Postharvest Handling Technology for Blackberry Quality and Shelf Life: Part 1

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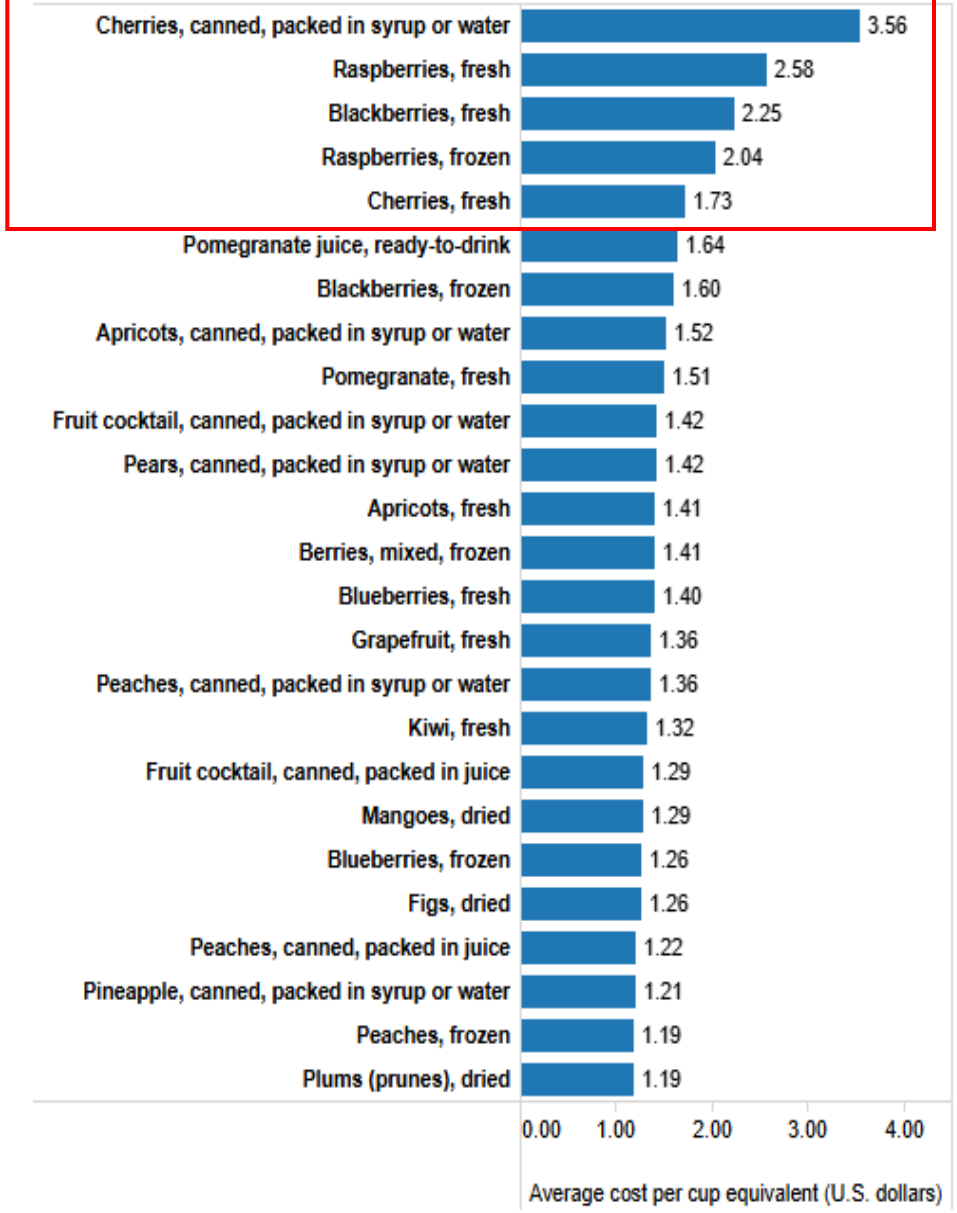
Collaborators:

- Drs. David Liu and Zhanao Deng
- Nurjahan Sriti, M.S. student and Adrian Berry, M.S.
- *The generosity of our Florida growers and shippers!*

