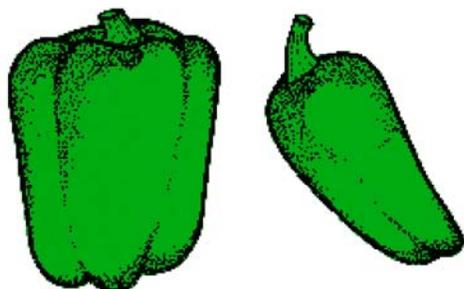


Postharvest Cooling and Handling of Peppers



Freshness Facts

Preferred cooling method: ... Forced air or room cooling
Optimum temperature: 45 to 50 F
Freezing temperature: 31 F
 (Significant chill injury occurs below 40 F)
Optimum humidity: 90 to 95%
Storage life: 2 to 3 weeks

Bell peppers and various specialty peppers are increasingly important summertime commercial vegetable crops in North Carolina. Although the state's growers supply only about 5 percent of the total annual U.S. production, during the month of July they produce one-third of the domestic supply.

Three-quarters of the North Carolina crop is shipped in July during extremely hot weather. Under these conditions, proper cooling and handling of the peppers before they are transported is essential to the delivery of a quality product. Mishandling injuries are cumulative and cannot be undone. Careful attention to postharvest handling can ensure that quality is maintained and that buyers will be satisfied with the product.

This publication has been prepared to acquaint pepper growers, shippers, and processors with energy-efficient handling and cooling methods.

Harvesting and Handling

Almost all peppers grown in North Carolina are harvested by hand into pails that are then emptied into bulk bins for transport to the packing shed. Considerable mechanical damage can occur during picking and handling if care is not taken to minimize scuffing and impact. Picker productivity should not be encouraged at the expense of pepper quality.

Peppers are considerably more susceptible to water loss, sun scald, and heat damage after they have been harvested than before. These problems are likely to occur if the bulk bins are allowed to sit for

more than an hour in direct sunlight. Harvested peppers should be placed in the shade immediately after harvest and cooled as soon as possible.

Some North Carolina growers are beginning to experiment with field packing to save money and to reduce postharvest losses. Field packing limits the amount that the peppers are handled and therefore reduces mechanical damage. It may also significantly reduce packing costs. However, some changes in cultural practices may be necessary. Field packing requires greater training and supervision of pickers to ensure that the peppers they pack are of consistently high quality. Field packing will work only if cooling is immediately available either in the field by means of portable refrigeration units or at a nearby cooling facility. Do not rely on refrigerated transport trailers to do all the cooling. They do not have adequate cooling capacity to remove field heat quickly.

Most peppers grown in North Carolina are picked in the green immature stage. Their young, growing tissue has a relatively high respiration rate and is very susceptible to damage by diseases such as alternaria stem rot and botrytis. When these diseases occur to any significant extent it almost always indicates mis-handling. They often result from physical damage combined with poor temperature management.

Although most peppers grown in North Carolina are not waxed, a light waxing can increase storage life and reduce damage by scuffing and abrasion. The use of perforated film carton liners or plastic bags also increases storage life somewhat, but this practice is not recommended because it inhibits proper cooling and can encourage disease.

Only first-quality peppers should be packed. They should be selected for uniform maturity, color, shape, and size and for freedom from defects. Any pepper showing signs of sunscald, mechanical or insect damage, or disease should be discarded.

Most peppers in North Carolina are packed in 1 1/9-bushel corrugated cartons that hold 28 to 30 pounds of peppers. Some are packed in 1 1/4-bushel cartons holding 35 pounds. Jalapeno, yellow wax, cayenne, pimiento, and all other types of peppers should receive the same treatment as bell peppers.

Cooling and Storage

The preferred temperature range for peppers is from 45 to 50 F. Since pepper harvesting in North Carolina normally occurs during the hottest months of the year, it is not unusual for the pulp temperature of harvested peppers to be more than 90oF. If they are allowed to remain at high temperatures for more than 1 or 2 hours, they will begin to show signs of shrinkage, softening, and eventually disease infestation. In addition, temperatures greater than 70oF greatly accelerate ripening and color changes.

Peppers are also sensitive to chill injury. Cooling them to temperatures below 40oF can result in softening, pitting, and predisposition to decay. Overcooling is just as serious a problem as undercooling.

Under optimum storage conditions--low temperature (40 to 45 F) and high relative humidity (90 to 95 percent)--peppers may be stored for as long as three weeks with little loss of quality, although there is seldom any reason to hold them that long. Frequent inspection and the addition of a suitable fungicide to the wash water are necessary to prevent disease infestation. For fungicide recommendations, see

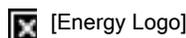
your county Agricultural Extension Service agent or refer to the latest edition of the *North Carolina Agricultural Chemicals Manual*. Controlled atmospheres low in oxygen and high in carbon dioxide have been shown to retard color change due to ripening and to help maintain quality during storage and transit.

Peppers are sensitive to the natural ripening hormone ethylene, a colorless and odorless gas produced as a natural by-product of ripening by some fruits and vegetables. The presence of even minute quantities can hasten ripening. The combination of high temperatures and ethylene can increase the ripening rate twentyfold or more. Thus, ethylene-producing crops such as apples, pears, and tomatoes should never be stored or shipped with peppers.

Acceptable Cooling Methods

Room cooling is the method most often used to cool peppers in North Carolina. However, this process is slow because it relies on natural convection and radiation to remove heat. It may take more than 12 hours to cool cartons of peppers sufficiently in a cooling room.

Forced-air cooling is the preferred method of cooling palletized produce, including peppers, and is being used increasingly in North Carolina. This cooling method ensures more uniform cooling and is four to five times faster than room cooling. Forced-air cooling equipment can be added to an existing room cooling facility relatively quickly and inexpensively. For more information on this subject, refer to Agricultural Extension Service publication AG-414-3, *Maintaining the Quality of North Carolina Fresh Produce: Forced-Air Cooling*.



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