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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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


Jovaras

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 crops fails? Still have 2 more!

June	July	August
		
Haskap (Blue Honeysuckles)	Saskatoons	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

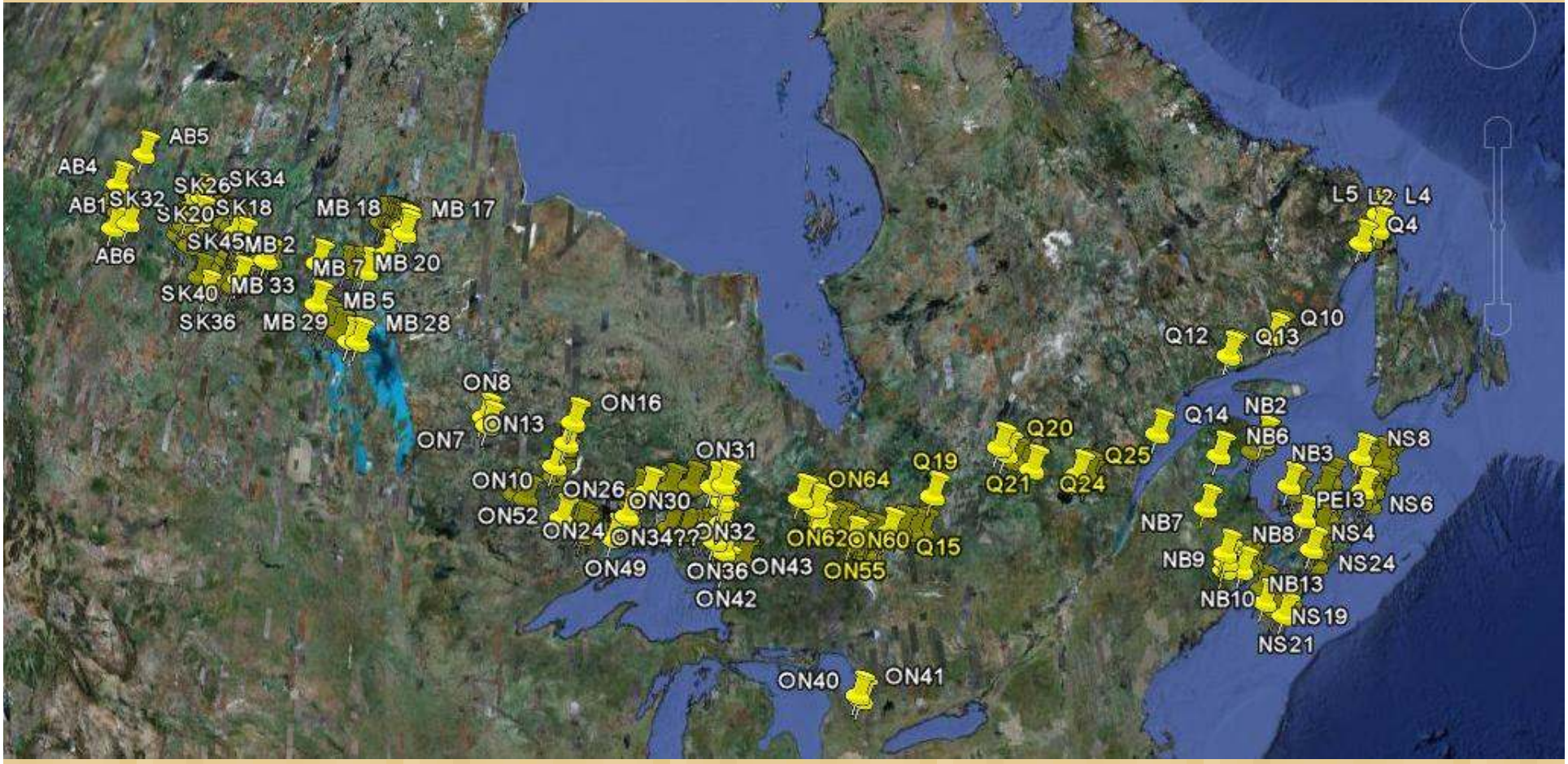
32
Cultivars
20 seed
lines

45 clones
2000 seedlings

7 clones

800 wild
accessions
collected

Haskap Sabbatical 2008/2009

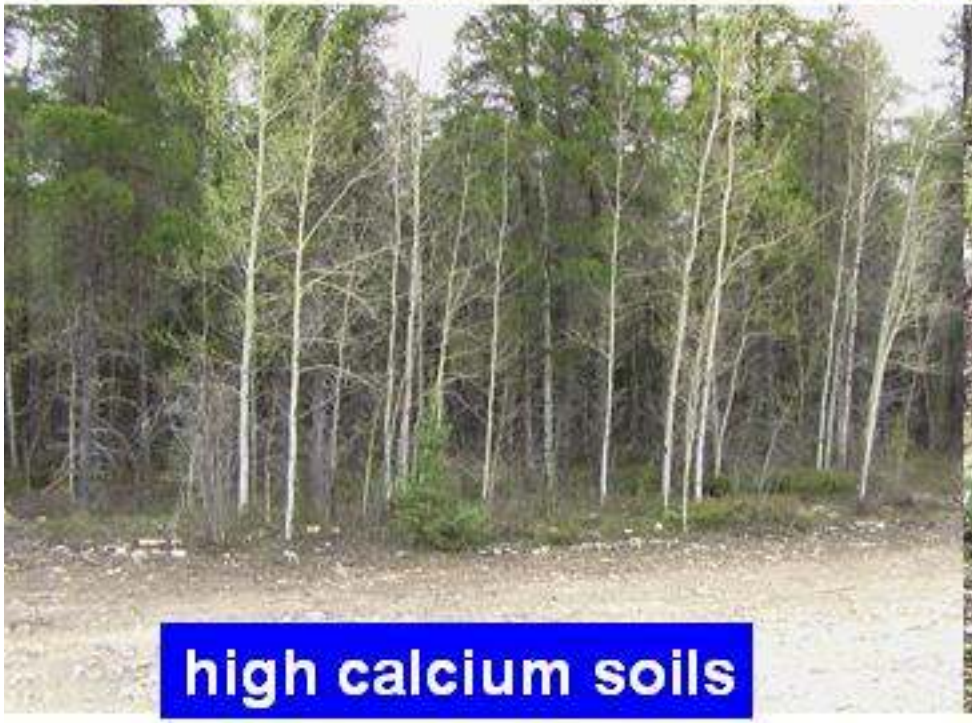


800 wild Canadian plants gathered from 250 locations
100's of new seedlings are from Japan and Russia

