PRESERVING CHERRY FRUIT QUALITY AT HARVEST AND BEYOND

MARLENE LONG

QUALITY CONTROL TECHNICIAN

TOPICS OF DISCUSSION

Best Harvest Practices For Maintaining Fruit Quality

Preserving Cherry Quality in Orchard After Harvest

Transportation From Orchard To Holding Facility

Precooling

CHERRIES ARE NOT APPLES

CHERRIES

- 2-4 DAYS PICKING MATURITY
- 4-HOUR DELIVERY TIME
- IMMEDIATE COOLING
- SHORT SEASON
- CHERRIES ARE A MATTER OF HOURS

APPLES

- 2-4 WEEKS MATURITY WINDOW
- NEXT-DAY DELIVERY
- SLOW COOLING OK
- 12-MONTH SEASON
- APPLES ARE A MATTER OF DAYS

HARVEST QUALITY

Cherry quality cannot be improved after harvest.

Cherries deteriorate from moment they're picked due to ongoing internal respiration, as O_2 is taken in and CO_2 given off, releasing energy to maintain metabolic processes, which in turn produces heat.

Goal is to slow down this deterioration process.

FACTORS AFFECTING POST-HARVEST QUALITY OF CHERRIES

- Crop Load
- Proper Harvest Timing
- Mechanical injury due to improper handling
- Internal changes due to respiration
- Moisture loss caused by humidity imbalance
- Decay caused by infection of pathogens

EFFECTS OF CROP LOAD ON FRUIT QUALITY

Is there a market for this fruit?

Small size
20-22mm

Should it be harvested?

Overset tree

Low sugar
<15 bx

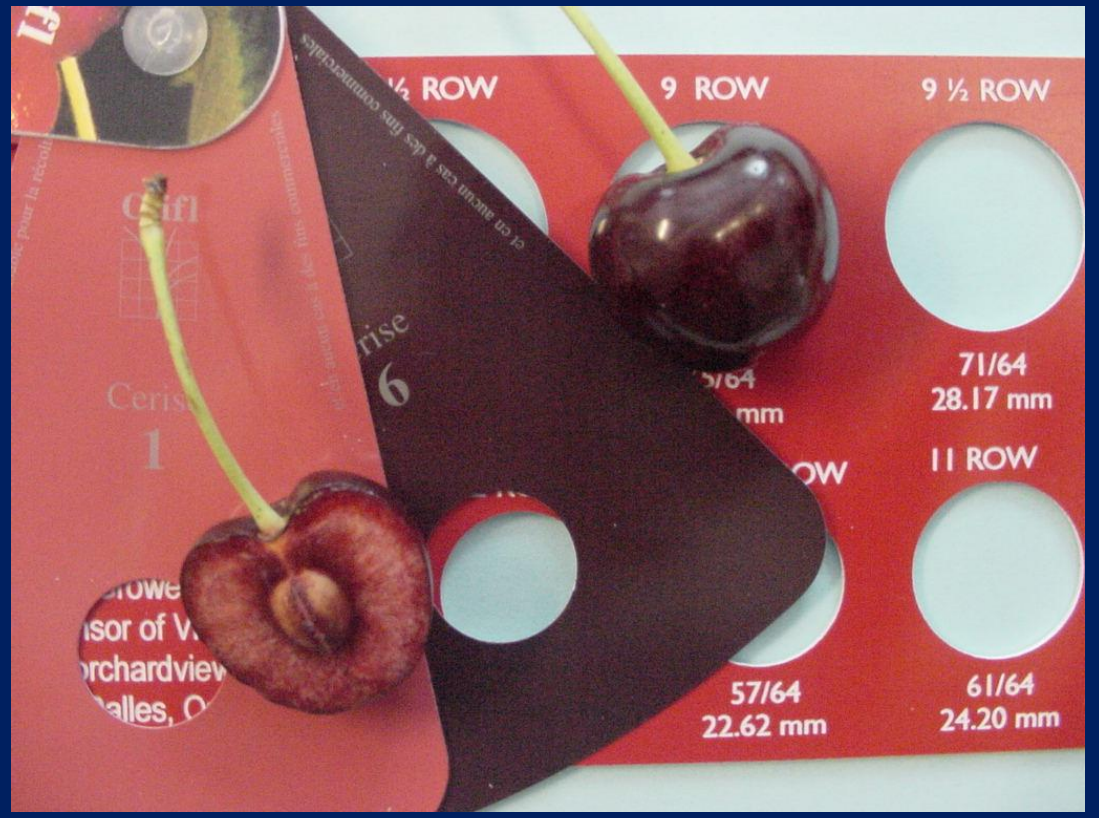
Easily damaged

WHEN TO HARVEST

- Determining proper time to harvest
- Know your varieties
  - Skin color
  - Flesh color
  - Taste
  - Size Potential

WHEN TO HARVEST

- Determining proper time for harvest
  - Skin color
  - Flesh color
  - Taste
- Information available on various web sites.



