Mechanized Harvesting of bush fruits: Haskap, Saskatoons & Cherries

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Outline of talk

• **Introduction**
• Bush Harvesters: Key Concepts
• Building a repertoire
• Haskaps  Saskatoons  Dwarf Sour Cherries
  • What are they?
  • Flavours & Uses
  • Advantages & Disadvantages
• Conclusion
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- Introduction
- **Bush Harvesters: Key Concepts**
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Key Concept: Mechanized harvesting can be higher quality than hand picked

- Fewer hands are touching fruit
- Fruit can be allowed to fully ripen
- Can harvest at night when temperatures are lower
  - Most Saskatoon growers do this, their fruit ripens during hottest time of summer!
Key Concept: It’s harder to find pickers

- Especially rural areas
- Young people often avoid it
  - In BC they attract kids from colder provinces
- Immigrant Workers
  - Paperwork
  - Prefer to go to places with a longer growing season (make work?)
Key Concept:
Varieties for Mechanized harvesting need certain characteristics

- **Fruit**
  - Durable (or be processed quickly)
  - Optimum fruit retention force
  - Uniform ripening
- **Plants**
  - Flexible branches
  - Proper canopy shape
Handpicked Haskap from Japan, but what about the inside?

Purple colored fruits often look ready a few days before they are ripe.
Machine harvested Saskatoons: 2 different varieties
Uneven ripening is made worse by:

- Machine Harvesting once instead of several times
  - Common if grower relies on someone else’s harvester
  - Grower has several varieties
- Vibration Settings too fast, pulls off unripe fruit
Uneven ripening is made worse by:

- Poor light penetration from not pruning
- Fluctuating temperatures at bloom
- A cool season
- Having seedlings instead of clones
Uneven ripening solutions:

- Hand sorting
- Electronic color sorting
- Processing
Uneven ripening solutions:

- Harvest twice but lower vibration
  - Less unripe berries come off
- Ethylene?
- U-Pick/machine combo
Key Concept: Potential for diseases to spread

- There is always some branch and leaf injury
  - Which machines and settings cause more injury? Take it slow?
- Machines will spread disease, if it is there
- Strategies?
  - Prune or spray after harvest
  - Sanitation
  - Grants to plant pathologists
**Key Concept: Upright Harvester characteristics**

- Greater fruit loss
- Greater fruit damage
- Less plant damage
- Best with single trunks and upright canopy
Key Concept: Sideways harvester characteristics

- Less fruit loss
- Less fruit damage
- More plant damage
- Best with multiple trunks and spreading canopy
- Can pick up fruit closer to ground
Key Concept: Ag Economists claim that 40 acres of fruit justifies buying a mechanical harvester

- Based on Saskatoon berry industry studies
- Hand-picking expenses can be ½ the final price
- Could share among smaller farms?
- Lower end new ~40K?
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Building a repertoire
Building a repertoire crops that go well together

- Use the same harvester but have different ripening seasons
- Similar pruning and training
- Can be made into similar products
  - Similar processing equipment
  - Simpler marketing
  - Same customers
Building a repertoire crops that go well together

- Better use of equipment and facilities
- Spreads cost
- Steady work for employees
- Better cash flow
  - especially appreciated if taking on an earlier crop
- Reduced risk
  - One crop fails? Still have 2 more!
June

Haskap (Blue Honeysuckles)

July

Saskatoons

August

Sour Cherries
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‘Haskap’

- An Anui name
  - Ancient people of Japan
  - Oldest name for this plant, still used in Japan

- Also spelled as: Haskap, Hascup, Haskappu
- Good marketing name to sell into Japan
Haskap

*Lonicera caerulea L.*

Blue Honeysuckles
“Honeyberries TM”
Sweetberry Honeysuckles
Edible Honeysuckles
Swamp Fly Honeysuckle

*Lonicera edulus* (old)
*Lonicera villosa* (old)
Lonicera caerulea germplasm

- 800 wild accessions collected
- 32 Cultivars 20 seed lines
- 45 clones 2000 seedlings
- 7 clones
800 wild Canadian plants gathered from 250 locations
100’s of new seedlings are from Japan and Russia
Habitats where blue honeysuckles were found in Manitoba

