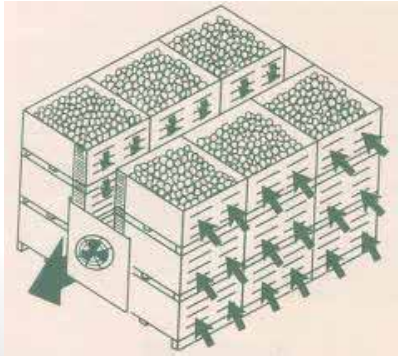
Precooling and Managing Produce Temperature

What is precooling?

www.bifulcos.com



www.caes.uga.edu

Why is Precooling Beneficial?

- **Reduce respiration rate** – Don't forget produce is still alive! Reducing the respiration rate will slow down enzymatic processes that cause produce to degrade.
- **Reduce water loss and wilting**
- **Slow the growth of spoilage bacteria** – These bacteria are always present and can cause rapid spoilage at higher temperatures.
- **Slow ripening** – At higher temperatures, ethylene producing produce will ripen quickly, perhaps before it can be consumed.

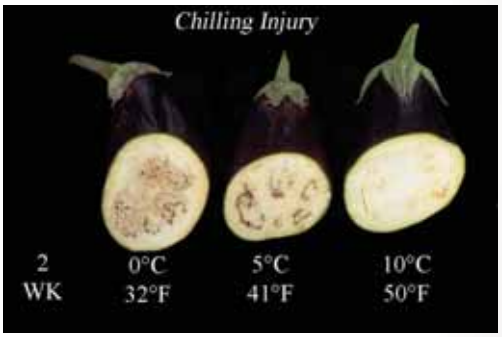
Kader 2002

Importance of Precooling

For highly perishable products, such as strawberries, deterioration at high temperatures occurs quickly.

- Every hour delay in precooling strawberries harvested at 86°F will result in a 10% loss in shelf life.
- Conversion of sugar to starch in sweet corn occurs 4 times more rapidly at 50°F than at 32°F.

Should All Crops Be Precooled?



http://postharvest.ucdavis.edu/pfvegetable/EggplantPhotos/?repository=29927

Some Chilling Sensitive Crops

Commodity	Temperature °F
Chilling injury will occur below these temperatures	
Asparagus	37
Cantaloupe	39
Cucumber	50
Eggplant	50
Honeydew	50
Sweet Potato	50
Peppers	45
Tomatoes (Pink)	50
Tomato (Green)	55
Watermelon	50

Source: Kader 2002

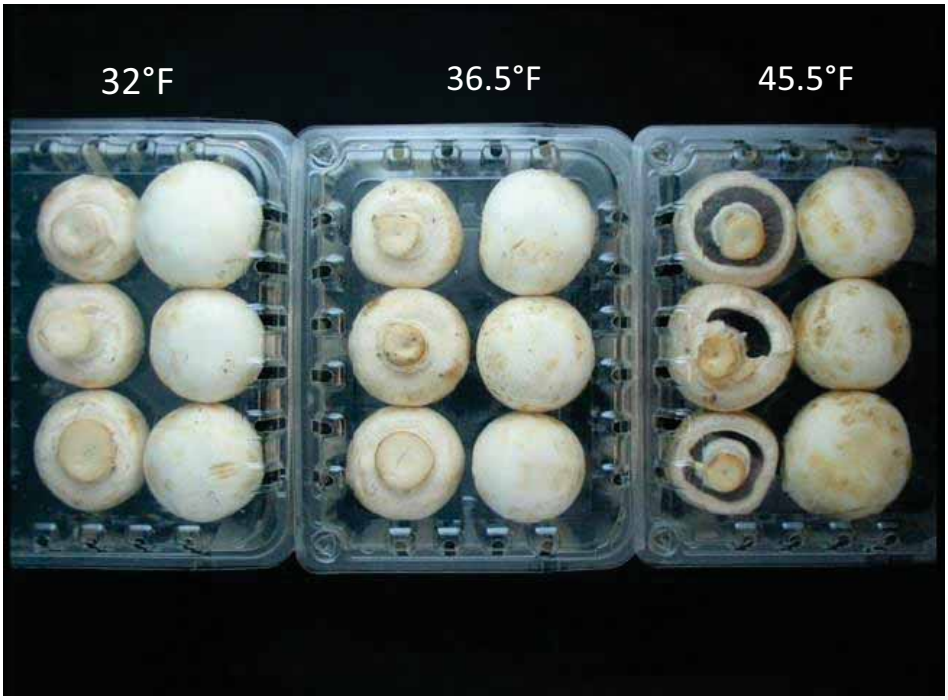
http://postharvest.ucdavis.edu/pfvegetable/EggplantPhotos/?repository=29927