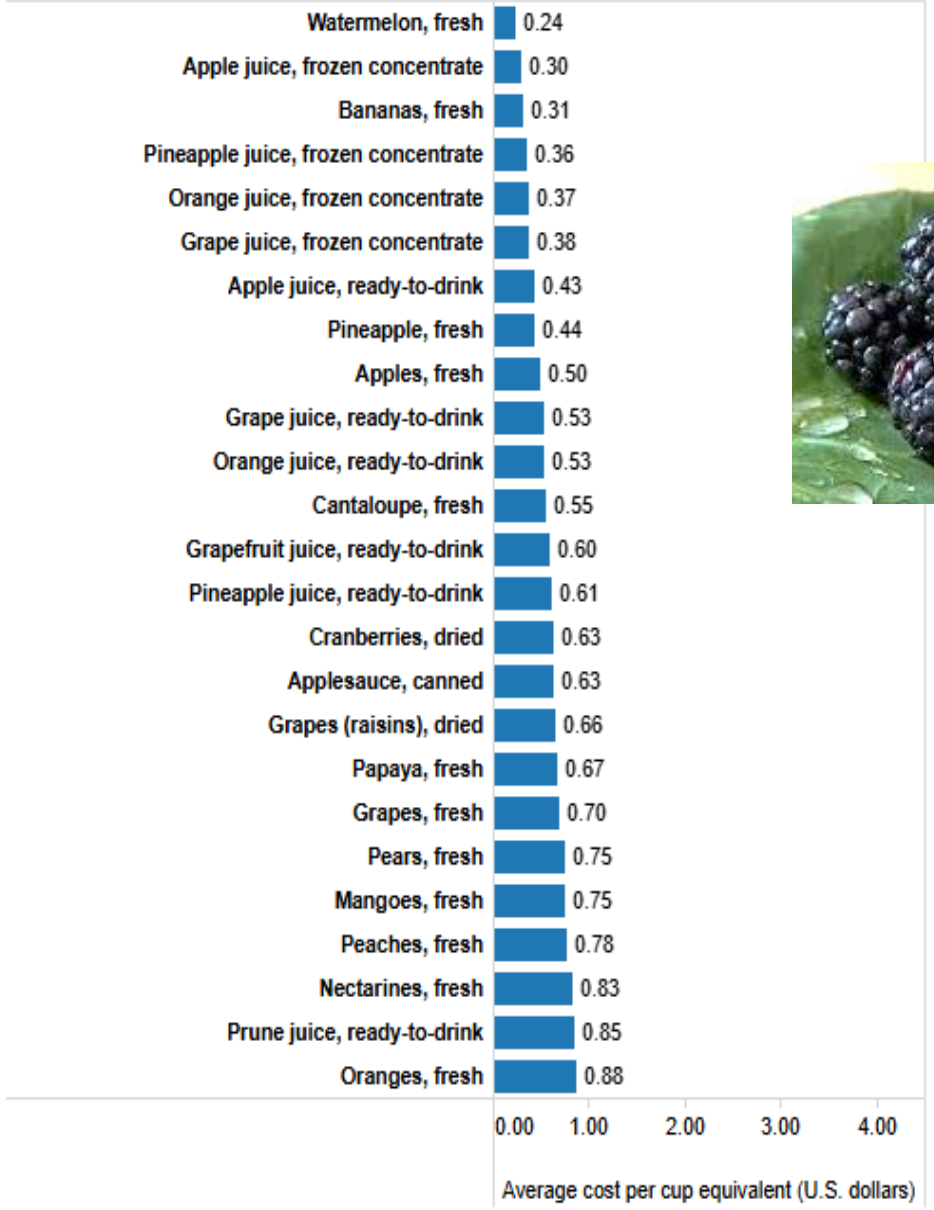
Increased demand in U.S.A. and Canada for year ‘round supply of small fruits