- open area near woods
- disturbance zone near a road
- high calcium soils
- seasonal streams
Flavour: Highly variable according to variety

- Sweet and/or Sour
- Some have fruity flavours:
  - Blueberry + raspberry
  - Blueberry
  - Blackberry
  - Saskatoon
  - Mild Black Current
Flavour: Highly variable according to variety

- Grassy
  - Unripe
  - Wild types
- Bitter
  - Some wild types
  - Quinine
    - Has been used in Russia to fight malaria
    - Some Russian breeders deliberately bred for more bitterness: grow your own Tonic Water
Many products can be made with Haskap Berries
Haskap Wine: grape/cherry like
Bush Characteristics

- Never suckers
- Naturally branches out well
- 4ft spacing between row
- 4 to 6 ft high according to variety
- Have seen 30yr old productive bushes in Japan
Pests and diseases

- Aphids
- Grasshoppers
- Powdery mildew
- Botrytis
  - on shoots, not fruit
- Sunscald?
- There is high levels of resistance to diseases in the germplasm
Cold Hardiness

- Dormant shrubs: -45°C
  - In 2003, at U of S - 47°C
- Young, actively growing shoots: -18°C
- Open flowers:
  - -8°C (per Russians)
  - -10°C (per Japanese)
  - -7°C (lab tests at U of S)

M. Thompson, 2001
Flowers

- Need 2 or more varieties to cross pollinate
- Can withstand -7C to open flowers!
- Blooms a month before the last frost
  - 1st food for bees?
- In the boreal forest it is one of the first plants to bloom
Haskaps are different!

- Not in the rose family
- More closely related to tomatoes and potatoes than other fruit crops
- Small not noticed seeds
- Frozen fruit: Skin dissolves in mouth
- High in antioxidants
  - As high or better than blueberries
Preliminary Results
Dr. Mitsko Ukai, University of Hokkaido

- Green Tea: Most popular ‘antioxidant’ in Japan
- Japan haskap, freeze-dried
  - 10x stronger than green tea
- Sk. Haskap, freeze dried
  - 20 to 100x stronger than green tea
  - Depends on variety
- Haskap better than blueberries?
Japanese types: uneven ripening
Russian types: even ripening
32 Russian varieties observed
Best 6 Used for breeding
Lonicera caerulea

germplasm
Learn how to grow using existing varieties but expect major improvements in new varieties in the next few years from our program

- A large collection of Japanese and Russian germplasm has not been brought together before
- Each type has traits to improve the other
- Hybrid vigor
- 20,000 seedlings from controlled crosses are beginning to fruit
- Selecting for Early, mid and late ripening
Maxine Thompson
Retired Oregon State Professor
Breeds Haskap using Japanese germplasm
New U of S variety for 2008

‘Tundra’

• 2nd Largest Fruit
• 2nd ‘Best’ flavour
• Durable
• Commercial potential
New U of S variety for 2008

‘Borealis’

- Largest Fruit
- ‘Best’ flavour
- Delicate
- For home gardens
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Saskatoons
Amelanchier alnifolia
Juneberry
Serviceberry
Saskatoons: A pome fruit

- Many pests, like other pomes
  - Wooly apple aphid
  - Wooly apple aphid
  - Various worm and maggots
- Diseases
  - Fireblight******
  - Saskatoon/Juniper Rust
  - Entomosporium
- At least it fruits early (a bit after strawberries)
Saskatoons Flavour

- Mild mild berry flavour
- Sometimes hint of almonds
  - people often add almond extract when making pies
- Low sweetness
- Not tart
- Some are bland
- Flavor influenced strongly based on location
- Hard to tell which variety is which by flavour
  - Nostalgia?
Fruit characteristics influencing uses

- Pies are a major use
  - Very firm, especially smaller fruited varieties
  - Fruit stays intact when cooked
- Not used as a natural dye
- Purple outside
- Green, white, pink inside when fresh
  - Cooking spreads skin colour to the inside
Fruit characteristics influencing uses

