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Some Chilling Facts
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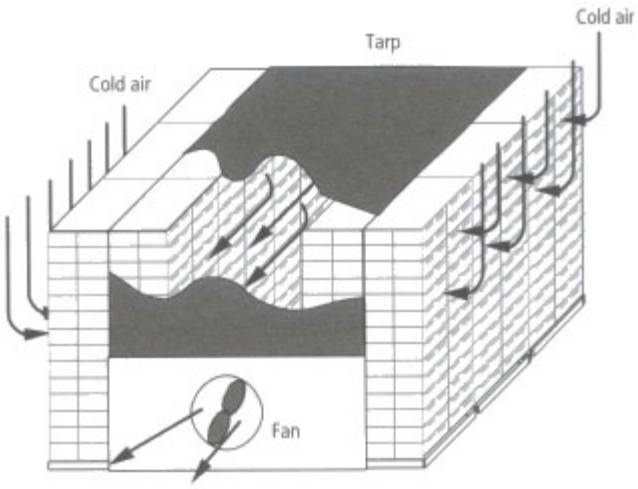
Chilling is critical to the quality and postharvest life of many commodities. Whether one is involved in the harvest, handling and transport, or as a consumer, getting the commodity chilled quickly and keeping it cool will result in greater returns and satisfaction. While cooling of commodities is a broad and important topic that could be discussed in an entire publication (such as publication 21567, *Commercial Cooling of Fruits, vegetables, and flowers, by Thompson et al., Univ. California*), only some brief highlights and a recent research finding are touched on here.
Removal of field heat and maintaining optimal holding temperatures slows the respiration, water loss, and breakdown of commodities. Field heat removal is generally accomplished with some form of cold air refrigeration or by hydrocooling. With either method the process is enhanced by movement of the cold medium (water or air) past the surface of the commodity, i.e., increased convection. Harvested commodities are commonly placed in temporary containers or final packaging and put into refrigerated storages. Cooling can be enhanced, whether a small or large operation is involved, by creating a 'tunnel' using the stacked packages, some tarps, and a fan to pull the cold air through the packaging and past the commodity (see figure). A couple key points to the success of this method are that the packaging must have openings to pull the air through and other openings, such as pallet openings, should be blocked so the majority of the cool air is forced over the commodity. This is a very simple and cost effective means to improve cooling of commodities, whether the operation is a small farm market or a large handler of product.
In all chilling cases, it is important to sample air or water and commodity temperatures and to do so with **calibrated** temperature measuring devices to be sure you are accomplishing your cooling goals and/or avoiding chilling injury to the produce. Running cooling coils too cold in forced air refrigeration systems can result in frost build-up and inefficient operation; can potentially cause chilling injury to the commodity located near the air exit of the evaporator; and can result in high moisture loss from the product.

Cherry cooling….
Hydrocooling is accomplished by showering chilled water over the commodity or by means of running the commodity through the chilled water, again with attention needed to ensure even and good commodity-to-cooling-medium contact throughout. The removal of field heat from tart cherries is accomplished by means of a form of hydrocooling where cold well water is passed through the cherries while in a tank. Growers and processors are looking at mechanically chilling water below well water temperatures to enhance cherry firmness and pitting performance and potentially reduce water inputs. A study in 2004 by the Department of Biosystems and Agricultural Engineering at MSU monitored temperatures at 12 locations within several tanks of cherries being cooled. The study found zones existed in each tank where temperatures ranged as much as 20 deg.F above the cooling water temperature even after two or more hours of cooling. This demonstrates a critical need to develop a process to enhance the convection and flow of chilled water around the cherries in addition to addressing the concern of additional chilling. It also represents an example of the need for thorough monitoring and the importance of good and even cooling medium flow to all areas holding commodity as noted above.
As mentioned, there are numerous technologies and parameters to consider in cooling produce, but two important general considerations are improving convection and monitoring temperature with calibrated instruments.
From the consumer's perspective, keeping most commodities refrigerated is important and the consumer should not be misled by retailers that display and sell several commodities, which should be kept cool, in open air, non-refrigerated produce areas. For example, apple, table grapes, and sweet cherries are often sold in such areas, however, appearance and quality can be maintained significantly longer through refrigeration to near the time of consumption.



Schematic of a tunnel-type forced-air cooler.