Challenges in Sustainable Agriculture: Tree Fruit Production Along the Wasatch Front

Dr. Jennifer Reeve
Assistant Professor of Organic and Sustainable Agriculture
Utah State University
Overview

- What is sustainable agriculture?
- Challenges to sustainable tree fruit production
- Potential solutions
- New research in:
  - Organic stone fruits
  - Integrated stone fruits
Definition of Sustainable Development

“The ability to meet the needs of the present without compromising the ability of future generations to meet their own needs”

Brundtland Commission 1983
Indicators of Sustainable Agriculture

- Economically viable
- Environmentally safe
- Socially responsible
- Adequate yields of high quality
- Resource conserving
Sustainable farming must be region specific.
Tree Fruit Production along the Wasatch Front

- A prime location for tree fruit production
- Rapid urbanization
- Dwindling water resources
- Rising costs of inputs
- Dwindling export markets
Utah’s Fruit Industry

- Tree fruit (2006)
  - 6,644 acres
  - 306 operations

Chart 1. Tree Fruit Types, Percent of Tree Fruit Acres

- Tart Cherries 48%
- Peaches 19%
- Apples 21%
- Apricots 2%
- Sweet Cherries 9%
- Other 1%
- Pears, Plums/Prunes and Nectarines

Utah Fruit and Berry Survey, 2006
Utah’s Fruit Industry: Acreage


- Peaches: 16,000
- Total cherry: 12,000
- Tart cherry: 14,000
- Sweet cherry: 8,000
- Apples: 4,000
# Utah’s Fruit Industry: Farm size

### 1974

<table>
<thead>
<tr>
<th>Size classification (acres)</th>
<th>Total</th>
<th>&lt; 1</th>
<th>1 - 5</th>
<th>5 - 15</th>
<th>15 - 25</th>
<th>25 - 50</th>
<th>50 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>farms</td>
<td>446</td>
<td>2.7%</td>
<td>23.5%</td>
<td>32.3%</td>
<td>20.0%</td>
<td>13.2%</td>
<td>8.3%</td>
</tr>
<tr>
<td>acres</td>
<td>9871</td>
<td>0.1%</td>
<td>2.7%</td>
<td>12.8%</td>
<td>16.5%</td>
<td>19.7%</td>
<td>48.3%</td>
</tr>
</tbody>
</table>

### 2006

<table>
<thead>
<tr>
<th>Size classification (acres)</th>
<th>Total</th>
<th>&lt; 1</th>
<th>1 - 4</th>
<th>4 - 10</th>
<th>10 - 30</th>
<th>30 - 50</th>
<th>50 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>farms</td>
<td>306</td>
<td>17.3%</td>
<td>38.6%</td>
<td>21.6%</td>
<td>12.4%</td>
<td>2.6%</td>
<td>7.5%</td>
</tr>
<tr>
<td>acres</td>
<td>6642</td>
<td>0.4%</td>
<td>3.1%</td>
<td>5.5%</td>
<td>9.4%</td>
<td>4.4%</td>
<td>77.2%</td>
</tr>
</tbody>
</table>
Utah: Population changes

Statewide

2.3% growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>1,000,000</td>
</tr>
<tr>
<td>1960</td>
<td>2,000,000</td>
</tr>
<tr>
<td>1970</td>
<td>3,000,000</td>
</tr>
<tr>
<td>1980</td>
<td>4,000,000</td>
</tr>
<tr>
<td>1990</td>
<td>5,000,000</td>
</tr>
<tr>
<td>2000</td>
<td>6,000,000</td>
</tr>
</tbody>
</table>

Fruit producing regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utah County</td>
<td>77.9%</td>
</tr>
<tr>
<td>N. Wasatch</td>
<td>14.3%</td>
</tr>
<tr>
<td>Southwest</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

Map used with permission www.utahwild.com
Utah: Population changes

Statewide

2.3% growth

Fruit producing regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Acreage</th>
<th>Growth Rate</th>
<th>Projected Pop. Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utah County</td>
<td>5178</td>
<td>77.9%</td>
<td>3.0%</td>
</tr>
<tr>
<td>N. Wasatch</td>
<td>953</td>
<td>14.3%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Southwest</td>
<td>291</td>
<td>4.4%</td>
<td>5.2%</td>
</tr>
</tbody>
</table>

Map used with permission www.utahwild.com
Utah: Population changes

Utah County

3.0% growth

Population

Year


Utah County

Population density (#/sq. mile)

Year

Utah: Irrigation water supply

- Quantity (water rights)
- Quality (salinity, alkalinity)
Salt Lake County Projected Water Supply vs. Projected High Water Demand

Demand Without Conservation
Demand With Conservation

Existing Ground Water Utah Lake Bear River
Utah Lake 2 Mountain Stream Unknown Supply

Jordan Valley Water Conservation data
Climate Change?
What are the Solutions?

- Labor (automation)
What are the Solutions?

- Labor automation
- Diversification
  - Foods with a story
What are the Solutions?

- Labor automation
- Diversification
- Direct marketing
What are the Solutions?

- Labor automation
- Diversification
- Direct marketing
- Value added
What are the Solutions?

- Labor automation
- Diversification
- Direct marketing
- Value added
- Agro-tourism
What are the Solutions?
What are the Solutions?

- Labor automation
- Diversification
- Direct marketing
- Agro-tourism
- Ecosystem services
  - Provisioning
  - Supporting
  - Regulating
  - Cultural
Organic and Integrated Stone Fruit Production

- Two orchards established in 2008
- Determine interactions between:
  - Mulches
  - Fertilizers
  - Water use
  - Pests
  - Fruit quality
  - Economics
Organic and Integrated Stone Fruit Production

Specific research questions

- Is compost a suitable source of nutrients for young trees? How much is needed?
- Can we grow nitrogen in the orchard without increasing pest pressure?
- How much water is saved through use of mulches?
- Can we overcome competition from cover crops?
- How do cover crops and pests interact?
- How do we optimize fruit quality?
Organic Tree Fruit Production

Treatments:

- Compost + tillage
- Compost + fabric mulch
- Compost + straw mulch
- Compost + alyssum living mulch
- Compost + straw mulch + legume alleys
- Compost + alyssum living mulch + legume alleys
Integrated Tree Fruit Production

- **Treatments:**
  - Conventional NPK + herbicides
  - Compost + herbicides
  - Paper mulch + NPK + reduced herbicides
  - Paper mulch, compost + organic herbicides
  - Conventional NPK + herbicides convert to organic once established.
Conventional
Paper Mulch + Reduced Herbicide
Organic + Paper Mulch
Tillage + Compost
Fabric Mulch + Compost
Alyssum Living Mulch
Straw + Compost
Preliminary Results

[Images of agricultural fields and plants]
Building Local Expertise

- Extension Service
- Grower to grower
- Students
- Field days
- Evening walks
- Web content
- Photo gallery
Acknowledgements

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