WHEN TO HARVEST

- Determining proper time for harvest
  - Skin color
  - Flesh color
  - Taste- interaction of sugar (SSC) and acid (TA) levels

Refractometer reading 17-22 Bx

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DETERMINING HARVEST TIMING

CTIFL 4,5, and 6 are acceptable

To determine best harvest timing use

- Fruit quality
- Weather forecasts
  - Heat (>32 C)
  - Rain

Be sure that you don't give up fruit size without reason

HOW TO HARVEST

GOOD FRUIT QUALITY AT MARKET BEGINS WITH CORRECT HANDLING IN ORCHARD

- Choose Proper Picking Containers
- Train picking crew in proper techniques
- Avoid damaging fruit

Choosing Type of Picking Container

Not the best choice: color dark
Too many rough edges, tendency to overfill causes crushing when stacked, can be put through hydro-cooler.

Container with soft drop-base eliminates damage from dumping of fruit into larger bin.

Container with rounded corners, smooth interior sides and white color are good.

Hard containers need to be lined with thin layer of bubble plastic or foam to lessen damage from cherry impact.

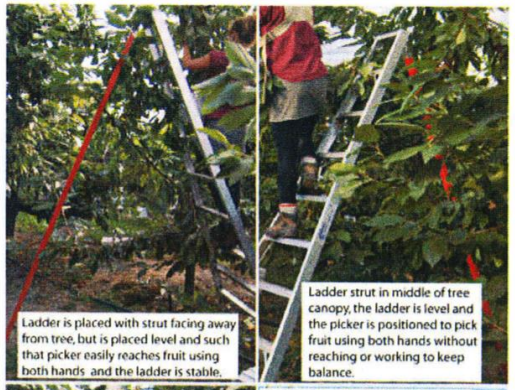
CANADIAN CHERRY PICKER TRAINING GUIDE

LADDER SAFETY BEGINS WITH PROPER PLACEMENT

Cherry Picker Training Guide

Successful picking requires: 1) good ladder placement, 2) good picking style and 3) careful fruit handling

Ladder placement is important for good picking style, reducing fruit drop heights and also, over the day, in reducing picker fatigue. Below are examples of good ladder placement, which allows the picker to get into the tree and have easy access to the fruit. The ladder should also be stable and level for picker safety.



PROPER PICKING TECHNIQUES

BEST PICKING PRACTICES

Pitting caused by dropping cherries.

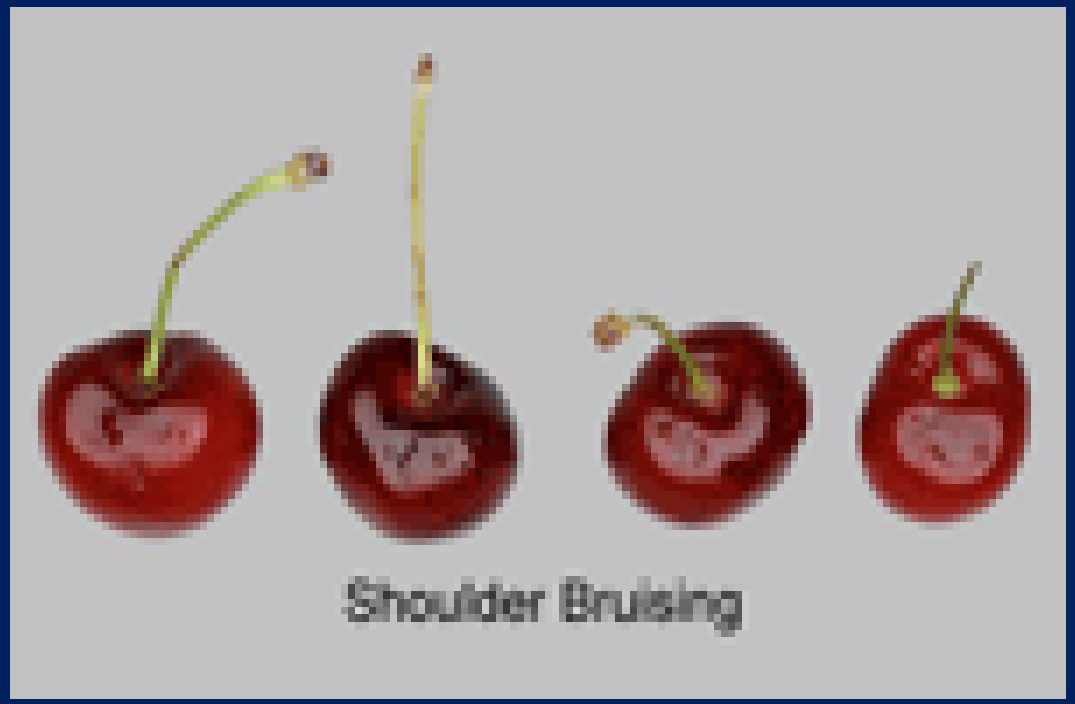
Short drops decrease pitting, should be no higher than from top edge of picking container.