Prices have risen in recent years

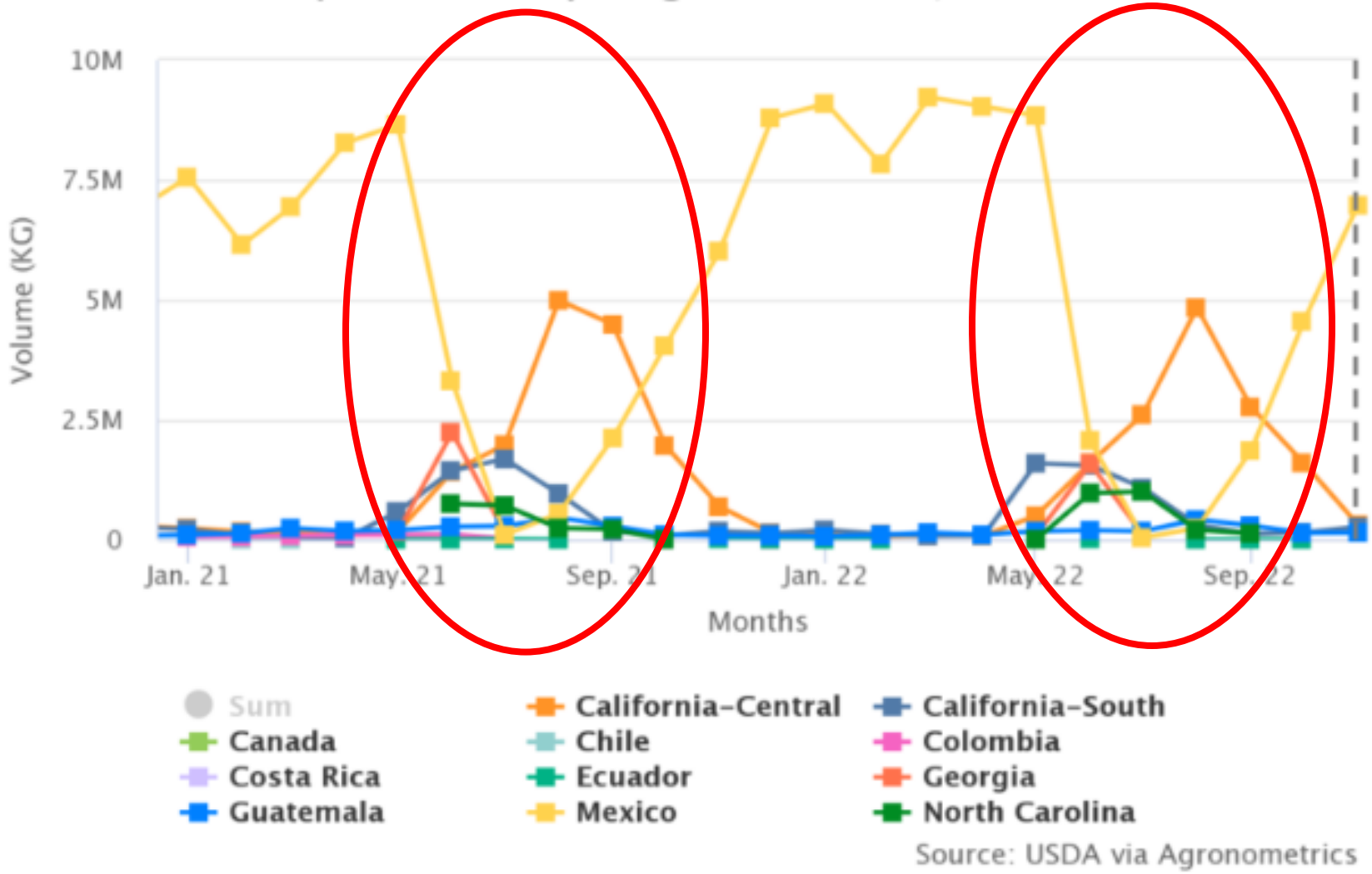
Most expensive fruit costs



Least expensive fruit costs

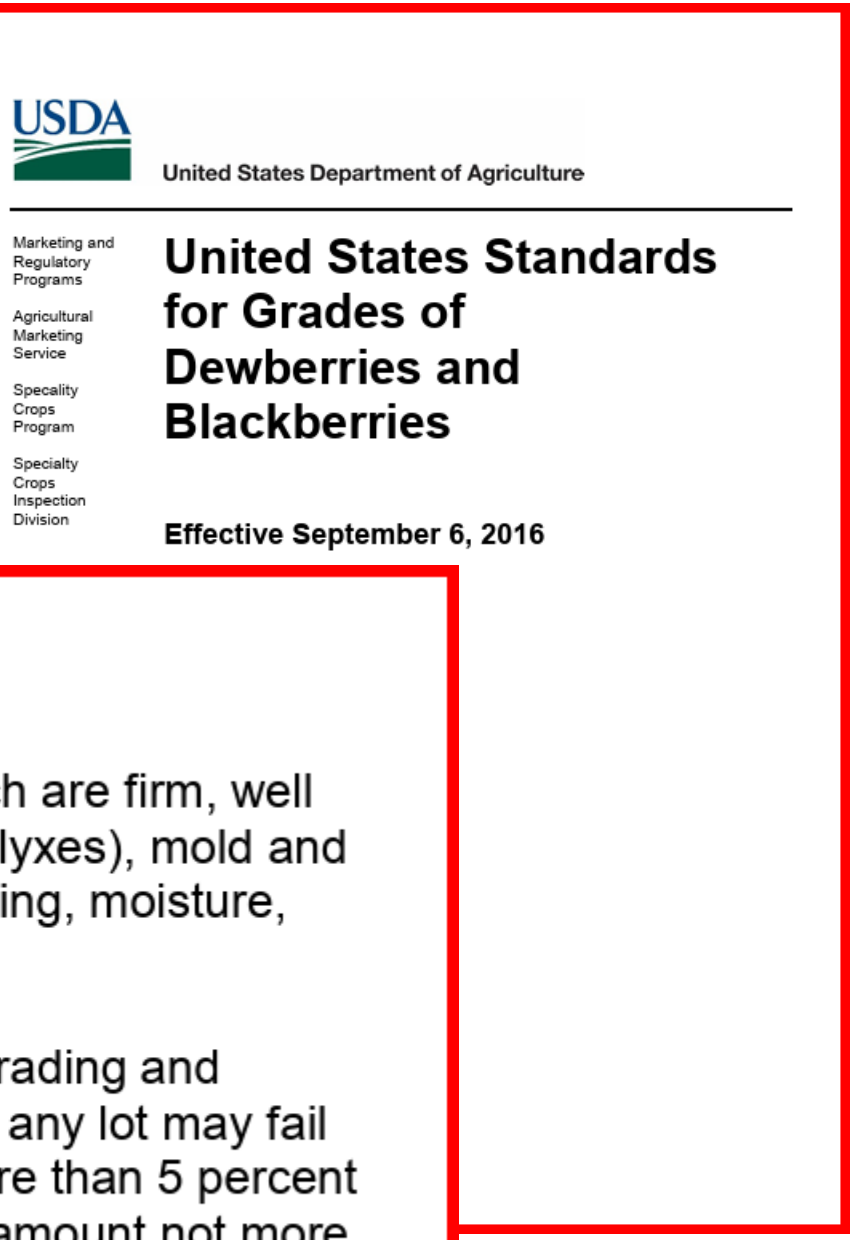


USDA-ERS. 2022.



