Five Steps Toward a Profitable Vineyard and Satisfied Customers

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Cornell University

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What I Know about Viticulture in Iowa

• 738 acres of grapes – 2008
• Most planted since 2000
• 200 growers
• 50 wineries
• 2.4 acres/vineyard
• $1000/ ton for MN varieties
• “Seller’s Market” for grapes
The Finger Lakes

- 10,000 acres of grapes
- Grape production since 1850s
- 200 growers
- Median vineyard size: 35 acres
- Bulk grapes $230-300/ton
- Premium grapes $1600-$2000/ton
- 100 wineries
New York Grape Production

Thousand Islands (Watertown)

Lake Ontario Plain (Orleans, Monroe, Wayne)

Champlain (Willsboro)

Lake Erie Region

Finger Lakes

Hudson Valley

Long Island
Wine Grape Varieties Grown in the Finger Lakes

- **Native American**
  - Concord
  - Niagara
  - Catawba
  - Delaware
  - Elvira
  - Diamond
  - Isabella
  - Fredonia
  - Dutchess
  - Ives

- **Interspecific Hybrids (‘French Hybrids’)**
  - Aurore
  - Baco noir
  - Dechaunac
  - Seyval blanc
  - Marechal Foch
  - Leon Millot
  - Chancellor
  - Rougeon
  - Chambourcin
  - Cascade
  - Colobel
  - Chelois
  - Vignoles
  - Vidal Blanc
  - Vincent
  - Ventura

- **Interspecific Hybrids (Geneva)**
  - Cayuga White
  - Traminette
  - GR-7 (numbered)
  - Melody
  - Chardonnel
  - Noiret (new variety)
  - Corot noir (new)
  - Valvin Muscat (new)

- **Vitis vinifera**
  - Chardonnay
  - White Riesling
  - Cabernet Franc
  - Pinot Noir
  - Cabernet Sauvignon
  - Gewurztraminer
  - Merlot
  - Lemberger
  - Viognier
  - Sauvignon Blanc
Pleasant Valley Wine Company
Great Western Champagne - 1865

Photo: Culture in a Glass
Small Wineries

- 100 in Finger Lakes
- 10-20% growth per year in 90s
- 40,000 visitors/year
- $14.50 Average sales/customer
Finger Lakes Riesling Has ‘Arrived’

“Mosel and the Rheingau would have to be considered the ultimate for Riesling, the greatest Rieslings in the world,” said Linda Lawry, director of the International Wine Center in New York City. “And you can favorably compare Finger Lakes Rieslings to them.”
Not by chance!

**Farming for Flavors**

**Viticulture**
- Canopy Management
- Disease Management

**Enology**
- Fermentation temperatures
- Yeast Strains
Farming for Flavors

- Flavors are what you are selling
- Quality throughout grape and wine production chain
- Deliver clean, ripe fruit to winery customers
- Make money doing so

Fred Frank
Konstantin Frank Vinifera Wine Cellars
Vineyards are a long-term investment

