Greenhouse Vegetables and Water Conservation
Presentation Overview

• Industry overview
• Growing the crop
• Water conservation
• Horticultural water use
BC Greenhouse Sizes

• 22 operations: 12 to 109 acres
• 18 operations: 2 to 12 acres
• 25 operations: less than 2 acres
High Capital Costs

- Glass structures
- Computer control environment
- Heated by natural gas or wood boilers
- Heat storage tanks, energy curtains & grow pipes
- Some grow lights are used for winter production
- Packing lines
Labour Intensive

- Placement of plastic ground cover, grow bags & transplants
- Leaf pruning
- Twisting
- Harvesting
- Packing
- Fall clean-up
Crops grown

Tomatoes
- TOV, Beefsteak and cocktail

Pepper
- Sweet Bell and Mini

Cucumbers
- Long English, Mini and Cocktail

Lettuce

Eggplant

Strawberries
## Canadian Greenhouse Area

<table>
<thead>
<tr>
<th>Province</th>
<th>Tomato acres</th>
<th>Pepper acres</th>
<th>Cucumber acres</th>
<th>Eggplant acres</th>
<th>Lettuce acres</th>
<th>Total acres</th>
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</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>936</td>
<td>891</td>
<td>726</td>
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<td>BC</td>
<td>259</td>
<td>383</td>
<td>104</td>
<td>2</td>
<td>5</td>
<td>753</td>
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<tr>
<td>Quebec</td>
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<td>12</td>
<td>30</td>
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<td>Alberta</td>
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<td>16</td>
<td>77</td>
<td>1.5</td>
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## North American Greenhouse Area

<table>
<thead>
<tr>
<th></th>
<th>Tomato acres</th>
<th>Pepper acres</th>
<th>Cucumber acres</th>
<th>Total Area acres</th>
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<tbody>
<tr>
<td>Canada</td>
<td>1388</td>
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<td>United States</td>
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<td>Mexico</td>
<td>2162</td>
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<td>875</td>
<td>3912</td>
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Markets

- Tomatoes, cucumbers, peppers and lettuce are regulated products in Canada
- Retailers demand 3rd party food safety audits
- Retailers demand year round supply
- Most produce is sold in Canada and the US
- Minor markets in Japan and Taiwan
- Farm gate value – $290 million (BC) and $1.3 billion in Canada
Propagation House

Rockwool cubes
Graphed tomatoes
Flood irrigation
Mechanization
Production House

- Hydroponic uses drip irrigation
- Coco fibre or peat, rock wool or sawdust growing media
- Crop fed carbon dioxide
- Bumble bee pollinated
- One tomato or pepper crop grown for 10 to 11 months
- One cucumber crop grown for 3 to 4 months
Sanitation and Biosecurity

Start clean, stay clean
Disinfection of cropping area
Foot baths and hand wash stations
Integrated Pest and Disease Management

- Tolerant varieties
- Monitoring & scouting
- Biological Control Agents
- Pesticides only as needed
Water Conservation - Overview

20 – 30% leach (average 25%)

100%

Fertilizer Injector

Blending point of water and leach solution

25%

Disinfection system

75%

Dirty Leach

Clean Leach

Fertilizer stock tanks

Water inlet

Fresh water
Case Study – Sunnybay
Fresh Water

Rainwater collection
Fresh Water

Rainwater retention pond
Fresh Water

City water storage tank
Drain water collection
Drain water treatment

- Heat
- Pasturization
- UV radiation
- Ozonation
- Sand/Gravel
- Lava rock
- Membrane

Sand and gravel filtration
Blending Fresh and Drain Water
Nutrient Injection
Precision Watering

Drip irrigation
Water Utilization

– Extremely efficient water use
– 30 acres of plants use 84 million L annually
– 60 % rainwater
– 40 % city water
– $35,000 water bill
Comparison of tomato production systems

Overview: Horticultural Water Use

Typical values for the volume of water required to produce common foodstuffs*

*Source: Water Footprint Network, University of Twente, Netherlands
Comments or questions?

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