- Pressing for juice results in making dark brown ‘applesauce’
  - But no one makes Saskatoonsauce
  - Probably good for fruit leather
  - Difficult, but possible to make a juice, often blended with another fruit
  - Fruit wines not that great
Uses

- Common
  - Pies
  - Jam
  - Topping
- Sometimes
  - Juice
  - Salad dressing
  - Ice cream
- Rare
  - Wine
  - dried
Uneven ripening: a flaw in all current varieties
Saskatoon Bushes

- All Saskatoons make rhyzomes
  - Making constant problems for upright harvesters
- Some are strongly upright
  - Difficult for sideways harvesters
- Fruit is borne on last year’s wood
  - Tall = fruit out of reach
- Can renew by pruning and burning
Saskatoons

- Stockpiled fruit
- Foodbank donation
- Stockpiled seeds
Is Big Better?
Theissen Vs Northline

- Big fruited berries need shallow trays
- Small ones can have deeper containers

Big fruited berries need shallow trays
Small ones can have deeper containers
Northline

- Best variety for sideways mechanical harvesting
- The only seed variety
  - Plants are cheaper
  - Higher quality
  - Uniform from seed
- Smaller, tough berries
- Multi-trunks, flexible
- #1 choice for recent plantings
Univ. of Sask.
Saskatoon Seedling Evaluations

- Field of ~3000 seedlings maintained from former Native Fruit Program
- Planted 7 years ago
- “No Funding”
- ‘Favourite wild Saskatoons’ from Western Producer ad
Univ. of Sask.
Saskatoon Seedling Evaluations

- Evaluated ~50 families of seedlings
- Common traits:
  - Superior Flavour
  - Average or small size fruit
- Variable: Machine adaptable
- Very Rare Traits
  - Uniform ripening
  - True from seeds
Saskatoons
Saskatoons

- Stockpiled fruit
- Foodbank donation
- Stockpiled seeds
Saskatoons
Row 5: Rarest of Rare!

- Uniform ripening
- True from seed
- Machine adapted

- But only “ok” flavour
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**Conclusion**
Fruit Program Field Plots
(started in 1920)
Selection for Mechanical harvesting & processing
Initial Selection

For Upright harvesters

- Low Suckering
- Upright Growth
Cherries
Upright harvesters
Carmine Jewel, 4 yrs old
Outline of talk

- Introduction
- Breeding Program
  - History
  - Our goals & methods
  - Our Varieties
- Training
  - Harvester types
  - Establishment & Pruning
  - Growth and Production
- Conclusion
# Bush Fruit Differences

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Harvest season</th>
<th>Organic</th>
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<tbody>
<tr>
<td>Honeysuckles</td>
<td>June</td>
<td>Yes</td>
</tr>
<tr>
<td>Saskatoons</td>
<td>July</td>
<td>No</td>
</tr>
<tr>
<td>Sour Cherries</td>
<td>August</td>
<td>Yes</td>
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</tbody>
</table>
# Bush Fruit Differences

<table>
<thead>
<tr>
<th></th>
<th>Harvest season</th>
<th>Shake by hand into tarp</th>
<th>Mech. Harvest</th>
</tr>
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<tbody>
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# Bush Fruit Uses

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<th></th>
<th>Pies</th>
<th>Jam</th>
<th>Juice</th>
<th>Wine</th>
<th>Health food</th>
<th>Dried</th>
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<tbody>
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<td>Mushy</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Saskatoons</td>
<td>Great</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Poor</td>
<td></td>
</tr>
<tr>
<td>Sour Cherries</td>
<td>Great</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Great</td>
<td></td>
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</tbody>
</table>
Obtaining varieties

- U of Sask Cherries:
  - Gardens Alive
- U of Sask Haskap
  - See our website: [www.fruit.usask.ca](http://www.fruit.usask.ca)
  - Canadian companies can ship to USA
- Saskatoons
  - [www.saskatoonfarm.com](http://www.saskatoonfarm.com)
  - [www.Prairieplant.com](http://www.Prairieplant.com)
U. of Sask. Fruit Program:
www.fruit.usask.ca

Cherry Grower Group:
www.cherryproducers.com

Gardens Alive

Alberta Farm Fresh Producers Association

Agriculture and Food Saskatchewan