<table>
<thead>
<tr>
<th>Project Year</th>
<th>Actual Year</th>
<th>Income</th>
<th>Accumulated Income or (Expense)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Plant Year</td>
<td>2005</td>
<td>$0.00</td>
<td>($547.47)</td>
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<tr>
<td>Year 1</td>
<td>2006</td>
<td>$0.00</td>
<td>($5,749.07)</td>
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<tr>
<td>Year 2</td>
<td>2007</td>
<td>$0.00</td>
<td>($7,279.56)</td>
</tr>
<tr>
<td>Year 3</td>
<td>2008</td>
<td>$1,500.00</td>
<td>($8,670.64)</td>
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<tr>
<td>Year 4</td>
<td>2009</td>
<td>$3,000.00</td>
<td>($8,399.80)</td>
</tr>
<tr>
<td>Year 5</td>
<td>2010</td>
<td>$3,500.00</td>
<td>($7,318.68)</td>
</tr>
<tr>
<td>Year 6</td>
<td>2011</td>
<td>$3,500.00</td>
<td>($6,172.97)</td>
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<tr>
<td>Year 7</td>
<td>2012</td>
<td>$3,500.00</td>
<td>($4,935.96)</td>
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<tr>
<td>Year 8</td>
<td>2013</td>
<td>$3,500.00</td>
<td>($3,647.29)</td>
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<tr>
<td>Year 9</td>
<td>2014</td>
<td>$3,500.00</td>
<td>($2,258.75)</td>
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<tr>
<td>Year 10</td>
<td>2015</td>
<td>$3,500.00</td>
<td>($809.44)</td>
</tr>
<tr>
<td>Year 11</td>
<td>2016</td>
<td>$3,500.00</td>
<td>$749.37</td>
</tr>
<tr>
<td>Year 12</td>
<td>2017</td>
<td>$3,500.00</td>
<td>$2,389.98</td>
</tr>
</tbody>
</table>

Year 3 – first income
Year 11 – in the ‘black’

Adapted from Domoto 2007, *Cost of Establishing A Vineyard – High Cordon, Iowa State University.*

http://www.agmrc.org/agmrc/commodity/fruits/wine/ineryfeasibility.htm
Five Keys to Vineyard Profitability

• 1. Select an appropriate site and prepare it properly

• 2. Eliminate weed competition under the trellis and manage cover crops and water availability

• 3. Be timely with Disease Management

• 4. Manage canopy and vigor to balance fruit and vegetative growth.

• 5. Develop long-term relationships with your customers and fellow grape growers. Share resources.
1. Select an appropriate site and prepare it properly

• Good sites have:
  – Excellent soil drainage
  – Good air drainage
  – Sufficient soil depth for rooting
  – Lack of climate limitations

What is the ‘value’ of a superior site?
How much is it worth to improve a site?
How much does a missing vine cost me?
Poor Air Drainage
‘Aurore’ Frost Injury in a “Cold Pocket” on 16 Oct 1989

M. Goffinet
Poor Drainage

Crown Gall

Poor Drainage
How much can you afford to pay for a higher yielding site?

6% discount rate, $1,500 per acre land value
10 year period following Vineyard Establishment

<table>
<thead>
<tr>
<th>Yield/T/A</th>
<th>NPV($Ac)</th>
<th>IRR (%)</th>
<th>Diff in NPV (from 3tns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>10,405</td>
<td>11.9%</td>
<td>9,188</td>
</tr>
<tr>
<td>3.8</td>
<td>8,567</td>
<td>11.0%</td>
<td>7,350</td>
</tr>
<tr>
<td>3.6</td>
<td>6,730</td>
<td>10.1%</td>
<td>5,513</td>
</tr>
<tr>
<td>3.4</td>
<td>4,892</td>
<td>9.1%</td>
<td>3,675</td>
</tr>
<tr>
<td>3.2</td>
<td>3,055</td>
<td>8.0%</td>
<td>1,838</td>
</tr>
<tr>
<td>3.0</td>
<td>1,217</td>
<td>6.8%</td>
<td>BASE</td>
</tr>
</tbody>
</table>

Source: G. B. White, *Economic Considerations in planning vineyards and wineries*  
Presentation at *Viticulture 2003 Conference*
Therefore, 1 ton per acre additional annual yield of grapes implies an additional land value of:

\[ \$10,405 (-) \$1,217 = \$9,188 \text{ per acre} \]
or \[ 9,188 \div 10 = \$919 \text{ per each .1 ton of annual grape yield!} \]

**Yield Expectations in the Finger Lakes**

*Vinifera - 3 to 5 T/acre*
*Hybrids - 5 to 7 T/acre*
*Labrusca – 6 to 10 T/acre*

Source: G. B. White, *Economic Considerations in planning vineyards and wineries*  
Presentation at *Viticulture 2003 Conference*
Tile Drainage installation
Laser guided
Extra investments for Site Preparation

