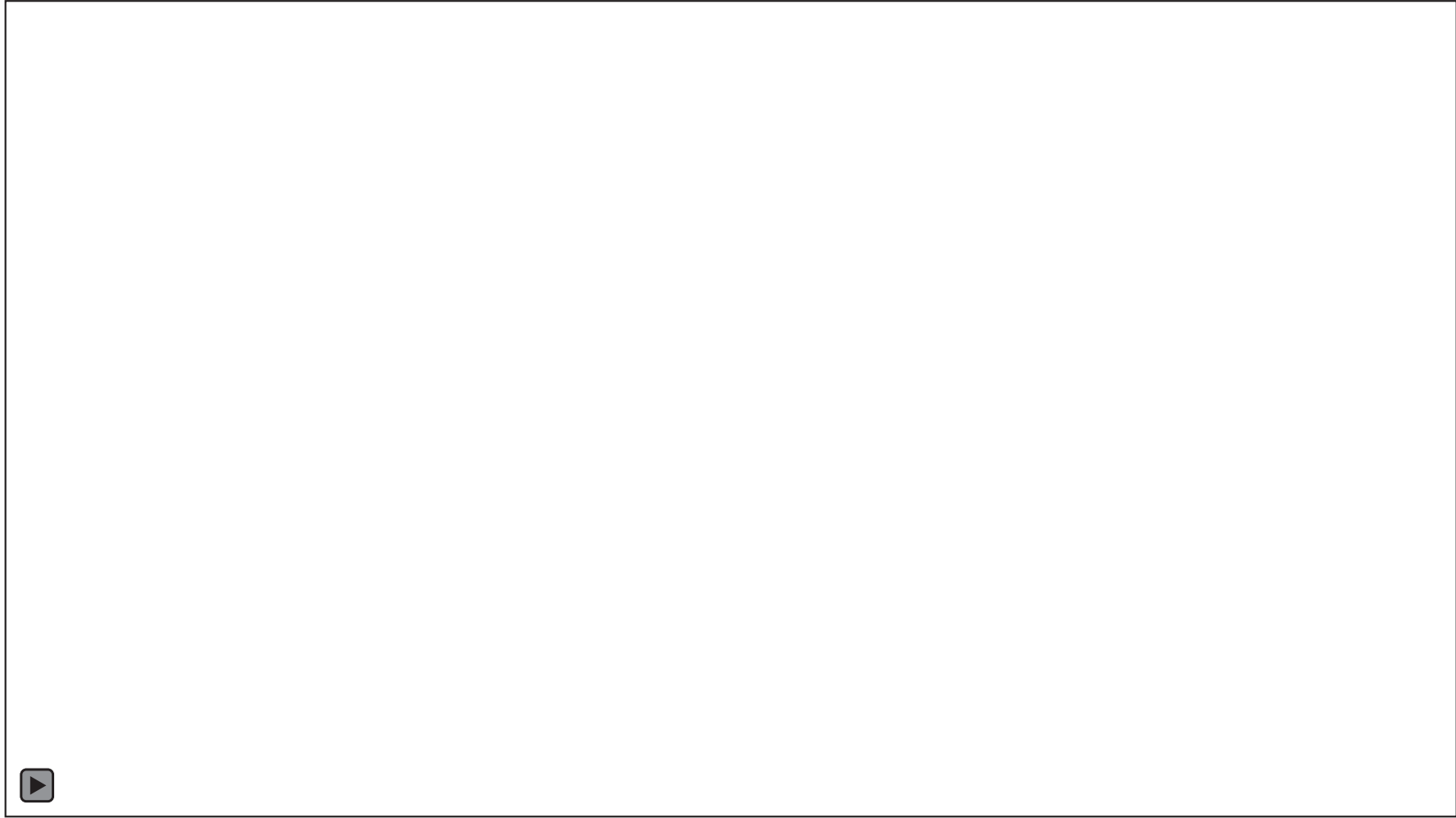


Fresh Pack Post-harvest Handling

Lily Calderwood

Extension Wild Blueberry Specialist





Challenges to Fresh Pack in Maine

- Labor
- Lack of cold chain infrastructure
 - on-farm cooling
 - centralized coolers
 - distribution channels

Advantages to Fresh Pack in Maine

- 30 million people live in the Northeast Metropolitan Area (Portland to NYC)
 - 10% of the US population
 - Maine berries are a lot closer to the population than Peru berries
- 16 ft Ryder rental truck, Load capacity 7,000 lb. costs \$194/day
- Quart of fresh berries sells for \$6 - \$12

Fresh Maine Wild Blueberries Are Out There!