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


57-71
22-34
41-90
44-76
22-42
22-72
26-72
22-61

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

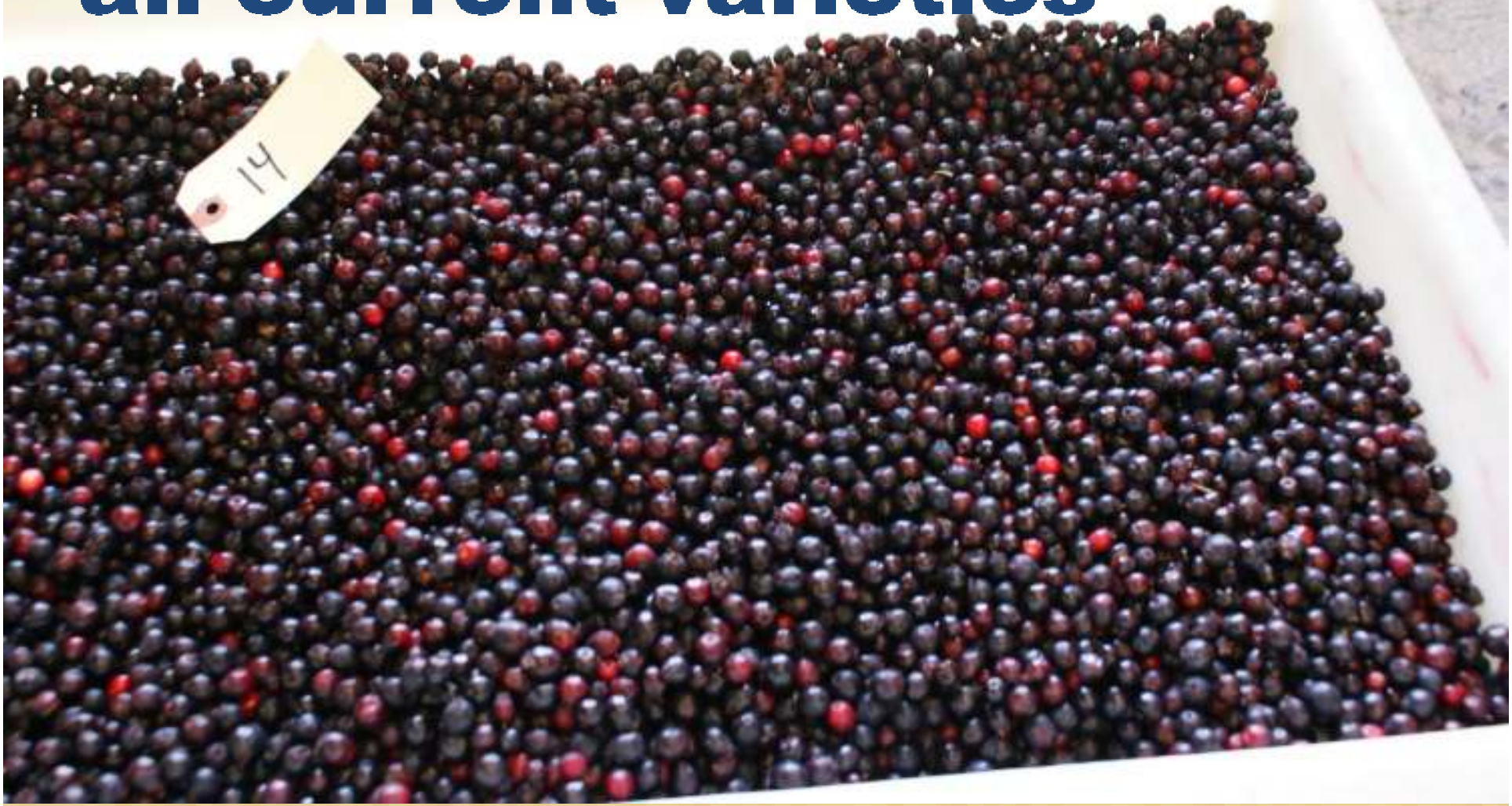
Fruit characteristics influencing uses

- 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

Northline

- Best variety for sideways mechanical harvesting
- The only seed variety
  - Plants are cheeper
  - Higher quality
  - Unifom from seed
- Smaller, tough berries
- Multi-trunks, flexible
- #1 choice for recent plantings