<table>
<thead>
<tr>
<th>Improvement</th>
<th>Cost per acre</th>
<th>Breakeven increase in yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tile Drainage (every 2nd row)</td>
<td>$2,500</td>
<td>0.3 Tons/acre</td>
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<tr>
<td>Drip Irrigation</td>
<td>$2,000</td>
<td>0.2 Tons/acre</td>
</tr>
<tr>
<td>Total additional Investment</td>
<td>$4,500</td>
<td>0.5 Tons/acre</td>
</tr>
</tbody>
</table>

Soil Amendments (pH, organic matter) Often return > 0.5 T/acre

- It pays to select the best site possible
- It pays to improve site limitations up front
Cost of a poor climate?

Winter Injury in 2004

Dead Trunks, Live Suckers
June '04

Dead Vines
September '04

Vine Collapse
June '04 - All of '05
## Cost of Winter Injury in 2004

*Finger Lakes Region of New York*

**Table 1.** Estimated losses attributable to winter injury in 2004, through the 2008 crop year.

<table>
<thead>
<tr>
<th>Source</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct crop loss 2004</td>
<td>$5,718,385</td>
</tr>
<tr>
<td>Projected crop loss 2005-2008</td>
<td>$3,031,400</td>
</tr>
<tr>
<td>Vine Replacement costs 2005</td>
<td>$2,086,060</td>
</tr>
<tr>
<td>Retraining/renewal cost</td>
<td>$97,500</td>
</tr>
<tr>
<td><strong>Subtotal Vineyard only</strong></td>
<td><strong>$10,933,345</strong></td>
</tr>
<tr>
<td>Wine retail and wholesale value <em>V. vinifera</em> 2004</td>
<td>$23,409,000</td>
</tr>
<tr>
<td>Wine retail and wholesale value hybrid 2004</td>
<td>$18,082,050</td>
</tr>
<tr>
<td><strong>Subtotal (wine value 2004)</strong></td>
<td><strong>$41,491,050</strong></td>
</tr>
<tr>
<td>Wine Value added 2004 (minus grape cost)</td>
<td>$35,772,665</td>
</tr>
<tr>
<td>Wine retail and wholesale value <em>V. vinifera</em> 2005-2008</td>
<td>$19,941,000</td>
</tr>
<tr>
<td>Wine Value Added 2005-2008 (minus grape cost)</td>
<td>$16,909,600</td>
</tr>
<tr>
<td><strong>Subtotal Wine Value Added only</strong></td>
<td><strong>$52,682,265</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$63,615,610</strong></td>
</tr>
</tbody>
</table>
Cost of a missing vine

Table 1. Financial losses per vine for hybrid and V. vinifera vines assuming one year crop loss for dead trunks or 4 year losses for dead vines.