Competition

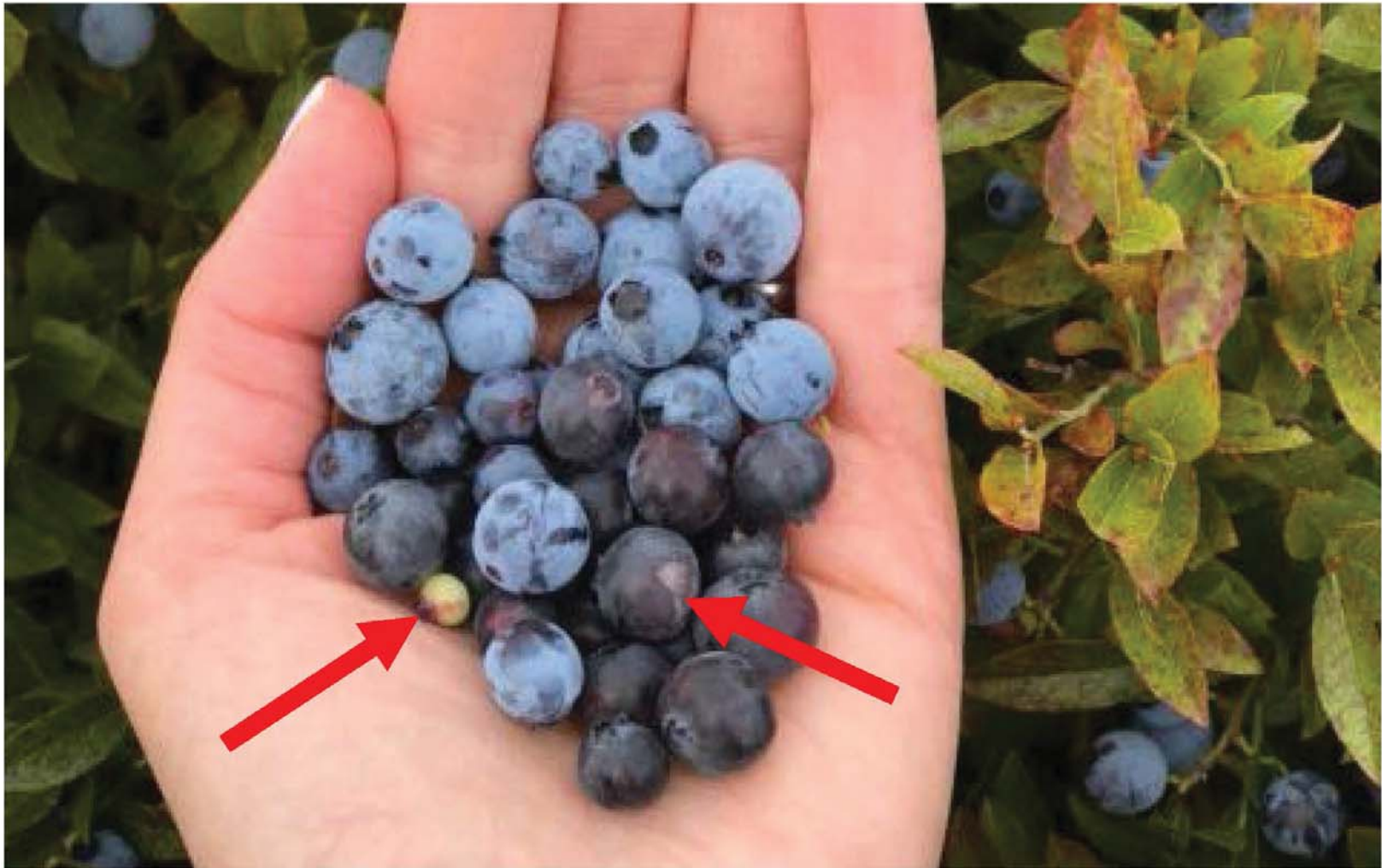


Improvements to Quality

- Less moisture on the berries
- Longer shelf life
- More storage space
- Communicating with buyers
 - smaller berries, color variation