Source: USDA Market News via Agronometrics. (Agronometrics users can view this chart with live updates here) (2022)

USDA Grade Standards



USDA

United States Department of Agriculture

Marketing and Regulatory Programs

Agricultural Marketing Service

Specality Crops Program

Specialty Crops Inspection Division

United States Standards for Grades of Dewberries and Blackberries

Effective September 6, 2016

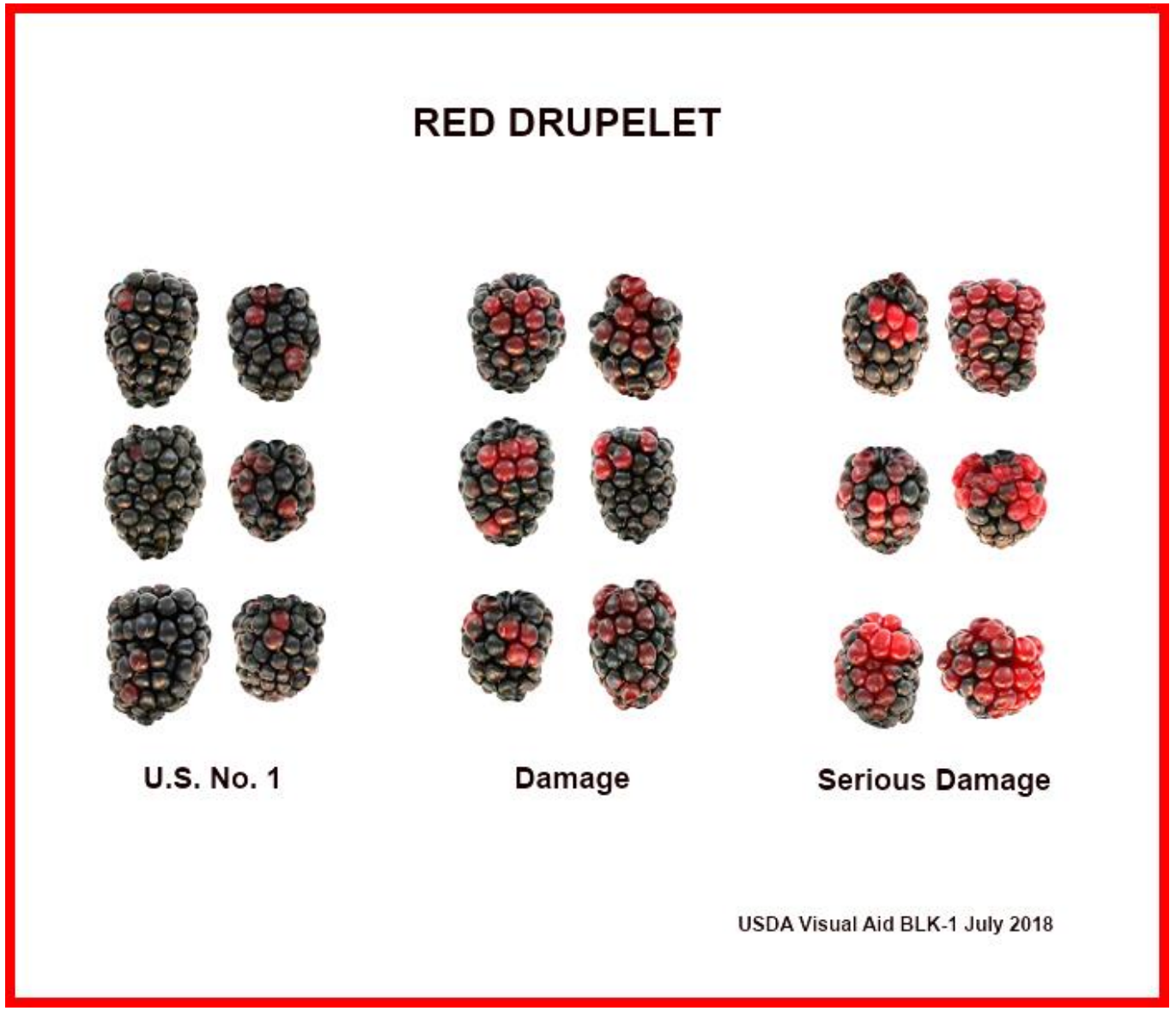
Grades

§51.4270 U.S. No. 1.

"U.S. No. 1" consists of dewberries or blackberries of one variety which are firm, well colored, well developed and not overripe, which are free from caps (calyxes), mold and decay, and from damage caused by dirt or other foreign matter, shriveling, moisture, disease, insects, mechanical or other means.

(a) Tolerances. In order to allow for variations incident to proper grading and handling, not more than 10 percent, by volume, of the berries in any lot may fail to meet the requirements of this grade, including therein not more than 5 percent for defects causing serious damage, and including in this latter amount not more than 1 percent for berries which are affected by mold or decay.

