Cherry Innovations®

Cherry Road Show 2017

By R.J. Nissen & Matt Whiting
Future Cherry Orchards

Key Production Trends?

Yield

Quality

Costs
To remain competitive the cherry industry must improve efficiency
Future cherry orchards

- Economically Profitable
- Environmentally sustainable
- Right cultivars
- Planted in the right location
- Grown with the right management/cultural practices
- Targeted at specific markets
- Stable yields & balanced production
- Produce high quality fruit, marketability & storability
- Efficient and effective production & marketing systems
Is this the orchard of the future?
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Australia
Is this the orchard of the future?

Australia

USA
Key components of future cherry orchards

- Profitable & sustainable
- Precious & constantly productive
- Simple to manage
- Pruning & training - simple, efficient productive canopies

Ability to utilise automation & mechanisation (drive costs down)
Production Systems?

Where do you want to be?

Input vs. Output

- LO/LO: Low/Output
- HI/LO: High/Input
- LO/Hi: Low/Output
- HI/HI: High/Output
Large canopies are too complex:

- Slow to operate – control fruiting wood, nutrition etc.,
- Difficult to manage – pruning & training, harvesting, costs of pests & disease control
- Dangerous and costly
Middle Age Systems

- Complex, large canopies
- Too much interpretation
- Dangerous
- Slow

USA
Is this what we want?

What production systems can deliver this result?
Is the future cherry orchard this?

- 2 dimensional fruiting walls
- Simple to manage
- Easy to manipulate through management practices
- Reduced management costs

• Increased set up costs
Is the future cherry orchard this?

- Compact, fruiting wall
- Repeated processes
- Efficient
- Suitable for mechanization/automation
Key critical factor: PAR interception of vertical and angled fruiting walls
Benefits of fruiting walls:

PAR interception: vertical vs. angled fruiting walls

Diurnal trend

Yield potential on angled canopies is greater than planar canopies

5 year old ‘Santina/Giselar 12
35 tonnes / ha (Y-trellis UFO)
Harvest efficiency

- Test in sweet cherries and apples
- Training systems have a substantial effect on harvesting efficiency and costs

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Training System</th>
<th>Mean Harvest Rate (kg/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sweet Cherries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bing/‘Mazzard’</td>
<td>Traditional open center</td>
<td>0.47 ± 0.12</td>
</tr>
<tr>
<td>Chelan/‘Mazzard’</td>
<td>steep leader (4-5 upright leaders)</td>
<td>0.53 ± 0.13 (+13%)</td>
</tr>
<tr>
<td>Tieton/‘G15’</td>
<td>Central leader</td>
<td>0.64 ± 0.19 (+36%)</td>
</tr>
<tr>
<td>Sweetheart/‘Mazzard’</td>
<td>KGB</td>
<td>0.72 ± 0.17 (+53%)</td>
</tr>
<tr>
<td>Cowiche</td>
<td>UFO</td>
<td>0.81 ± 0.18 (+72%)</td>
</tr>
<tr>
<td><strong>Apple</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuji (Apple)</td>
<td>moderate density (7 x 13) central leader</td>
<td>3.58</td>
</tr>
<tr>
<td>Braeburn (Apple)</td>
<td>high density tall spindle</td>
<td>5.61 (+60%)</td>
</tr>
</tbody>
</table>
Is the future cherry orchard this?

Other crops, what is happening?

Australia

- Capture 70% of available light
Australia
What are the effects of these new systems?

Double row V trellis system

- **Tree spacing**: 1.5 m between trees
- **Row spacing**: 4 metres between rows
- **Trees**: 2286 trees/ha

Single row non-trellis system

- **Tree spacing**: 3 m between trees
- **Row spacing**: 4 m between rows
- **Trees**: 833 trees/ha

**Economics**

**Australia**
Labour efficiency

Precision Horticulture

Labour monitoring systems
Mechanical harvest

- Taking short- and long-term look using total systems approach
  - Mechanical assist (shake-and-catch)
  - Fully mechanical harvest
Key components

- Improve labour efficiency & safety
- Mechanisation or assisted mechanisation

USA

- 3-4 fold improvement in harvest efficiency with shake-and-catch system
- Worked with 10 growers in 2013/2014 to test/demonstrate the system
- Sold stem-free and stem-on cherries (same price, package, orchard)
Key components

- Are stem free cherries accepted by domestic and export markets?
Key components

- New packaging and marketing by Chelan Fresh
Key component

- Improve labour efficiency & safety
- Mechanisation or assisted mechanisation

USA

- Limb tying
- Thinning
- Pruning
- Harvesting

- Work at night
Key component

Determine best management practices for pruning sweet cherry and apple mechanically, by understanding equipment and orchard requirements.
Mech pruning 23 and 29 times faster than hand pruning (hedging and topping) in 2014 and 2015.

Combination of manual and mech. pruning was twice as fast as hand pruning (ca. 2.0 km/h)
Results: Efficiency 2015

Mech + hand pruning was 66% more efficient than hand pruning alone.
Mech pruning was 11 times more efficient than hand pruning.
Australia

- Palmette training systems (close planted) 1.75 m x 4 m (1428 trees/ha)
- Use of growth bio-regulators (split applications of 2 ml/tree, 4ml/tree total)
- Mechanical pruning in spring & post-harvest topping & hand pruning in winter
- Peach cultivar - TropicBeauty 30% reduction in pruning costs
  - $2.39/tree or $2987/ha
- Nectarine cultivar – Sunwright 31% reduction in pruning costs
  - $2.54/tree or $3175/ha
ASSUMPTIONS:
- 1 acre of UFO ‘Tieton’/‘Gisela5’
- Full canopy
- 1350 trees/ha

1 person
8 hours work/day
$12/h
UFO pruning rules

<table>
<thead>
<tr>
<th>Estimated pruning costs</th>
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<tr>
<td></td>
<td>$741</td>
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<tr>
<td></td>
<td>$168</td>
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<td></td>
<td>$590</td>
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Results:

- Mech-assist pruning was 7 times faster than hand
- Slight improvement (+12%) in colour with both timings
- Slight reduction (-9%) in soluble solids at 20 dbh
- Return bloom, regrowth TBD

Trial:

‘Rainer’/’Giselar® 5’

Treatments
- Control (unpruned)
- Hand-pruned
- 20 days before harvest
- 10 days before harvest
Future Cherry Orchards

What is the future cherry orchard?

Totally new production systems in the foreseeable future (decision aid systems for growers)

- New orchard design
- New trellising systems
- New tree architecture
- New cultivars
- New rootstocks
- New canopy management systems (pruning & training)
- New plant bio-regulators (excessive vegetative growth = poor fruit quality & fruiting capacity)
- New nutritional and irrigation systems (mechanisation of delivery, control & monitoring)
- Mechanisation or mechanical assistance of labour intensive tasks (pruning & training, harvesting, post-harvest handling) – use of precision horticulture systems & electronics

Benefits: Reduction in the production system costs

Enhanced fruit quality; yield stability & predictability; profitability & sustainability
What is the future cherry orchard?

Thankyou Ladies and Gentleman