Small sunken areas appear well after damage occurs.

OTHER PICKING DAMAGE

Pickers can damage cherries by grabbing fruit rather than stem

Causes shoulder bruising



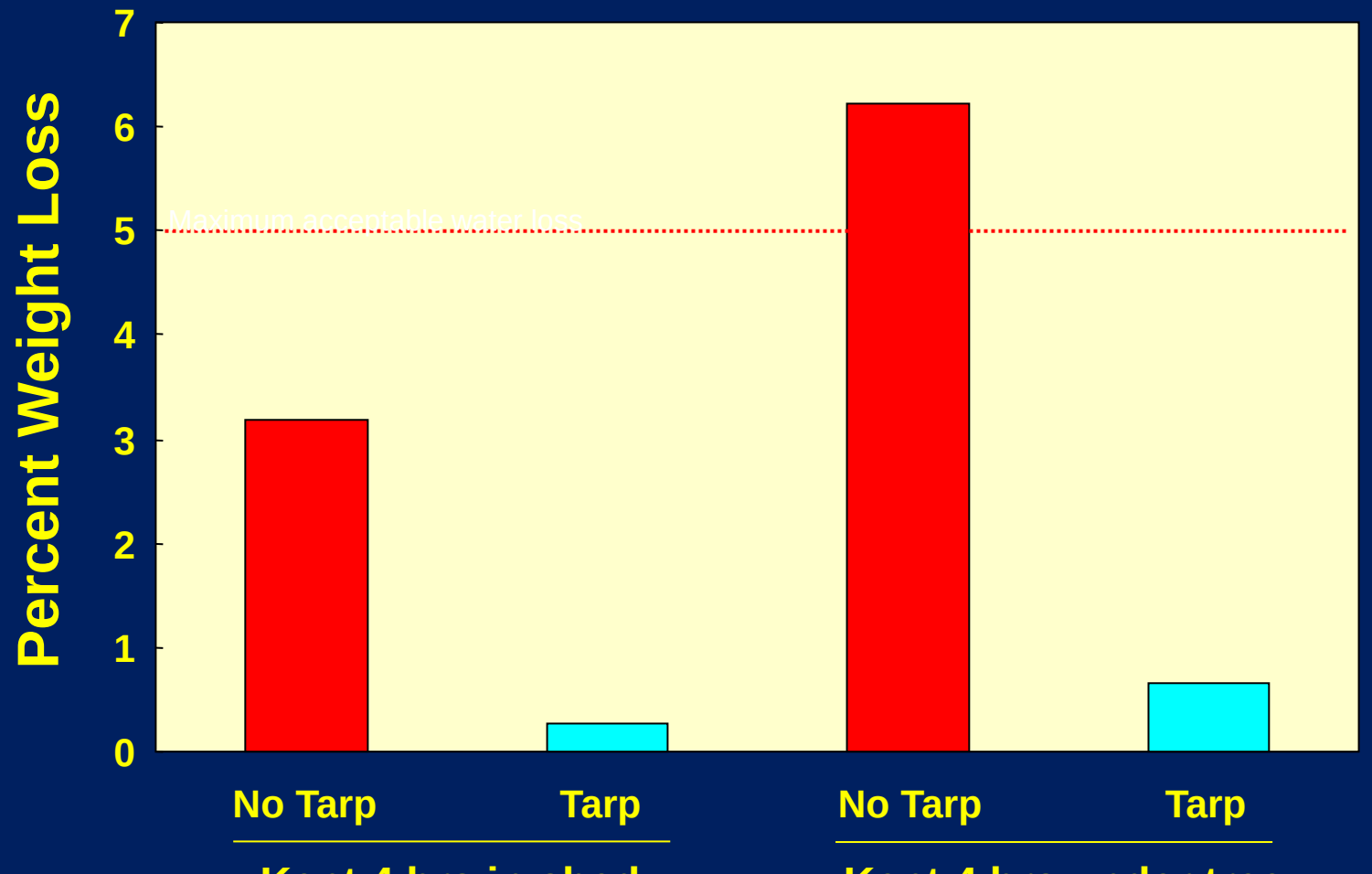
Skin tears caused by fingernails; Any break in skin allows entry of disease causing organisms.