<table>
<thead>
<tr>
<th>Item</th>
<th>V. vinifera</th>
<th>Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vineyard Losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vines per acre (1)</td>
<td>806</td>
<td>806</td>
</tr>
<tr>
<td>Yield (T/acre)</td>
<td>3.5</td>
<td>5</td>
</tr>
<tr>
<td>Yield per vine(lb)</td>
<td>8.7</td>
<td>12.4</td>
</tr>
<tr>
<td>Price/ton</td>
<td>$ 1,400.00</td>
<td>$ 400.00</td>
</tr>
<tr>
<td>Crop Value/Acre</td>
<td>$ 4,900.00</td>
<td>$ 2,000.00</td>
</tr>
<tr>
<td>Annual Crop Value/Vine</td>
<td>$ 6.08</td>
<td>$ 2.48</td>
</tr>
<tr>
<td>Value - 4 years production</td>
<td>$ 24.32</td>
<td>$ 9.93</td>
</tr>
<tr>
<td>Replanting Costs (2)</td>
<td>6250</td>
<td>4638</td>
</tr>
<tr>
<td>Replanting Cost/vine</td>
<td>$ 7.75</td>
<td>$ 5.75</td>
</tr>
<tr>
<td>Vineyard Cost per missing vine</td>
<td>$ 32.07</td>
<td>$ 15.68</td>
</tr>
<tr>
<td>Wine losses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gal/acre (3)</td>
<td>595</td>
<td>850</td>
</tr>
<tr>
<td>Cases/acre</td>
<td>248</td>
<td>354</td>
</tr>
<tr>
<td>Bottles/Vine</td>
<td>3.7</td>
<td>5.3</td>
</tr>
<tr>
<td>Retail price/bottle</td>
<td>$12</td>
<td>$7</td>
</tr>
<tr>
<td>Wholesale price/bottle</td>
<td>$7</td>
<td>$3.50</td>
</tr>
<tr>
<td>Retail wine value/acre</td>
<td>$ 35,700</td>
<td>$ 29,750</td>
</tr>
<tr>
<td>Wholesale wine value/acre</td>
<td>$ 20,825</td>
<td>$ 14,875</td>
</tr>
<tr>
<td>Retail value per vine</td>
<td>$44.29</td>
<td>$36.91</td>
</tr>
<tr>
<td>Wholesale value per vine</td>
<td>$25.84</td>
<td>$18.46</td>
</tr>
<tr>
<td>Four year retail value</td>
<td>$177.17</td>
<td>$147.64</td>
</tr>
<tr>
<td>Four year wholesale value</td>
<td>$103.35</td>
<td>$73.82</td>
</tr>
<tr>
<td>Wholesale wine value added (missing vines)</td>
<td>$ 71.28</td>
<td>$58.14</td>
</tr>
<tr>
<td>Wholesale wine value added (one year crop loss)</td>
<td>$ 19.76</td>
<td>$15.97</td>
</tr>
<tr>
<td>Retail wine value added (missing)</td>
<td>$ 145.10</td>
<td>$131.96</td>
</tr>
<tr>
<td>Retail wine value added (one year crop loss)</td>
<td>$38.21</td>
<td>$34.43</td>
</tr>
<tr>
<td>70/30 Retail/Wholesale split</td>
<td>$ 122.95</td>
<td>$109.82</td>
</tr>
<tr>
<td>One Year 70/30</td>
<td>$ 32.68</td>
<td>$28.89</td>
</tr>
<tr>
<td>Total economic losses (missing vines)</td>
<td>$ 155.02</td>
<td>$125.50</td>
</tr>
<tr>
<td>Total economic losses (one year)</td>
<td>$ 38.76</td>
<td>$31.37</td>
</tr>
</tbody>
</table>

(1) Planting density of 9 x 6’
(2) Cash costs derived from White (2001); costs of site preparation and trellis construction were subtracted; additional fungicide costs in year 2 were added. Full cash cost of vineyard establishment estimated at $9976 per acre; lower cost for hybrids assumed savings from planting ungrafted vines, or layering.

- **Hybrids ($400/ton, $7/bottle)**
  - 1 yr crop loss = $2.50
  - Missing vine = $15.68
  - Wine Value added = $109.82
  - Total cost = $125.50

- **Vinifera ($1400/ton, $12/bottle)**
  - 1 yr crop loss = $6.08
  - Missing vine = $32.07
  - Wine Value added = $122.95
  - Total cost = $155.72
Replace Vines Promptly
2. Eliminate weed competition under the trellis and manage cover crops and water availability

• Eliminating weeds ‘biggest bang for the buck’.
  – Non-bearing vineyards
  – Under the trellis
  – Row middles (or Alleyways)

• Floor management = water, erosion management.
Weed control during Vineyard Establishment