Blackberry Defects



Importance of uniform color: these were at retail level (red drupelet reversal)

Harvest Operations

- Pick in early mornings
- Pick at full color stage
- Directly into consumer pack to minimize damage
- Quickly transport for cooling

Harvest Operations

- Food safety is the thread from harvest through shipping:
  - Establish food safety protocols
  - Train employees
  - Monitor

Portable collection/pregrading station

- Close to workers
- Shading during harvest
- Keeps pallets off ground
- Quick transport to cold room

Container type and size depends on the market

Source: Highland Packaging Solutions
https://highcor.com

An absorbent pad is often added to clamshell

5050180PADK
STOCK Blackberry 6 oz
With BLACKPAD, (600)

7256-187PADK
12 oz Low Profile
Blackberry Clamshell
PADDED (600)

Source: Monte Package Company
https://montepkg.com

Effective Cooling

Storage conditions for maximum shelf life are crop-dependent:

- Lowest Safe Temperatures for Small Fruits:
  - 32-34 °C (0 - 1 °C)
  - Relative Humidity: 90 to 95%

- Shelf life: 2 weeks

Cooling rate is determined by the 3 T's:

Time of exposure to the cooling medium

- Longer exposure = colder fruit

Temperature of the cooling medium

Lower temperature = faster cooling

Turbulence (contact & mixing)

Better contact = more uniform cooling

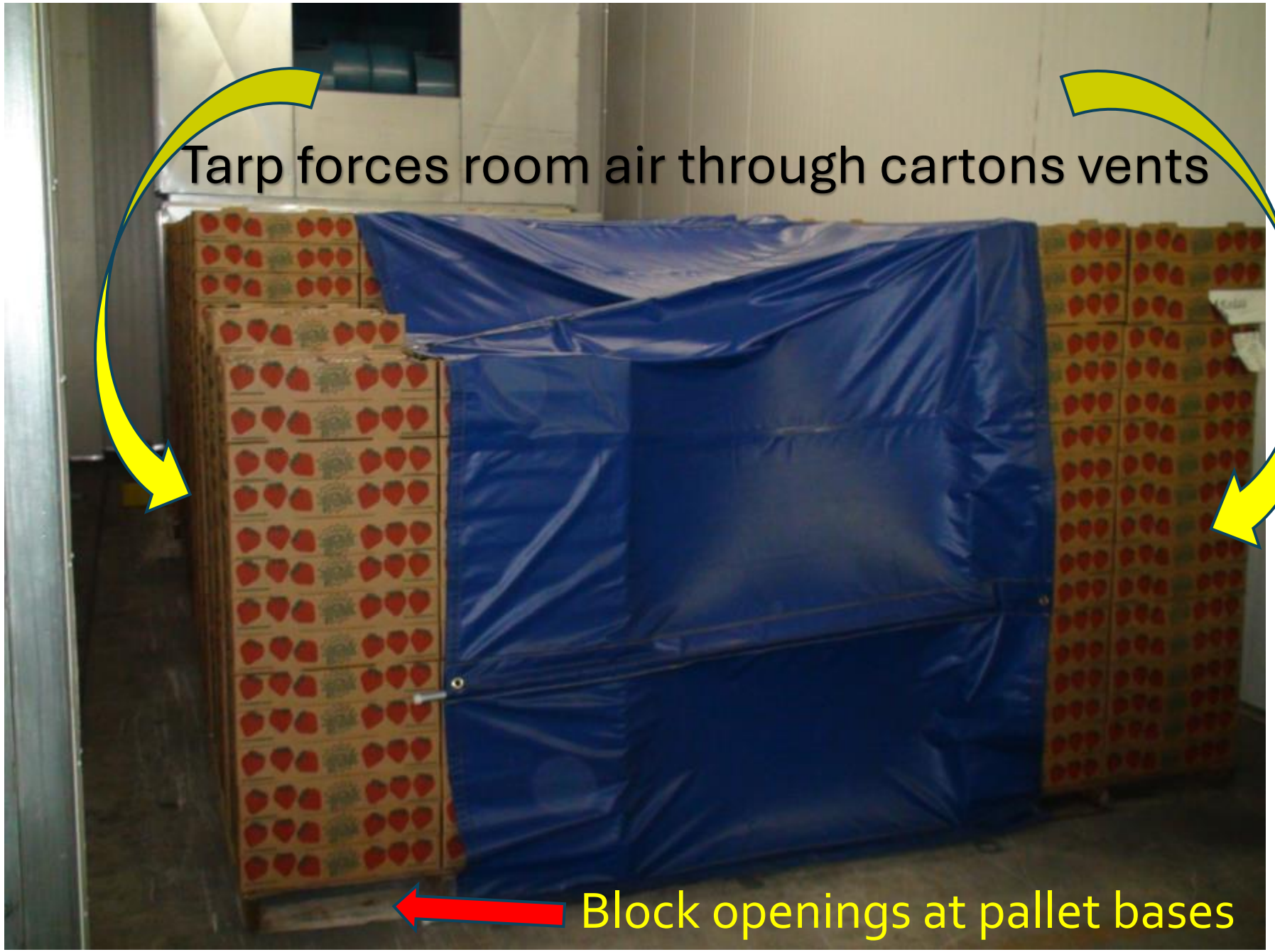
GOAL: 7 /8 Cooling = Removal of 7/8 of the field heat

