



Cooling and Storage Requirements for Vegetables and Selected Fruits

Commodity	Respiration Rate ¹	Suitable Cooling Method(s) ²	Optimum Temp. °F	Freezing ³ Temp °F	Optimum Humidity %	Normal Storage Life
Apples	L	R ,F,H	30-40	29	90-95	1-12 months
Asparagus	EH	H ,I	36	31	95-100	2-3 weeks
Basil	H	R	50	-	95 – 100	10 – 14 days
Beans, snap	H	R ,F, H	40-45	31	95	7-10 days
Beans, butter	H	R ,F, H	37-41	31	95	5-7 days
Beets, topped	M	R	32	30	98-100	4-6 months
Blueberries	M	R ,F	32	30	90-95	2 weeks
Brambles	M	R ,F	32	30	90-95	3-5 days
Broccoli	EH	I	32	31	95-100	2 weeks
Brussels Sprouts	H	R	32	30	95-100	3-5 weeks
Cabbage	M	R ,F	32	30	98-100	1-6 months
Cantaloupes	M	R ,H,I	32-40	30	95	2 weeks
Carrots, topped	M	R	32	30	98-100	4-6 months
Corn, Sweet	EH	H ,I	32	31	95-98	5-8 days
Cucumbers	M	R ,F,H	45-50	31	95	2 weeks
Eggplant	M	R ,F	45-54	31	90-95	1 week
Green onions	H	H ,I	32	30	95-100	3-4 weeks
Herbs (not basil)	H	R	37-38 ⁴	31	95-100	5-7 days
Leafy greens ⁵	H	H ,I ⁶	32	30	95-100	1-2 weeks
Peas	EH	F, H	32	31	95-98	1-2 weeks
Peas, field	EH	F, H	40-41	30	95	6-8 days
Peppers	M	R ,F	45-50	31	90-95	2-3 weeks
Potatoes, New	M	R	38 – 40	31	95	4-7 days
Potatoes, Mature	L	R ,F	38-40	31	90-95	5-8 months
Squash, Summer	M	R ,F	45-50	31	95	1-2 weeks
Squash, Winter	H	R	50-55	31	50-75	2-3 months
Strawberries	H	R ,F	32	31	90-95	5-7 days
Tomatoes, pink	M	R ,F	46-50	31	90-95	1 week
Turnips	M	R	32	30	95	4-5 months
Watermelons	L	R	50-60	31	90	2-3 weeks

¹ L = low, M = medium, H = high, EH = Extra-high. Commodities with higher respiration rates require more rapid cooling.

² * R = room cooling; F = forced air cooling; H = hydro-cooling; I = icing. Bolded method is recommended for small farm operations. When using hydro-cooling, a wash-water sanitizer is recommended. For hydro-cooling of fruits, the water must be no more than 10° F colder than the internal temperature of the commodity.

³ CAUTION: chilling injury may occur in some commodities at 10 to 20 °F above freezing.

⁴ Optimum for most herbs; basil 48 to 50 °F.

⁵ Lettuce, kale, collards, Swiss chard, and similar crops.

⁶ Icing is not suitable for lettuce, salad greens



Temperature injuries: Temperature is the most significant environmental factor that influences the deterioration rate of harvested commodities. Fresh products exposed to extremes of heat or cold may sustain serious physiological damage, leading to rapid deterioration. Exposure to alternating cold and warm temperatures may result in moisture accumulation on the surface of commodities (sweating), which may enhance decay development. Commodities exposed to direct sunlight or excessively high temperatures can be damaged.

Symptoms of heat injury: These symptoms include bleaching, surface burning or scalding, uneven ripening, excessive softening, and desiccation (water loss). For short-term storage, higher-than-recommended temperatures may be satisfactory for some commodities.

Chilling injury occurs at temperatures above freezing in some commodities (especially those of tropical origin), including cucumbers, eggplant, okra, pumpkins and squashes, potatoes for processing, sweet potatoes, and mature-green tomatoes. **Adhere strictly to recommended temperatures for these products.** Some chill-susceptible products can sometimes be held briefly at lower temperatures (non-freezing) without injury. However, keep in mind that chilling injuries are accumulative (the product of all the time a commodity is exposed to chill-inducing temperatures).

Symptoms of chilling injury: These symptoms include pitting, surface decay (snap beans, cucumbers), internal browning (apples, sweet potatoes), surface scald (eggplants), objectionable flavor (watermelons), waters-oaking (ripe tomatoes), poor color when ripe (mature-green tomatoes), sweetening (potatoes), and hardness when cooked (sweet potatoes).

Additional Resources for Post-Harvest Handling Information

Knott's Handbook for Vegetable Growers, Donald Maynard and George Hochmuth, 2006. Also available online as a PDF at extension.missouri.edu/sare/documents/knottshandbook2012.pdf.

USDA Handbook 66 – The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks. Updated version available online at www.ba.ars.usda.gov/hb66/contents.html.

