Preliminary Studies of Mechanically Harvested Blueberries for Fresh Markets in Florida

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Blueberry Variety Selections for Mechanical Harvesting and Fresh Pack

- Funding source – USDA Specialty Crops Block Grant.
- Funding agency – Florida Department of Agriculture and Consumer Services.
- Grant Recipient – Florida Blueberry Growers’ Association.
- Investigators – Paul Lyrene, Jeff Williamson, Steve Sargent, and Jim Olmstead.
Grant Components

• Breeding for mechanical harvest
• Analysis of efficiency of machine harvesting selected cultivars and advanced selections.
• Postharvest physiology of machine harvested berries.
Korvan harvester
Base pruned plants
Plant material

• 2009 – 13 cultivars and advanced selections from the UF breeding program.

• 2010 – ‘Meadowlark’, ‘Farthing’, and ‘Sweetcrisp’
‘Sweetcrisp’
‘Meadowlark’
‘Farthing’
Day of harvest: cooling to 50F
Fruit grading on packing line
Fruit Storage
Machine Picked

Day of Harvest
- Cooled to 50F at packinghouse
- Held overnight in lugs

Next Morning
- Run over packing line
- Sorted; packed into 125 g clamshells
- Returned to lab
Seasonal Packout of three SHB cultivars harvested by hand and by machine - 2010

### ‘Farthing’

<table>
<thead>
<tr>
<th>Harvest Method</th>
<th>Marketable (%)</th>
<th>Immature (%)</th>
<th>Soft (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand</td>
<td>94.3</td>
<td>4.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Machine</td>
<td>80.5</td>
<td>17.3</td>
<td>2.2</td>
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<tr>
<td>Significance</td>
<td>0.0039</td>
<td>0.0051</td>
<td>0.0356</td>
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</table>

### ‘Meadowlark’

<table>
<thead>
<tr>
<th>Harvest Method</th>
<th>Marketable (%)</th>
<th>Immature (%)</th>
<th>Soft (%)</th>
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</thead>
<tbody>
<tr>
<td>Hand</td>
<td>92.1</td>
<td>6.2</td>
<td>1.7</td>
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<tr>
<td>Machine</td>
<td>84.1</td>
<td>11.9</td>
<td>4.0</td>
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<td>Significance</td>
<td>0.0058</td>
<td>0.0133</td>
<td>0.0005</td>
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### ‘Sweetcrisp’

<table>
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<th>Harvest Method</th>
<th>Marketable (%)</th>
<th>Immature (%)</th>
<th>Soft (%)</th>
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</thead>
<tbody>
<tr>
<td>Hand</td>
<td>95.3</td>
<td>3.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Machine</td>
<td>77.4</td>
<td>20.6</td>
<td>1.9</td>
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<td>Significance</td>
<td>0.0030</td>
<td>0.0006</td>
<td>0.0682</td>
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Combined seasonal packout for ‘Sweetcrisp’, ‘Meadowlark’ and ‘Farthing’ – 2010

<table>
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<th>Harvest method</th>
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<th>Immature</th>
<th>Soft</th>
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<tr>
<td>Hand</td>
<td>93.9</td>
<td>4.8</td>
<td>1.3</td>
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<tr>
<td>Machine</td>
<td>80.7</td>
<td>16.6</td>
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<tr>
<td>Significance</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0008</td>
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</table>
- Cultivars: ‘Farthing’, ‘Meadowlark’ and ‘Sweetcrisp’
- Picked, packed into 125 g clamshells
- Stored at 1 °C
- Evaluated at 0, 7, 14 days
Percent shrivel - 2010

Shrivel (%)

- Meadowlark
- Farthing
- Sweetcrisp

Hand Mechanical Hand Mechanical
7 d 14 d

0 20 40 60 80 100 120

UF FLORIDA LAND GRANT UNIVERSITY Results Beyond Education
Percent soft berries - 2010

- Hand Mechanical
- Meadowlark
- Farthing
- Sweetcrisp

Soft Berries (%)

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<tr>
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<th>7 d</th>
<th>14 d</th>
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<tr>
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<td>Hand</td>
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<tr>
<td>Mechanical</td>
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Results Beyond Education
Fruit ripeness and bruising

Drop tests for bruising

- Fruit (‘Sweetcrisp’, ‘Star’, ‘Emerald’) tagged at red/purple stage; harvested at early and late blue stages.
- Stored overnight at 5°C
- Brought to room temperature, dropped once from 61 cm (n=10).
- Stored at 5°C for 3 days then evaluated for bruising.
Impact bruising
Spring 2012 – Drop Tests

Emerald           Star      Sweetcrisp

Soft berries (%)

- Early Blue
- Late Blue

- Emerald
- Star
- Sweetcrisp
Summary

• Significant packout losses occurred from the harvest of immature fruit.
• Marketable packout was about 81% for machine and about 94 % for hand harvested fruit.
• Apart from packout losses, significant losses occurred from blue and immature fruit dropped on the ground by the harvester.
• Mechanically harvesting resulted in a high incidence of soft berries, especially during storage.
• For the drop tests, the firm-fruited cultivar ‘Sweetcrisp’ had and fewer soft blueberries than ‘Emerald’ or ‘Star’.
Acknowledgements

- United States Department of Agriculture
- Florida Department of Agriculture and Consumer Services
- Straughn Farms, Waldo FL.
- Island Grove Ag. Products, Island Grove, FL
Thank you!

Questions?