Excellent Site Preparation

Grow Tubes

Seeded Cover Crop

Cultivation
Weeds during Establishment
## Cost of delaying crop by 1 year

<table>
<thead>
<tr>
<th>Actual Year</th>
<th>Income</th>
<th>Accumulated Income or (Expense)</th>
<th>Income</th>
<th>Accumulated Income or (Expense)</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>$0.00</td>
<td>($547.47)</td>
<td>$0.00</td>
<td>($547.47)</td>
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<tr>
<td>1</td>
<td>$0.00</td>
<td>($5,749.07)</td>
<td>$0.00</td>
<td>($5,749.07)</td>
</tr>
<tr>
<td>2</td>
<td>$0.00</td>
<td>($7,279.56)</td>
<td>$0.00</td>
<td>($7,279.56)</td>
</tr>
<tr>
<td>3</td>
<td>$1,500.00</td>
<td>($8,670.64)</td>
<td>$0.00</td>
<td>($10,170.64)</td>
</tr>
<tr>
<td>4</td>
<td>$3,000.00</td>
<td>($8,399.80)</td>
<td>$1,500.00</td>
<td>($11,399.80)</td>
</tr>
<tr>
<td>5</td>
<td>$3,500.00</td>
<td>($7,318.68)</td>
<td>$3,500.00</td>
<td>($10,318.68)</td>
</tr>
<tr>
<td>6</td>
<td>$3,500.00</td>
<td>($6,172.97)</td>
<td>$3,500.00</td>
<td>($9,172.97)</td>
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<tr>
<td>7</td>
<td>$3,500.00</td>
<td>($4,935.96)</td>
<td>$3,500.00</td>
<td>($7,935.96)</td>
</tr>
<tr>
<td>8</td>
<td>$3,500.00</td>
<td>($3,647.29)</td>
<td>$3,500.00</td>
<td>($6,647.29)</td>
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<tr>
<td>9</td>
<td>$3,500.00</td>
<td>($2,258.75)</td>
<td>$3,500.00</td>
<td>($5,258.75)</td>
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<tr>
<td>10</td>
<td>$3,500.00</td>
<td>($809.44)</td>
<td>$3,500.00</td>
<td>($3,809.44)</td>
</tr>
<tr>
<td>11</td>
<td>$3,500.00</td>
<td>($749.37)</td>
<td>$3,500.00</td>
<td>($2,250.63)</td>
</tr>
<tr>
<td>12</td>
<td>$3,500.00</td>
<td>($2,389.98)</td>
<td>$3,500.00</td>
<td>($610.02)</td>
</tr>
</tbody>
</table>

Adapted from Domoto 2007, *Cost of Establishing A Vineyard – High Cordon, Iowa State University.*

Concord Juice Grape Study  
Weed competition during vineyard establishment

- Vines planted in 2001
- Assume $150 per ton
  (Actual Concord cash price in 2005)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>‘03 tpa</th>
<th>‘04 tpa</th>
<th>total</th>
<th>return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weedy</td>
<td>0.0</td>
<td>1.4</td>
<td>1.4</td>
<td>$210</td>
</tr>
<tr>
<td>Weed-free</td>
<td>3.8</td>
<td>6.5</td>
<td>10.3</td>
<td>$1,545</td>
</tr>
</tbody>
</table>

From: How to Survive at $135 – Extension Workshop for Concord Growers
Under-row weed competition

Concord weed management trials

- Orchard grass - 45% yield reduction
- Summer annuals - 10-15% reduction
- Winter annuals - 0% (not competitive)
- 2 post-emergence only - 7% reduction*

*compared to standard pre-emergence + glyphosate program, based on results of one 4-year experiment - not a “statistically significant” difference
Row Middle Management

Permanent Sod

Cultivation

Killed Sod

Straw Mulch
Concord Row Middle Mgt Study
1992-1995

Budbreak
Mulch
Round-up applied

Cultivate

Orchardgrass

Percent Ground Cover

May June July Aug Sept Oct
Floor management treatments had little effect until around and after bloom when shoots and roots are actively growing.