Non-Chilling Sensitive Crops

Commodity	Shelf Life* if Stored between 32°F & 41°F
Apples	Up to 3 months
Cabbage	20 days to 3 months
Carrots	2-3 weeks
Lettuce	14 to 28 days
Peaches	30°F to 36°F: 1 to 5 weeks, or greater than 45°F. Do not store between 36°F and 45°F if the cultivar is susceptible to internal breakdown.
Mushrooms	2 to 7 days
Sweet Corn	5 to 8 days
Strawberries	About 1 week

Source: Kader 2002

Temperature and Quality



Courtesy of Sensitech Inc www.sensitech.com

Precooling - The Fundamentals

- Harvest Early in the Day
- Remove Harvested Produce from the Field ASAP
- Utilize Shade
- Packaging – Vented, light colored, sized to allow for cooling

Kader 2002

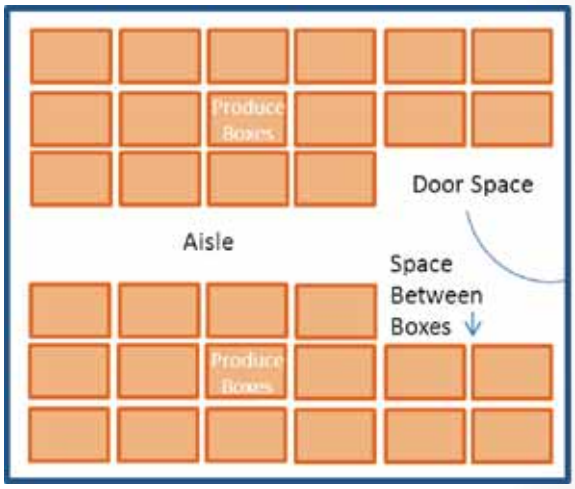
Many ways to precool

- Vacuum Cooling
- Hydrocooling
- Forced Air Cooling
- Passive Air (Room) Cooling
- Top and Slurry Icing
- Others

Source (Top and Bottom): Thompson 2002

Room Cooler

- **May take 24 hours or longer to cool produce to its long term storage temperature.**
- **! It is critical not to pack cold rooms too tightly. 25 - 40% of the floor space must remain open to allow for space between the walls and between produce boxes. If sufficient space is not present, produce will not cool.**
- **Hot spots can remain in the center of boxes or bins, even when the outside portions of the containers are cooled.**
- **Fans can be added to room coolers to speed cooling by increasing the airflow.**

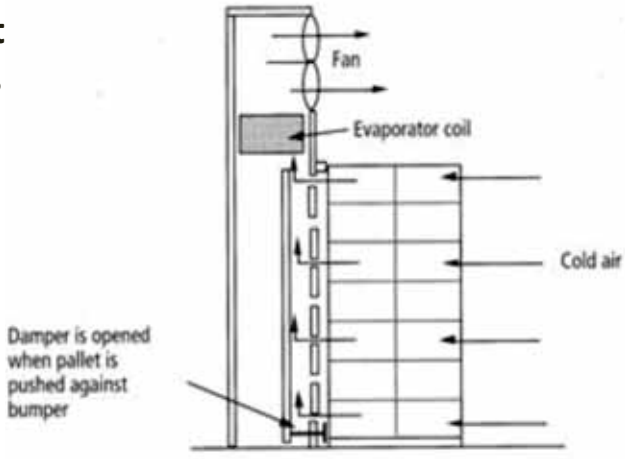


Top View – Room Cooler

Kitinoja 2010, Boyette 1991

Forced Air Cooler

- **Cools produce in less than an hour**
- **Potential to dry produce out if used for extended periods**
  - **Cool produce 7/8th of the way to prevent drying**
- **Whenever possible, follow forced air cooler with refrigerated storage or transport.**



Source: Thompson 2002