Honeycrisp Production In Washington
Lessons Learned

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As it should be
18th leaf Fuji
Maverick Orchard
Volume has tripled in last 5 years with 8.9M boxes in 2015
Nursery

The rise of Honeycrisp

Year of planting

Estimated
<table>
<thead>
<tr>
<th>Redder and Earlier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Royal Red</td>
</tr>
<tr>
<td><img src="image1" alt="Royal Red" /></td>
</tr>
</tbody>
</table>

Source: GFG
...Challenges...

- Bi-annual bearing
- Judging maturity
- Bruising
- Decay
- Sunburn
- Sensitive to low oxygen, high CO₂, low storage temps.
- Off flavor after longer storage
- Stem bowl and side splits
- Internal browning on the tree
- Birds love it
- Sequential picking needed
- Short stems
- Earwigs
Until something better comes along
You too can lose money!

To make money you need to spend money.
Bruce Allen
Mike Robinson
Richard Thomason
Average sunburn development (Scale 0-5)

Average sunburn increase over time

- 22-Aug
- 26-Aug
- 29-Aug
- 2-Sep
- 5-Sep

Sunburn

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
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</thead>
<tbody>
<tr>
<td>WEST</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>EAST</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Heat Stress and Sun Stress

Rotating applications of
Raynox and Surround
EC / misting
Shade cloth
Shade Cloth + EC
Effects on physiology of apple under photo-selective anti-hail nets

Dr’s Lee Kalcsits, Stefano Musacchi, Desmond Layne
Washington State University
Photoselective Netting Colors
Blue, Pearl and Red netting compared to an uncovered control

<table>
<thead>
<tr>
<th></th>
<th>Mean Temperature (°F)</th>
<th>Relative Humidity</th>
<th>Light Intensity (umol m$^{-2}$ s$^{-1}$)</th>
<th>Wind Speed (feet s$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>76.75 a</td>
<td>0.387 a</td>
<td>1804 b</td>
<td>5.53 a</td>
</tr>
<tr>
<td>Blue</td>
<td>76.29 b</td>
<td>0.384 a</td>
<td>1404 a</td>
<td>3.45 b</td>
</tr>
<tr>
<td>Pearl</td>
<td>76.32 b</td>
<td>0.376 a</td>
<td>1459 a</td>
<td>3.63 b</td>
</tr>
<tr>
<td>Red</td>
<td>76.14 b</td>
<td>0.379 a</td>
<td>1355 a</td>
<td>3.33 b</td>
</tr>
</tbody>
</table>

Credit: Sindhija Sankaran and Lav Khot
Wind?
Bird Management

- 4% sugar solution:
- 4lbs. Cane sugar / 100gal.

- Bird Shield
Light management

- Pre-harvest reflective foil
- Extenday products
  - Difficult on rolling slopes
Roots

• Won’t Bloom (M26 / M111)
• Won’t Return (M9 types)
• Won’t Grow (M9 types)
• Low Yields (Need more precocious)
Statistically, G.890 is biggest; G.210, G.30, G.935, G.969 and M.9 Nic 29 are similar; G.11, M.9 337, G.41 and G.214 are the same; Bud 9 smallest,
2015 East Wenatchee Honeycrisp

- Spring 2015
- Fall 2015

<table>
<thead>
<tr>
<th>Variety</th>
<th>TCSA cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bud 9</td>
<td></td>
</tr>
<tr>
<td>G.214</td>
<td></td>
</tr>
<tr>
<td>G.41</td>
<td></td>
</tr>
<tr>
<td>M.9 T337</td>
<td></td>
</tr>
<tr>
<td>G.11</td>
<td></td>
</tr>
<tr>
<td>M.9 Nic 29</td>
<td></td>
</tr>
<tr>
<td>G.969</td>
<td></td>
</tr>
<tr>
<td>G.935</td>
<td></td>
</tr>
<tr>
<td>G.30</td>
<td></td>
</tr>
<tr>
<td>G.210</td>
<td></td>
</tr>
<tr>
<td>G.890</td>
<td></td>
</tr>
</tbody>
</table>
Statistically, M.106 is biggest, G.210 is separate; G.890, G.969, G.935 are similar; M.9 Nic29, G.214, G.11, M.9 337 and G.41 are similar; Bud 9 smallest.
Current interest:
G.214, G.210, G.969 and G.890 for extra vigor
These rootstocks are VIGOROUS as non bearing trees
Crop density will calm them
Vigor/HEALTH will sustain very high yields better than M.9
2nd Year –
Sleeping Eye Honeycrisp Planting
Systems

- We have on every system – responds well to 3D and 2D
- Vertical and V
- Most are successful
- Grower (and site) dependent
BMR: Royal City
Fill the space / Grow the Tree

• More fruiting units per acre

• Stress
  – Nitrogen
  – Water
  – Weed free
  – Netting / cooling
  – Mildew control
  – Remove flowers

Mike Robinson
End of first leaf, 2.5’ X 11’
Most trees to 7 feet. Top wire 11 feet

Mike Robinson
Aggressive fertigation
Weekly soil testing for salt and N
Weekly mildew and leaf feed spray
2015 crop