Challenge: Ripening Variation in the Field



Challenge: Wild are Different than Highbush

- Variation in each container
 - Cannot hand pick
 - Thinner skin
 - Smaller berries
 - more surface area!
 - less air space
 - more heat and moisture build up
- Shallow berry depth could be a solution.



Picked Berries are *ALIVE*.

What does ALIVE mean?

Photosynthesis creates energy. $\text{CO}_2 + \text{H}_2\text{O} = \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$

Respiration is the use of photosynthetic energy.

- O_2 consumption
- CO_2 AND Heat release
- Causes berry to decay

Extending Shelf Life = Slowing Respiration Down

→ Temperature

→ Gasses

Known Steps to Improve Fresh Pack Quality

1. Improve Harvest Timing

Field Conditions

- Avoid wet berries
- Avoid hot temperatures

Best after dew has dried but before mid-day heat



Known Steps to Improve Fresh Pack Quality

2. Reduce Compression

- Rake can be too full
- Bin can be too full
- More berries = more weight
- More berries = less air flow

Known Steps to Improve Fresh Pack Quality

3. Reduce Bruising

- Travel out of the bumpy field
- Moving containers
- Packing line

Bruising from 10 short drops = 1 big drop

Known Steps to Improve Fresh Pack Quality

4. Remove Field Heat!

- Reducing temp is the #1 way to slow respiration
- Blue is a dark color, berries absorb heat
- Fruit temp can exceed air temp in 1 hour
- Berries in shade are 10° cooler

Fields are big and hot.

- Light colored cover?
- Wet down light colored cloth over bins = evaporative cooling



Known Steps to Improve Fresh Pack Quality

5. Pre-cool Before Packing

- Continue to slow respiration
- Faster they are cooled, the better
- Cooling can reduce fungal decay by 39%
- Blueberries can have chilling injury below 32°

Condensation?!

- Poor sorting
- Bruising
- Range of ripeness in container
- **Condensation alone NOT found to decrease shelf life**



