING OF FRESH FRUITS, VEGETABLES AND FLOWERS FOR SMALL FARMS

Part IV: Mixed Loads

L. G. Wilson, Extension Postharvest Horticulturist, NCSU
M. D. Boyette, Extension Biological & Agricultural Engineer, NCSU
E. A. Estes, Extension Agricultural & Resource Economist, NCSU

At times, it is necessary to transport or store different commodities together. In such mixed loads it is very important to combine only those commodities that are compatible with respect to their requirements for:

- Temperature
- Relative humidity
- Atmosphere; oxygen and carbon dioxide
- Protection from odors
- Protection from physiologically active gases, such as ethylene

Odors

There is a **cross-transfer of odors when commodities are stored together**, and such a transfer between certain commodities is not desirable. Combinations that should be avoided in storage rooms are apples or pears with celery, cabbage, carrots, potatoes, or onions; celery with onions or carrots; and citrus with any of the strongly scented vegetables. Odors from apples and citrus are readily absorbed by meat, eggs, and dairy products. Pears and apples acquire an unpleasant, earthy taste and odor when stored with potatoes. Green peppers will taint pineapples. It is recommended that onions, nuts, citrus, and potatoes each be stored separately.

Ethylene

Many commodities produce ethylene as a natural product and this gas can have

undesirable effects, such as causing abscission of leaves and flower petals, yellowing, russetting, and senescence. Thus, commodities sensitive to ethylene should not be mixed with those producing the gas.

Commodities that are affected by ethylene include cabbage, carrots, lettuce, various greens, watermelons, kiwifruit, nursery stocks, and some kinds of flowers and florist greens.

Commodities that are known to produce considerable ethylene are apples, avocados, bananas, pears, peaches, plums, cantaloupes, honey dew melons, and tomatoes. *Penicillium digitatum* (green mold of citrus) and probably other decay organisms also produce ethylene, so decayed produce should be removed promptly from storage rooms.

Ethylene also induces ripening of many fruits and vegetables. This ripening effect generally is negligible at 32°F, but may cause harm at higher temperatures. For this reason, products such as cucumbers, peppers, and acorn squash, which need to be stored at a minimum temperature of 45° to 50°F and in which retention of green color is desired, should not be stored with apples, pears, tomatoes, or other ethylene-producing products.

References: See Part V.

Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Employment and program opportunities are offered to all people regardless of race, color, national origin, sex, age, or disability. North Carolina State University, North Carolina A&T State University, U.S. Department of Agriculture, and local governments cooperating.

COMPATIBILITY OF SELECTED FRESH PERISHABLE COMMODITIES

Commodity	Temp. °F	% RH	Ethylene *	Odor #	Chilling @	ShelfLife
Apples	32-34	90-95	P	+	-	90-240 days
Asparagus	32-35	95-100	-	-	-	10-21 days
Beans, snap	40-45	95	-	-	+	7-10 days
Blueberries	32	90-95	-	-	-	10-18 days
Brambles	31-32	90-95	-	-	-	3-5 days
Broccoli	32	95-100	S	-	-	10-14 days
Cabbage	32	98-100	S	+	-	90-180 days
Cantaloupes	38-40	90	P	-	+	10-14 days
Carrots	32	98-100	S	+	-	28-180 days
Cauliflower	32	90-98	S	-	-	2-3 weeks
Cucumbers	45-50	90-95	S	-	+	10-14 days
Eggplant	45-54	90-95	S	-	+	10-14 days
Onions	32	65-70	-	+	-	30-180 days
Green Onions	32	95-100	-	+	-	7-10 days
Herbs	37-38	95-100	-	-	-	5-7 days
Leafy greens	32	95-100	-	-	-	1-2 weeks
Okra	45-50	90-95	S	-	+	7-10 days
Peppers	45-50	85-90	S	+	+	8-10 days
Peaches	32	90-95	P	-	-	14-21 days
Peas	32	95-98	S	-	-	7-10 days
Potatoes	45-50	90	-	+	+	56-140 days
Sprouts	34-36	85-90	-	-	-	5-10 days
Squash, soft-shell	45-50	90-95	S	-	-	1-2 weeks
Strawberries	32	90-95	-	-	-	5-7 days
Sweet corn	32	95-98	-	+	-	5-8 days
Sweetpotatoes	55-60	85-90	S	-	+	120-210 days
Tomatoes; Green	60-70	85-88	S	-	+	21-28 days
Ripe	46-50	85-88	S	-	+	7-14 days
Watermelons	50-60	90	S	-	+	14-21 days

* Ethylene; P = Produces, or S = Sensitive to

Odor; + = produces or is sensitive to; - = generally not a problem

@ Non-freezing temperature injury (described in Part I)