TEMPERATURE AFFECTS BOTH FRUIT AND STEM QUALITY DUE TO AN INCREASE IN RESPIRATION….

- Fruit Color Darkens
- Firmness is Lost
- Acidity (Flavor) is Lost
- Stem Color Deteriorates
- Decay Increases

…AND TRANSPIRATION

Transpiration is the movement of water throughout the plant and into the air as water vapor. It is related to the vapor pressure deficits where water vapor moves from an area of high relative humidity to one of low relative humidity.



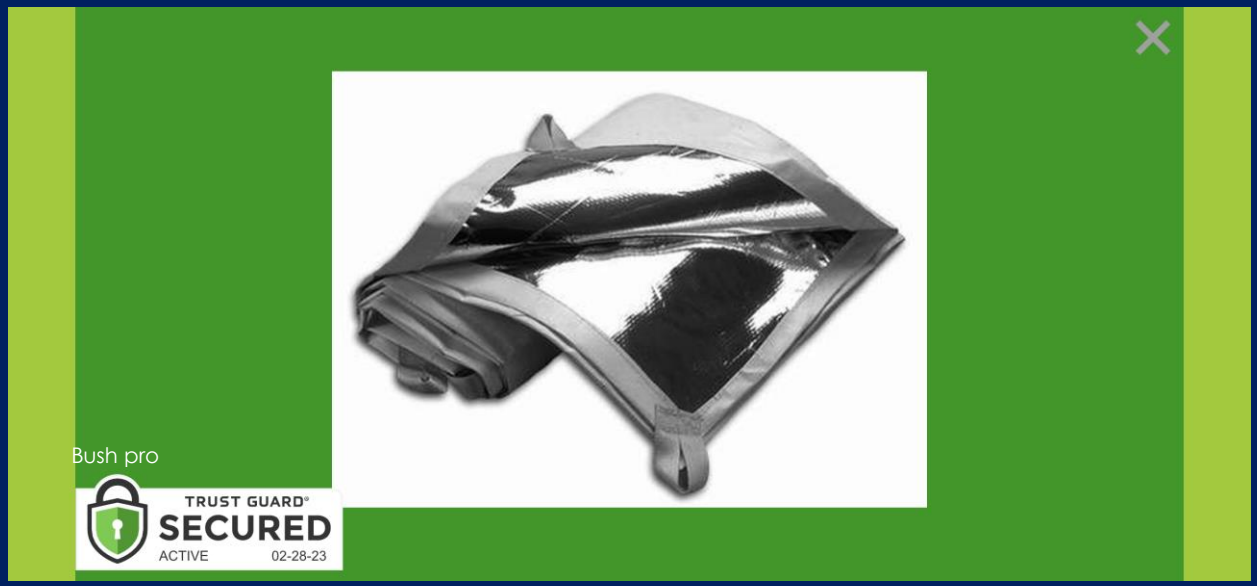
TEMPERATURE AND HUMIDITY CONTROL

- Maximum acceptable weight loss from orchard to consumer is 5%
- Harvest in cool of day
- Do not harvest above 32 C
- Keep fruit cool and humidity around fruit high

KEEPING FRUIT COOL AND MAINTAINING HUMIDITY LEVELS

INDIVIDUAL PICKING CONTAINERS COVERED WITH MOIST FOAM PAD AND THEN REFLECTIVE TARP.