CCM 278

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


Joanna-2
Berry Harvester

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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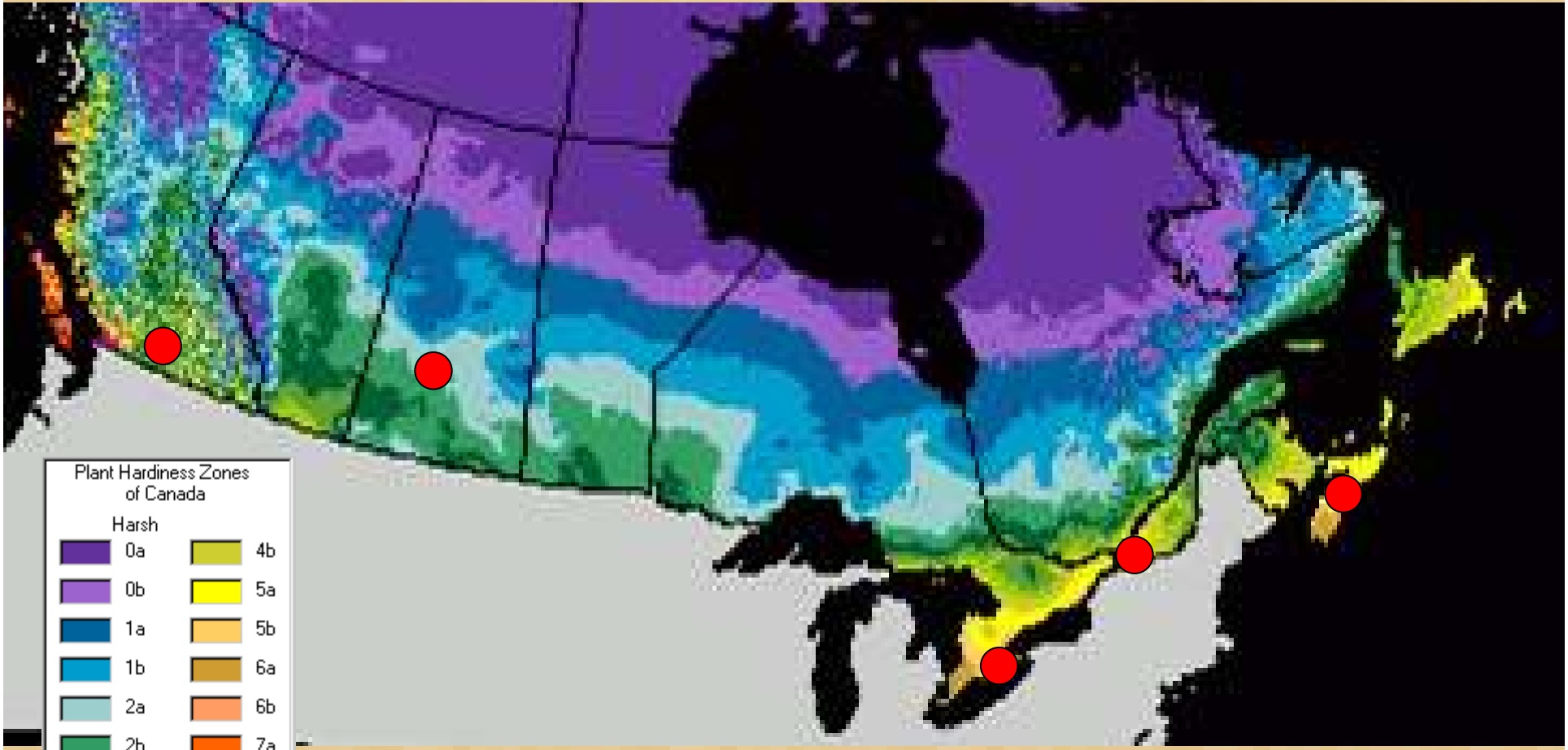
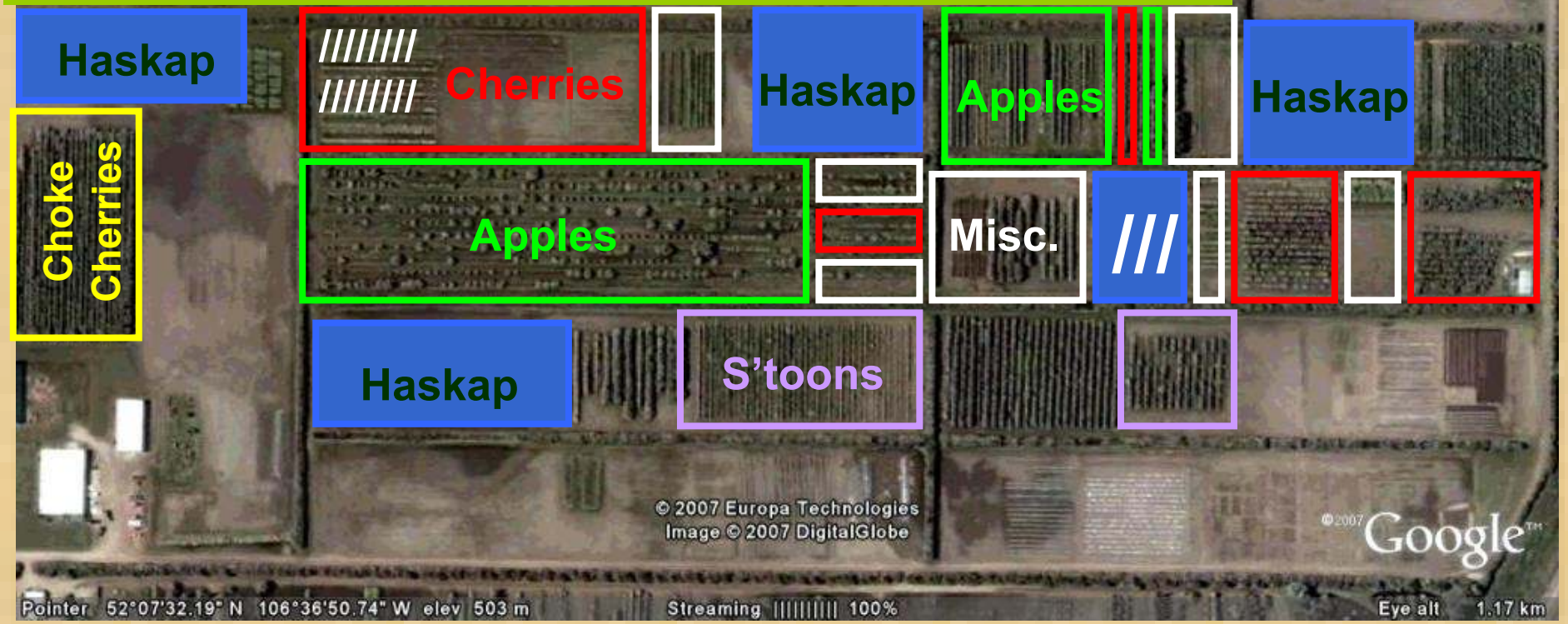
Fruit Breeding in Canada