Recommended Cooling Methods for Blackberries

- Room cooling
  - Slowest – 12 or more hours
  - Loses most moisture

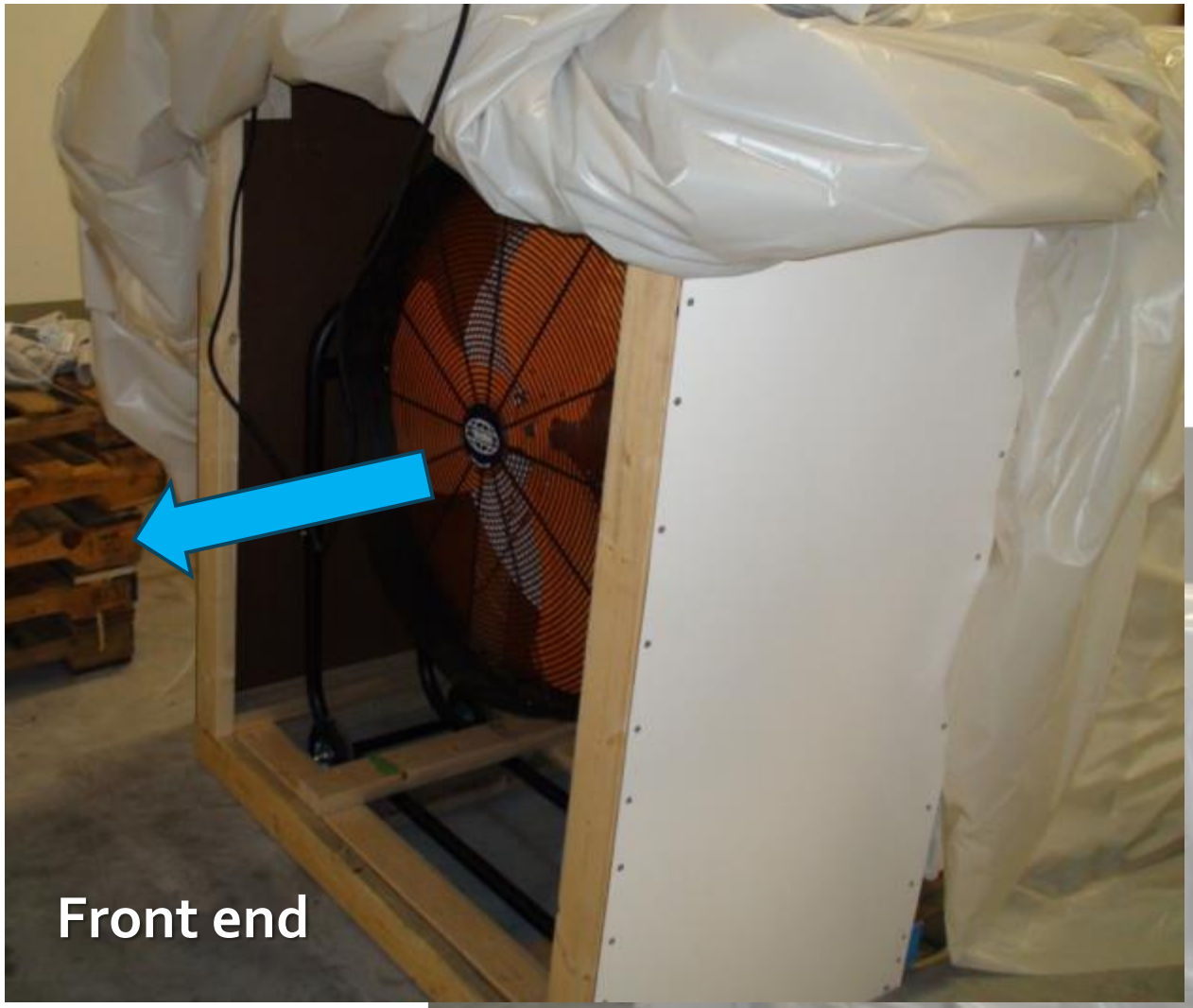
- Forced-air cooling – most common for small fruits
  - Faster – 1 to 2 hours
  - Less moisture loss