WHITE CANVAS/REFLECTIVE TARP



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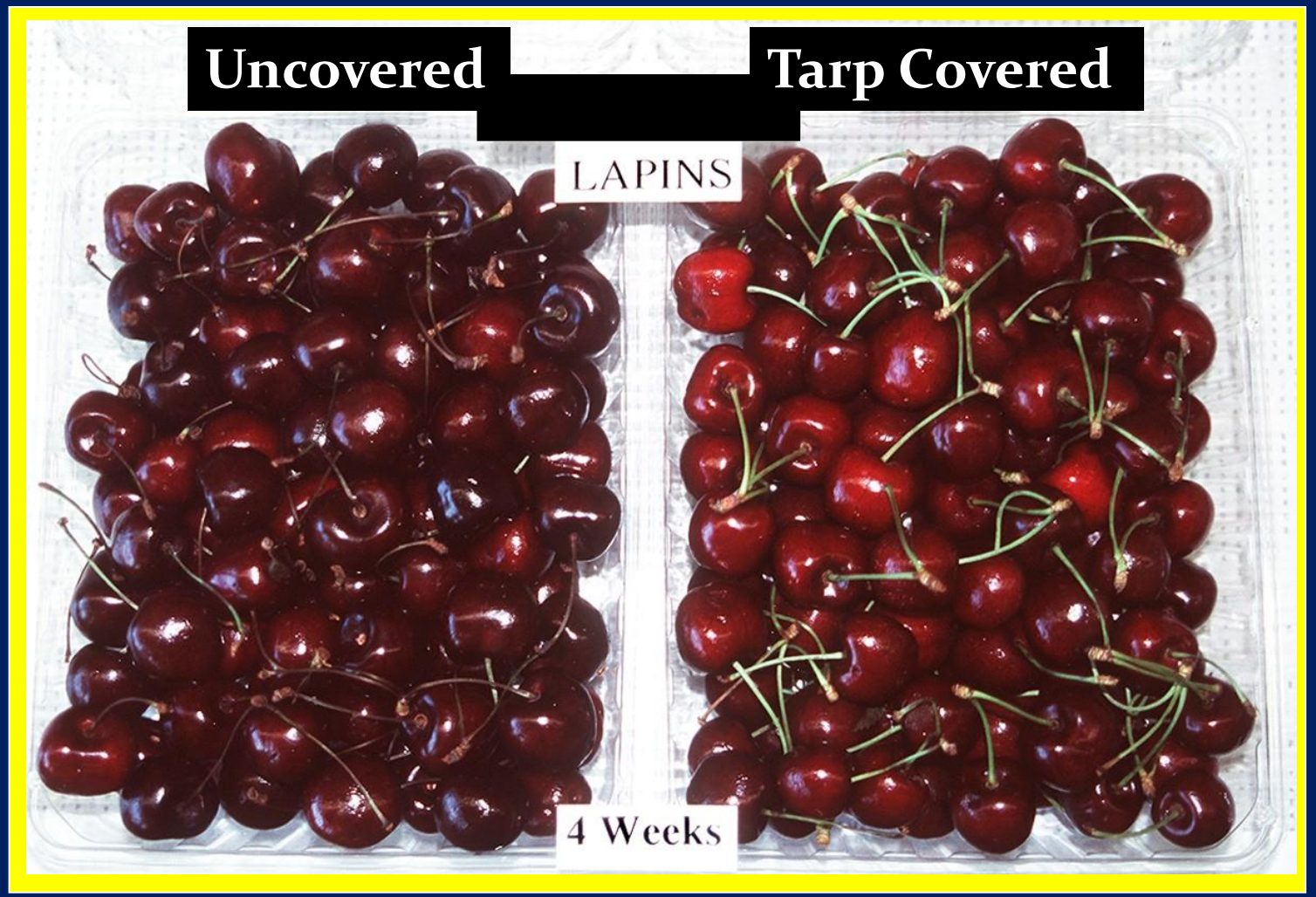

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PROTECT FRUIT FROM HEAT

- From harvest fruit should never be in sun.
- Fruit temp. increases as much as 5 C in 6 min.
- Shade structures protect fruit.
- Tree shade inadequate because It Moves

TRANSPORTATION

Transport within 4 hours of picking to receiving area so that fruit can be cooled as quickly as possible

For every hour that harvested fruit is held in orchard, one day of shelf-life is lost.

Keep fruit covered with moist pads, Preferably in Refrigerated Transport.

TRANSPORTATION

- Necessitates good roads
  - Rapid transport to cooling facility.
  - Smooth surface reduces fruit damage
- Options:
  - Fix road
  - Improve vehicle suspension.
  - Use under-inflated tires.
- Marble/ball-bearing test

REMOVING FIELD HEAT PRIOR TO MARKETING

Room Cooling	• Least Effective • Too much time, only exposed fruit is cooled
Forced-Air Cooling	• Can be used on unpacked fruit but risk drying of stems • Very effective for final cooling of packed fruit
Hydro-Cooling	• Quickest and most effective way to remove field heat • Requires potable water and sanitation practices

COLD ROOM

Fruit that will not be pre-cooled may be held at 0-1 C but will not be cooled adequately. It should be sold or packed as soon as possible.