2015 season water use approx. 2 acre feet includes frost

Deep reading in grey
Shallow reading in blue

May
July
September

Mike Robinson
Crop load management = Higher average production

8\textsuperscript{th} leaf 3 year ave. 31 BPA

6\textsuperscript{th} Leaf 3 year ave. 69 BPA
Crop load management = Consistent quality

50% 3rd grade no top grade  80% top grade
Crop load management = Consistent size

Size 27 $30 a box

Size 80 $70 a box
Large size equals more Bitterpit
Large size = reduced packouts

<table>
<thead>
<tr>
<th>Peak size</th>
<th>Ave packs / bin</th>
<th>Ave $ / box</th>
<th>Gross $ / bin</th>
<th>Packing cost per bin</th>
<th>Net per bin</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>10</td>
<td>$30</td>
<td>$300</td>
<td>$200</td>
<td>$100</td>
</tr>
<tr>
<td>80</td>
<td>16</td>
<td>$70</td>
<td>$1120</td>
<td>$232</td>
<td>$888</td>
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</tbody>
</table>

Packouts on lots heavy to very large sizes are always low.

Size 80 Packing costs from WSU fact sheet fso62e Galinato and Gallardo

Ave $ / box are a SWAG estimate based on observed 2014 crop sales

Mike Robinson
Count buds, Count flowers, Count fruits, Repeat................
Get the look, look a lot

Mike Robinson
Honeycrisp thins like a Gala when young and Fuji when mature

Positives:
Low cost. No labor demand

Negatives:
Lack of precision, potential for over-thinning, under-thinning and unwanted singles
# Cost

## Honeyscrisp production costs

<table>
<thead>
<tr>
<th>Yield</th>
<th>Growing cost</th>
<th>Hand bloom thinning cost</th>
<th>Harvest cost</th>
<th>Total Per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>69 BPA</td>
<td>$5,582</td>
<td>$1,500</td>
<td>$2,760</td>
<td>$9,842</td>
</tr>
<tr>
<td>31 BPA</td>
<td>$5,582</td>
<td>$0</td>
<td>$1,240</td>
<td>$6,822</td>
</tr>
</tbody>
</table>

Growing costs from WSU fact sheet fso62e Galinato and Gallardo
Assume 1452 TPA spindle

Mike Robinson
## Net per acre, small vs. large size fruit

<table>
<thead>
<tr>
<th>Peak size</th>
<th>Ave packs / bin</th>
<th>Ave $ box</th>
<th>Gross $ bin</th>
<th>Packing cost per bin</th>
<th>Net per bin</th>
<th>Bins</th>
<th>Per acre</th>
<th>Cost</th>
<th>Per Acre net</th>
</tr>
</thead>
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<tr>
<td>36</td>
<td>10</td>
<td>$30</td>
<td>$300</td>
<td>$200</td>
<td>$100</td>
<td>69</td>
<td>$6,900</td>
<td>$6,822</td>
<td>$78</td>
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<tr>
<td>80</td>
<td>16</td>
<td>$70</td>
<td>$1120</td>
<td>$232</td>
<td>$888</td>
<td>69</td>
<td>$61,272</td>
<td>$9,842</td>
<td>$51,430</td>
</tr>
</tbody>
</table>

Mike Robinson
Net per acre, low vs. high production

<table>
<thead>
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<th>Ave packs / bin</th>
<th>Ave $ box</th>
<th>Gross $ bin</th>
<th>Packing cost per bin</th>
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<th>Bins</th>
<th>Per acre</th>
<th>Cost</th>
<th>Net</th>
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<td>80</td>
<td>16</td>
<td>$70</td>
<td>$1120</td>
<td>$232</td>
<td>$888</td>
<td>31</td>
<td>8</td>
<td>$6,822</td>
<td>$20,706</td>
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<tr>
<td>80</td>
<td>16</td>
<td>$70</td>
<td>$1120</td>
<td>$232</td>
<td>$888</td>
<td>69</td>
<td>2</td>
<td>$9,842</td>
<td>$51,430</td>
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Mike Robinson
Earwigs

• Remove triples

Aug. 19, Chiawana
Doubles reduce size and increase yield

Honeycrisp in Columbia Basin of Washington
Preharvest sprays

• ReTain and Harvista
  – Widen harvest window
• Stop Drop (NAA)
  – Twice
Timing of harvest

**Too early**
- Increased bitterpit
- Less color
- Smaller size
- Lack of flavor

**Too late**
- Reduced storage life
- Skin greasiness
- Bruising
- Preharvest drop
Maturity determination

Color
Percent acid   0.6
Starch movement 60%
Firmness 14+
Soluble solids concentration 13

Starch Iodine Index Honeycrisp
Maturity determination

FRUIT NEEDS TO TASTE GOOD!
The Good the Bad and the Ugly

• Ugly = run now, Bad = run as soon as Ugly, Good = Run between Jan. and May

  – What factors decide what fruit gets ran when?
    • Age of Block
    • Crop load and or fruit size
    • Storage index of fruit at harvest (mineral analysis)
    • Block History – has it gone long term before?
    • Fruit pressure
    • Malic acid content
    • Fruit starch content
    • Willingness of grower to take a chance

  – Growers tag bins Green(good), yellow(bad) and Red(Ugly)
Bruising
Flavor Wake Up

Flavor Classification

- **apple flavor**
- **no flavor**
- **off flavor**