[Plant Hardiness Zones of Canada 2000]

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Fruit Program Field Plots (started in 1920)



1.17 km

Selection for Mechanical harvesting & processing

Initial Selection

For Upright harvesters

- Low Suckering
- Upright Growth

Cherries


Juliet
Carmine Jewel
Valentine
Cupid
Romeo
Crimson Passion

Upright harvesters


Joanna-2

Carmine Jewel, 4 yrs old

Photo by Bob Mason

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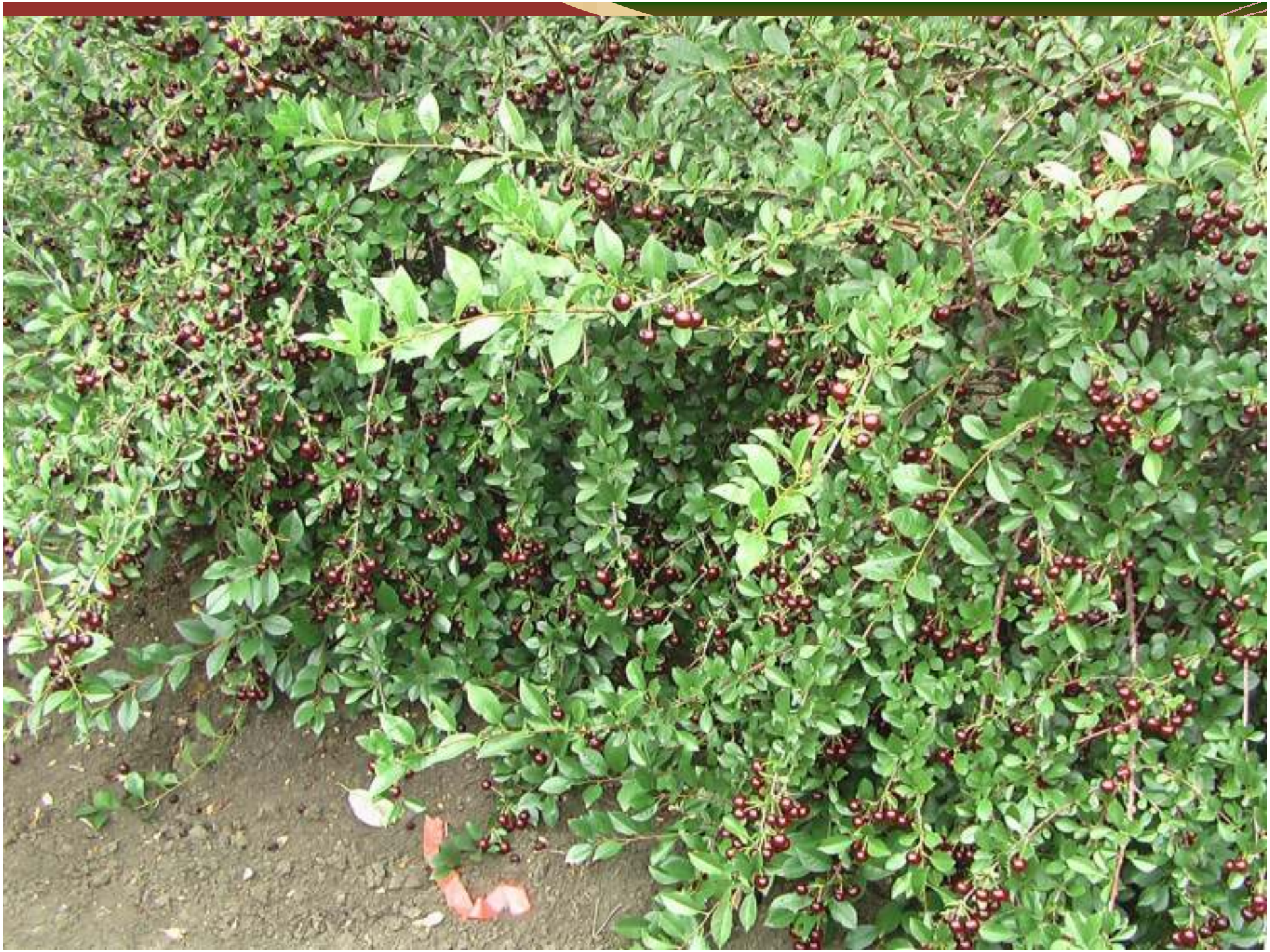

Photo by Bob Mason

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- Introduction
- Breeding Program
  - History
  - Our goals & methods
  - Our Varieties
- Training
  - Harvester types
  - Establishment & Pruning
  - Growth and Production
- ***Conclusion***

Bush Fruit Differences

	Harvest season	Organic
Honeysuckles	June	Yes
Saskatoons	July	No
Sour Cherries	August	Yes

Bush Fruit Differences

	Harvest season	Shake by hand into tarp	Mech. Harvest
Honeysuckles	June	Yes	Yes
Saskatoons	July	No	Yes
Sour Cherries	August	Yes	Yes

Bush Fruit Uses

	Pies	Jam	Juice Wine	Health food	Dried
Honeysuckles	Mushy	Yes	Yes	Yes	?
Saskatoons	Great	Yes	No	Yes	Poor
Sour Cherries	Great	Yes	Yes	Yes	Great

Obtaining varieties

- U of Sask Cherries:
  - Gardens Alive
- U of Sask Haskap
  - See our website: www.fruit.usask.ca
  - Canadian companies can ship to USA
- Saskatoons
  - www.saskatoonfarm.com
  - www.Prairieplant.com

U. of Sask. Fruit Program:

www.fruit.usask.ca

Cherry Grower Group:

www.cherryproducers.com

Gardens Alive