Jackson and Sanford 1989, WSU and OSU Extension

CoolBot Option for Pre-cooling and Storage

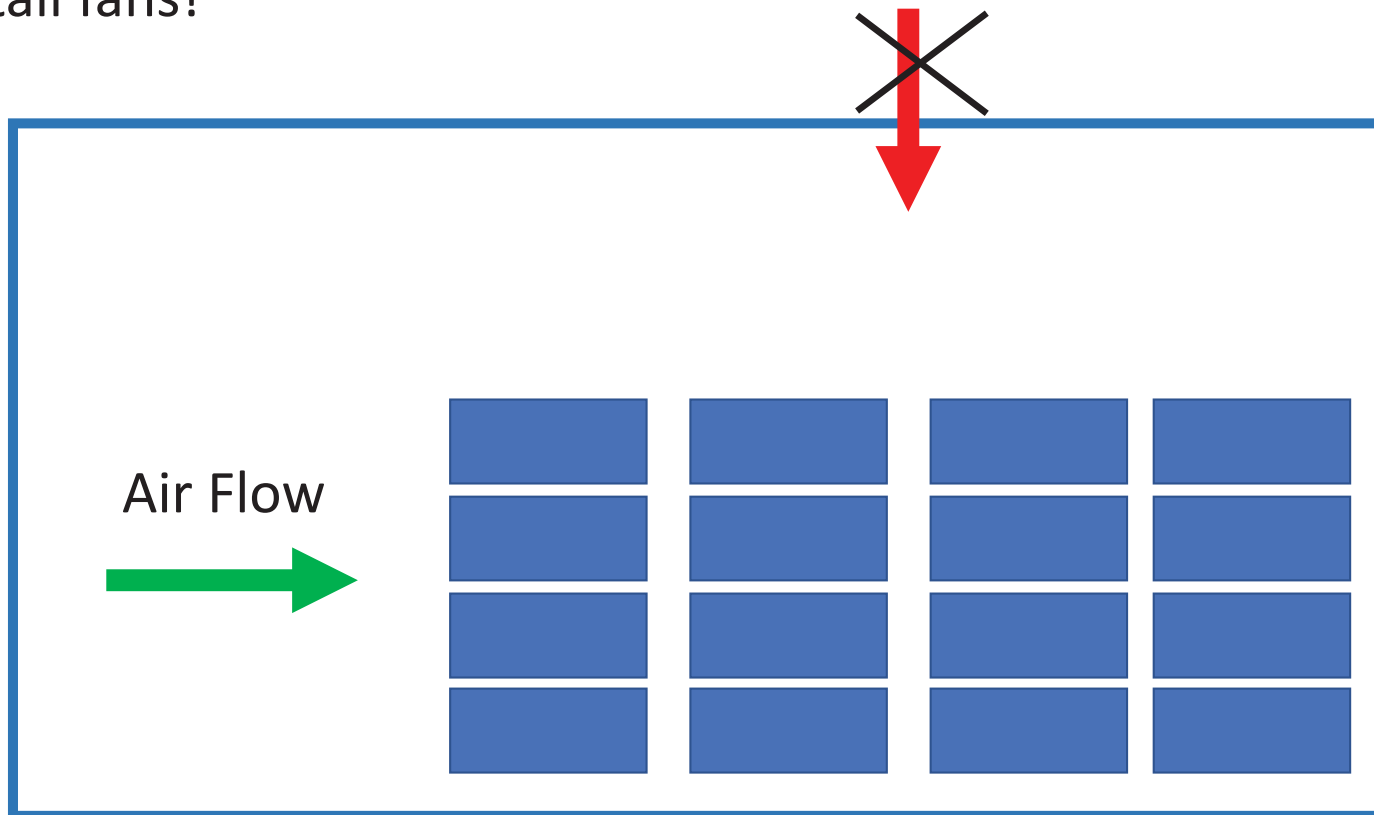
- 8ft x 8ft insulated room with AC unit
- CoolBot holds at set temp
- Cheaper than buying a walk-in cooler
 - Walk-in \$4,000 - \$10,000
 - Vermont farmer built cool room for \$2,500
 - In Maine = insulated shed
- Inside existing building
- Not a freezer
- Not efficient if you open the door 6x/hr

- BHF this summer



Forced Air Cooling

- Air movement across stack of bins removes moisture (wet shoes)
- Install fans!



6. Pre-harvest Fertility to Increase Firmness

Calcium sulfate fertilizer (CaSO₄)

- Argentina Highbush Study (Angeletti et al. 2010)
- Applied in Fall after harvest for the following season's fruit
- Delayed postharvest softening
- Decreased berry weight loss after storage at 35°F for 32 days

Isn't Gypsum the same as calcium sulfate?

Gypsum = calcium sulfate dihydrate (CaSO₄ 2H₂O)

CaSO₄ and Gypsum are OMRI approved.

Check out Chris Callahan, UVM Ag Engineer



The University of Vermont

MENU

UVM EXTENSION AG ENGINEERING

Blog and Podcast!

Highbush Ideals

Field Packing and Cooling

- Down to 32° ASAP
- Packed in MAP

(modified atmosphere packaging)

1.8% O₂

12% CO₂

Limits respiration and ethylene production





Modified Atmosphere Packaging (MAP)

StePac Xtend bin liners
Stores for 3 months



- Long travel distance
- Perishability issues
- Stands out in store
- Atmosphere that limits respiration and ethylene production
- $\text{CO}_2 + \text{O}_2$

StePac 40% less packaging
Recyclable Lid
Stores for 17 days



Source: FreshPlaza

Eco-Friendly Packaging

Whole Packaging, Newcastle ME



Develop a Plan for Workers

- Good lighting
- Round edges
- Bathroom, breakroom
- Hairnets and hand washing
- Jewelry

Questions? Comments?