Concord Shoot Growth 1993 Cover Crop

- Mulch
- RoundUp
- Cultiv
- Orchgrass

Date:
- 13-May
- 2-Jun
- 22-Jun
- 12-Jul
- 1-Aug

Bloom
Soil Water Content (g/cm³)

Seasonal Soil Water Changes with Different Treatments

Concord Cover Crops 1993

Period of Greatest Vine Sensitivity

Date


Soil Water Content (g/cm³)

Mulch
Round-Up
Cultiv
Orchardgrass
Cover crop expt. 1992-95

<table>
<thead>
<tr>
<th>Treatment</th>
<th>tpa</th>
<th>cost</th>
<th>return@$150/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mowed sod</td>
<td>6.5</td>
<td>$24</td>
<td>$951</td>
</tr>
<tr>
<td>Cultivation</td>
<td>7.5</td>
<td>$33</td>
<td>$1,092</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>8.0</td>
<td>$27</td>
<td>$1,174</td>
</tr>
<tr>
<td>Killed rye</td>
<td>8.7</td>
<td>$50</td>
<td>$1,255</td>
</tr>
<tr>
<td>Mulch</td>
<td>9.0</td>
<td>$250?</td>
<td>$1,100</td>
</tr>
</tbody>
</table>

Return = yield@$150/ton minus row middle cost
Break-even points

• At $150 per ton:
• At $30/acre for weed control the “break-even” point = 0.2 tons per acre
• At $55/acre break-even = 0.4 tons per acre
• Even at $150 per ton, good weed control pays off.
Herbicide Sprayers
3. Be timely with disease management

- You need to produce clean fruit to produce quality wine.

- You need healthy foliage to ripen grapes and create vine reserves to carry your vines into the next growing season.
Cluster Infections

- Total crop loss on infected clusters
- Small amounts reduce wine quality
  Powdery mildew < 2% detectable in wines

Remedy:
- Fungicide coverage through 4-6 wk after bloom
- Most critical: immediate prebloom and postbloom.
- Timely spray intervals!
- Good Canopy Management – Exposed Clusters
Disease Management - Foliage

Late Season Downy Mildew Defoliation
4. Manage canopy and vigor to balance fruit and vegetative growth

- Balanced vines have:
  - Good fruit microclimate- clusters are exposed and warm
  - Good leaf exposure for efficient photosynthesis
  - Minimal shade in the fruit zone and renewal zones
Drought Stress 2005
Inadequate Vigor
Traminette – October  2007

Excess Vigor

Exposed

Shaded
Long Island Hortic. Res. Center
Concord – Geneva Double Curtain
Vine Balance- What is it?

- 25-40 g cane weight
- Pruning weight: 0.3 lbs/ft of row or canopy
- Crop loads (yield/vine size ratio) of 5-12
- Yields @ 3-5 lbs/ft canopy
5. Develop long-term relationships with your customers and fellow grape growers. Share resources.

- Hazards of a “Seller’s Market”
- The ‘rare grape’ phenomenon
- As grape supply expands, prices will fall
- What happens when $1000/T grapes become $500/ton grapes?

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Farms</td>
<td>567</td>
<td>445</td>
<td>313</td>
<td>258</td>
</tr>
<tr>
<td>Grape acreage</td>
<td>15,184</td>
<td>14,187</td>
<td>10,647</td>
<td>10,007</td>
</tr>
</tbody>
</table>

Source: New York Fruit Tree and Vineyard Survey, various years.
Quality Sells

• Deliver clean, ripe fruit to the winery
• Communicate with your customers
• Strive for long-term relationship with buyers
• Share resources!
Laser Planting
Grape Harvesting
Mobile bottling Line
33rd ASEV Eastern Section Annual Meeting and Seminar

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