Fruit that has been hydro-cooled can be held for up to 48 hrs at 0-2 C, 98%RH

HYDRO-COOLING UPON ARRIVAL

GARAGE-STYLE, 48, 8KG CRATES

WATER TEMPERATURE AROUND 1 C

26 C on arrival, 12 min. results in 9.9 C

STACKS OF TWO SMALL CRATES

REDUCE INTERNAL TEMPERATURE TO 10 C

FORCED-AIR (PRESSURE) COOLING

- FORCED AIR COOLING RELIES ON PRESSURE GRADIENT.
- FAN PULLS OR PUSHES COLD AIR FROM 0 C ROOM THROUGH BOXES LOWERING TEMPERATURE OF FRUIT.

USED TO COOL PACKED FRUIT TO 0 C BEFORE SHIPPING.

ALSO UNPACKED FRUIT CAN BE COOLED BUT STEMS MAY BE DRIED OUT.

CONCLUSION

- GOOD HORTICULTURAL PRACTICES IN THE FIELD AND PROPER POST-HARVEST HANDLING ARE BOTH NEEDED TO PRODUCE HIGH QUALITY CHERRIES THAT WILL RETURN HIGH REWARDS TO THE GROWER.

Proper Handling for Quality Cherries

Marlene Long
Quality Control Technician

QUALITY CONTROL FROM PICKING TO PROCESSING

MARLENE LONG

QUALITY CONTROL TECHNICIAN

TOPICS OF DISCUSSION

- Best harvest practices
- Maintaining cherry quality in orchard after harvest
- Packing house equipment and procedures
- Packaging options

PACKINGHOUSE HANDLING PRIORITIES

Maintain cherry quality by keeping fruit temperature low and relative humidity high.

Handle fruit with care to avoid mechanical damage.

Use good sanitation practices to prevent disease and decay.