Forced-air cooling tunnel:
Forming the tunnel with pallets


Tarp forces room air through cartons vents
Block openings at pallet bases

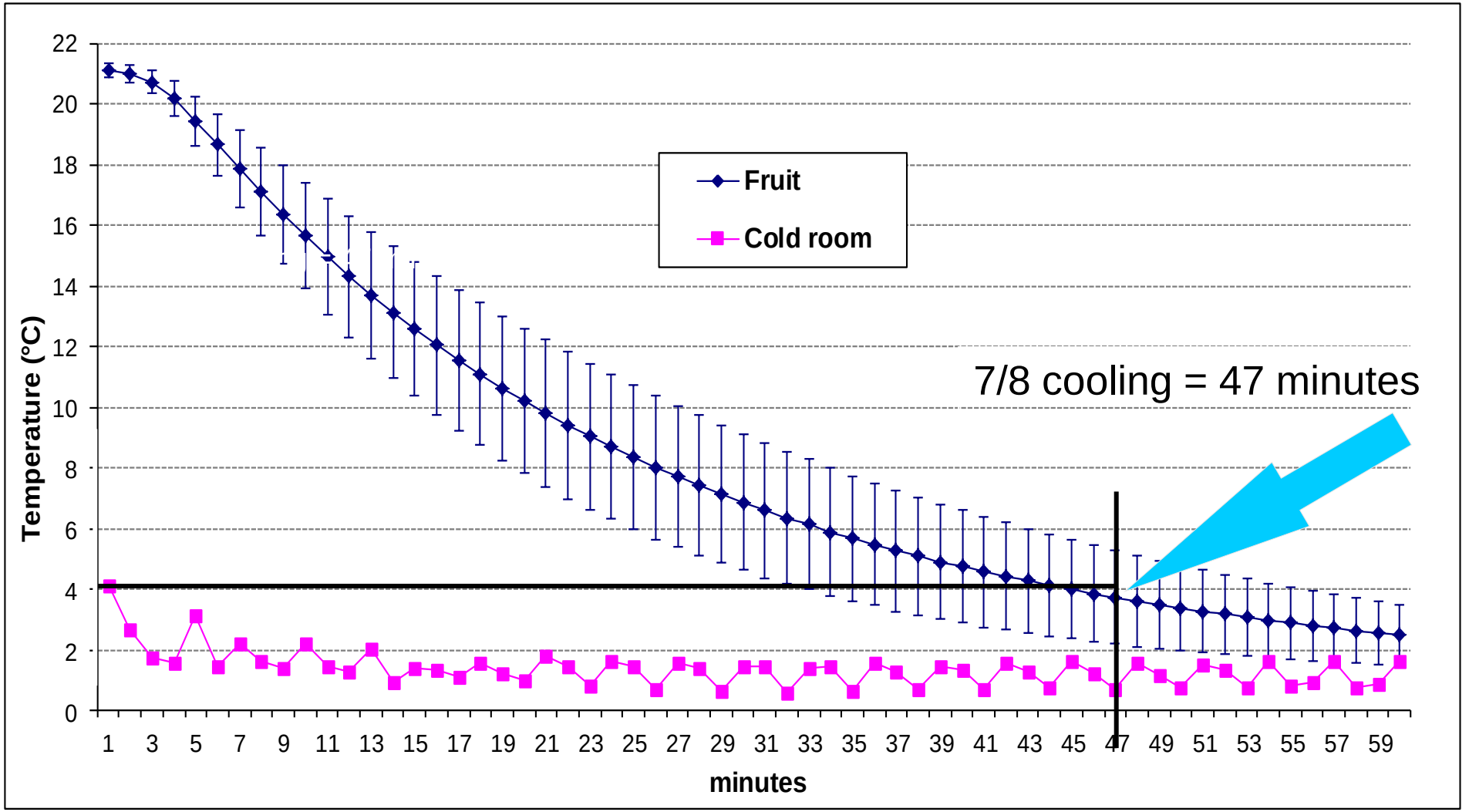
Portable Forced-air Cooler in Cold Room

Portable Forced-air Cooler in Cold Room

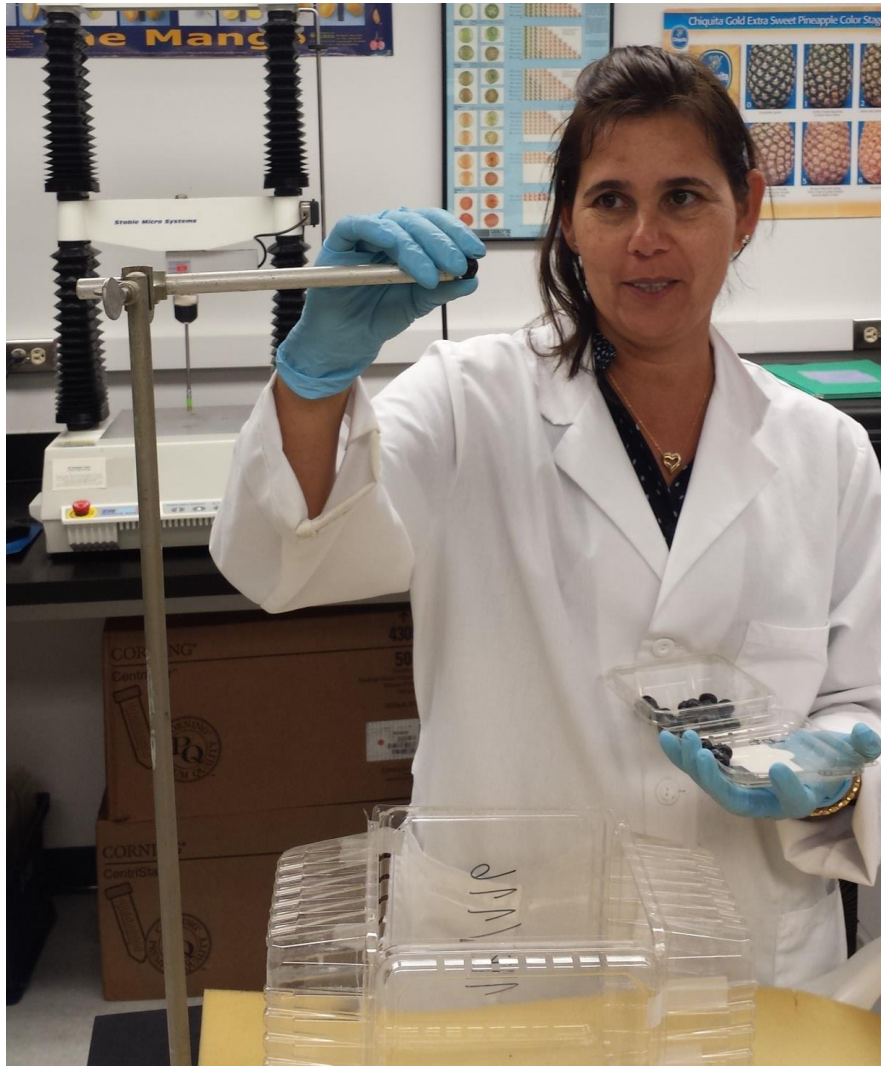


Cooling rate for forced-air-cooling of strawberries

(Note wide standard deviation between fruits)

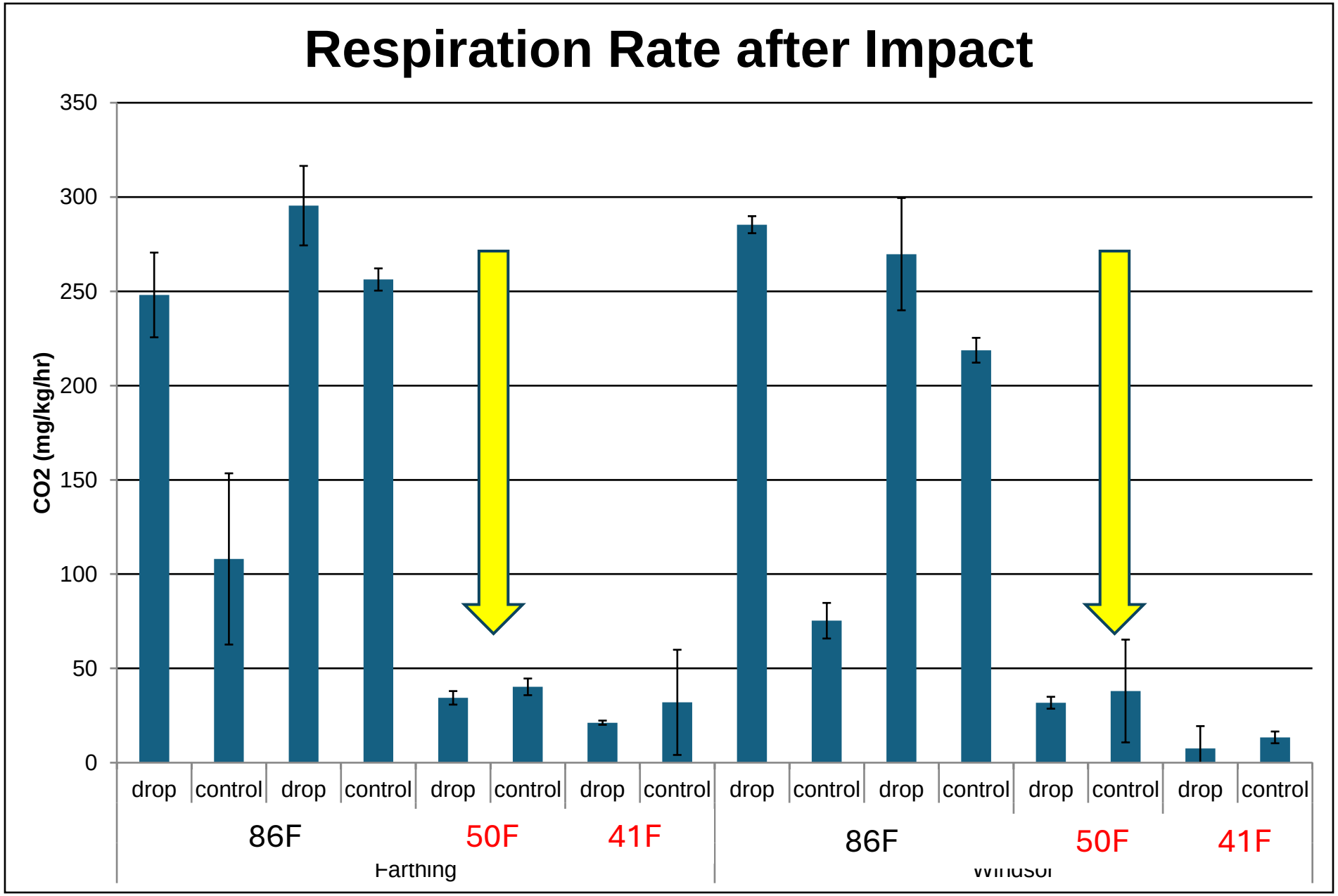


Effect of blueberry pulp temperature on respiration rate



- Fruit at 86, 50 or 41 °F
- Dropped once from
  20 inches

‘Farthing’; ‘Windsor’


Respiration Rate after Impact
CO2 (mg/kg/hr)
350
300
250
200
150
100
50
0
drop
control
drop
control
drop
control
drop
control
drop
control
drop
control
drop
control
drop
control
86F
50F
41F
86F
50F
41F
Farthing
Windsor

Summary

- Market potential
- Fruit quality
- Harvest operations
- Cooling operations