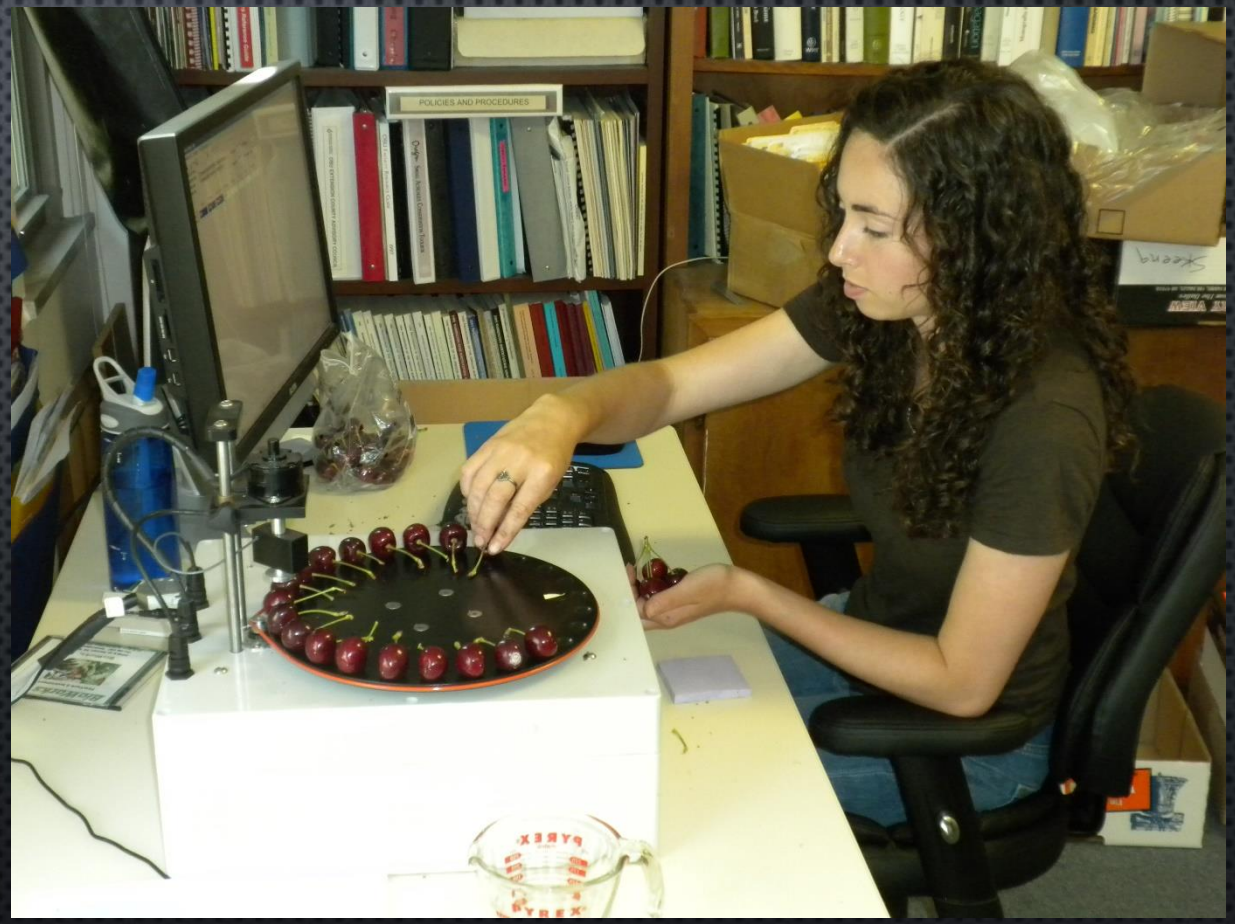
ARRIVAL AT PACKING FACILITY

SAMPLES COLLECTED FOR EVALUATION TO DETERMINE MARKETABILITY.

PULP TEMPERATURE MEASURED. <26 C

Firmness/Texture measured with durometer avg. >70 firm, 80 for export

Firmness/Texture measured with Firm Tech II avg. >225 g/mm firm, 275 for export



Fruit dumping onto packing line

Small totes being hand-dumped into bin. Water temperature is 0 C.

Automated dumping of totes. Totes are tipped after submerged.

FRUIT SORTING

Hand sorting for color and defect elimination.

Number of sorters needed dependent on fruit volume and quality of fruit.

MECHANICAL CHERRY SIZERS

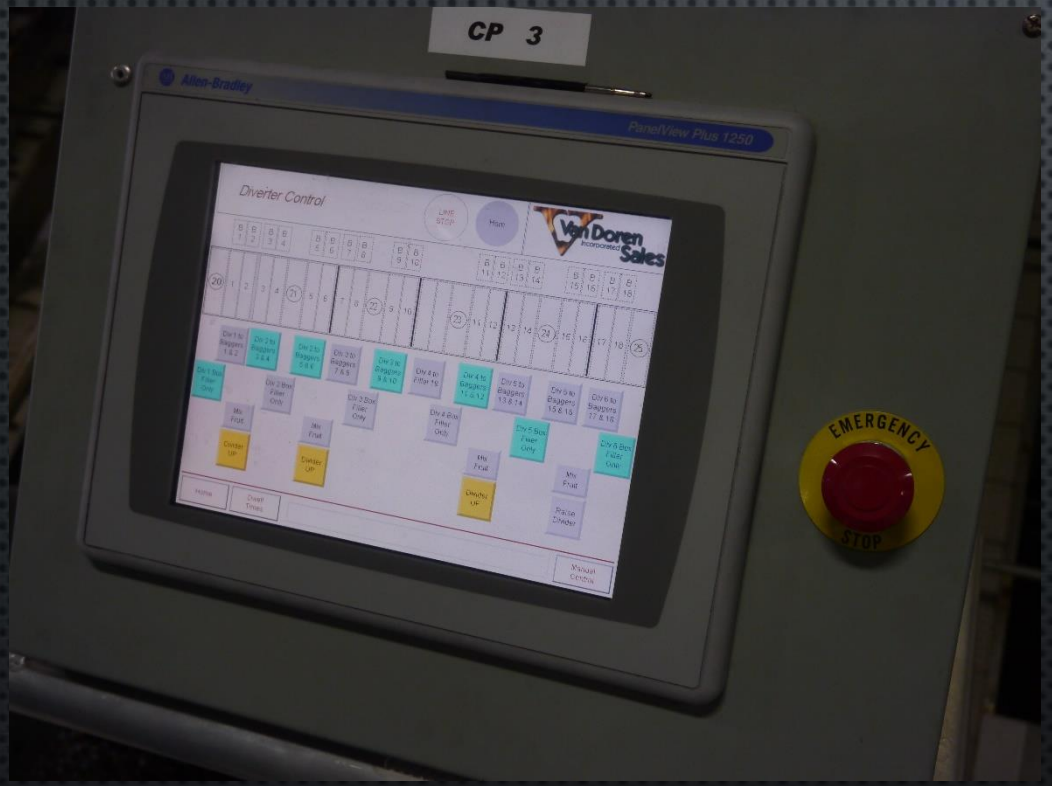
CHERRIES TRAVEL BETWEEN ROLLERS OF DIFFERING SPACING, FALLING THROUGH THE SPACE WHERE THEY FIT TO A WATER TROUGH.

NOT A PERFECT SYSTEM BECAUSE CHERRIES ARE NOT COMPLETELY ROUND AND SHAPE VARIES WITH VARIETY.

MECHANICAL CHERRY SIZERS

SPACING OF THE ROLLERS CAN BE COMPUTER- CONTROLLED TO ADJUST TO SIZES BEING RUN.

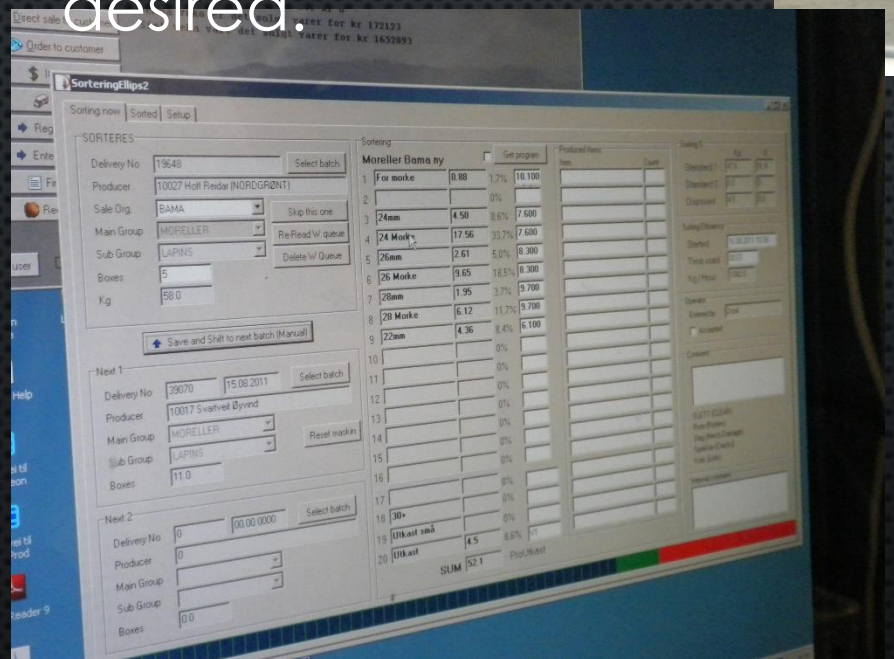
COMPUTER CAN ALSO DIVERT DIFFERENT SIZES TO SPECIFIC TROUGHS FOR PACKAGING.



ELECTRONIC CHERRY SORTING

Simple electronic system sorts for size only. Computer is programed for the needs of the packer according to sizes desired.

Cherries are removed by a gentle puff of air to the appropriate packing lane.



Cherries are singulated before passing under a camera.

ELECTRONIC CHERRY SORTING

Technologically advanced sorting system. Sorts for size, color, defects and firmness.

Camera takes several images of each individual cherry as well as using laser detection of interior quality.

Removes subjectivity from sorting as well as reducing number of laborers

Warm Cherries Warm Faster Than Cool Cherries due to Heat of Respiration

Fruit must be cooled to at least 10C before it is packaged.

FRUIT PACKAGING

BULK PACKAGING. FROM 2.5KG-9KG.

CONSUMER PACKS. BASED ON DEMANDS OF THE MARKETERS.

FRUIT PACKAGING

Consumer packaging into clam shells for domestic market.

Consumer packaging into clam shells, with liner in box for export.

MODIFIED ATMOSPHERE PACKAGING

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Cherries packaged with MAP bag.

MAP cherries five weeks old.

MODIFIED ATMOSPHERE PACKAGING

1. MAP (modified atmosphere packaging) does not improve the quality of the fruit.
2. It is unlikely that appreciable benefits from MAP will be observed in less than 7 to 10 days.
3. Many different films with varying permeability are available. Varieties differ in rates of respiration so type of bag used will vary.

MODIFIED ATMOSPHERE PACKAGING

4. Carbon dioxide is the most important component of MAP on cherries. Preferred gas levels are low O_2 of 3-7% and CO_2 of 7-10%.
5. Storage life will be extended up to six weeks.

COLD ROOM STORAGE

Boxes palletized.

Placed in cold room ready for shipping.

Room temperature -1C to -3C.

High humidity.

Fruit must be cooled to appropriate temperature before it is packaged.

FORCED-AIR (PRESSURE) COOLING

- Necessity if fruit is not hydro-cooled in packing line or if fruit is not packed at 0 C.
- Forced air cooling relies on pressure gradient.
- Fan pulls cold air from room through boxes lowering temperature of fruit.

FORCED-AIR COOLING

- If pack fruit at 10 C passive system will take 200 cold storage hours to drop temp to 0 C.
- Boxes must be vented.
- With vented boxes (2.5 cm) temp will drop to desired level in 15 hours with forced air cooling.


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