Poplar and Willow short-rotation-intensive-culture (SRIC) crops
--Western Canada--

Cees ("Case") van Oosten

SilviConsult Woody Crops Technology Inc.
silviconsult@telus.net
SRIC vs. SRWC?

SRIC = short-rotation-intensive-culture

SRWC = short-rotation-woody-crops

It’s all the same
Overview

Provide an overview of SRIC activities in Western Canada

– Why SRIC woody crops?
– SRIC woody crops
– Challenges
  – Weed control
  – Disease issues
  – Inadequate genetic material
– Solutions
Western Canada

Prairie Provinces:
- Manitoba
- Saskatchewan
- Alberta
and
British Columbia
Cropzones – Western Canada

- Dryland crops:
  - Zone 5
  - Zone 12
  - Zone 14
- Irrigated crops:
  - Zone 7
  - Zone 11
Cropzones – Arable land only

- Most arable land in the Prairie Provinces
- Very little arable land in British Columbia
- Central south Manitoba similar to southern Ontario
Species Terminology

Poplar
- *Populus* species belonging to the *Aigeiros* (D & N) and *Tacamahaca* sections (T, B & M), including interspecific and intersectional hybrids

Aspen
- *Populus* species belonging to the *Populus* section (formerly *Leuce* section)

Confused? Join the club!

Willow
- *Salix* species
Woody crops

Three SRIC woody crop types:
- Poplar – operational & experimental
- Aspen – experimental
- Willow – experimental

Majority of operational crops in
- Alberta (poplar)
- British Columbia (poplar SW coastal B.C.)

Where the main action is & will be:
- Alberta and Saskatchewan
Why SRIC woody crops?
Natural stands

- Natural stands with *Populus* species dominated by *Populus tremuloides* – the trembling or quaking aspen

- Estimated aspen and poplar inventory in Canada:
  - 4.0 billion m³ on 161.5 million hectares
  - 3.5 billion m³ on 28.3 million hectares with *Populus* as predominant species

- No national inventory records for willow
  - Considered a shrub species
Natural stands – cont’d

*Populus* age class distribution in stands with *Populus* (>>¾ aspen) as predominant genus:

- **Serious** age class imbalances
- Involves 3.5 billion m$^3$ on 28.3 million hectares (69.9 million acres)

This is generally the case in each Province

- Too good a job killing aspen!
Natural stands – cont’d

Canada
Age Class Distribution of Stands where the predominant genus is Populus
Other is Unclassified and Uneven-Aged

Source: Canada National Forest Inventory - CanFi 2001
Natural stands – cont’d

- Shortage of ‘replacement stock’ in
  - 0-20 and 21-40 year age classes
- *Populus* harvest levels below annual allowable cut (AAC) levels
  - Older age classes (dominant) not replaced with younger age classes
- We can now blame the US mortgage and housing crisis for all of our troubles!!
  - Still best of friends, OK?
Boreal forest near Drayton (AB)

Photo courtesy: Tim Gylander – Weyerhaeuser Company Ltd.
Why SRIC woody crops?

- Anticipated shortage of harvestable age classes in aspen 10-20 years hence
- Transportation distances to wood supply is huge issue
- Overcommitted aspen inventory on Crown lands (especially Alberta)
SRIC woody crops
## SRIC woody crops by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>Operational - ha</th>
<th></th>
<th>Experimental - ha</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poplar</td>
<td>Aspen</td>
<td>Willow</td>
<td>Poplar</td>
</tr>
<tr>
<td>Manitoba</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>250</td>
<td>-</td>
<td>-</td>
<td>500</td>
</tr>
<tr>
<td>Alberta</td>
<td>9,000</td>
<td>-</td>
<td>20</td>
<td>150</td>
</tr>
<tr>
<td>British Columbia</td>
<td>1,500</td>
<td>-</td>
<td>-</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>10,750</td>
<td>-</td>
<td>45</td>
<td>900</td>
</tr>
</tbody>
</table>

All estimates

1 hectare = 2.5 acres

Note: One company has been liquidating its farms and will not replace the crop
A former alfalfa site near Meadow Lake (SK):

- Right front is a clone X fert trial, left front is a spacing trial, behind clone X fert trial is stocktype trial; in the background are clonal trials.

Photo courtesy: Ken Van Rees - U of S
Pleasantdale (SK)

- Date: 5 July 2005
- R-2 crop
- Planted 2004 with poor stock
- Replanted spring 2005

- Date: 13 July 2006
- R-3 after heavy browse in previous seasons
- Mechanical weed control
Rose Valley (SK)

- Date: 13 July 2006 (Left)
  - R-4 crop of Walker poplar
  - Planted in 'powdery' dry soil, with moisture at 15 cm.
  - 3 years Roundup & mowing; no weeding at R-4 stage
  - Pruning: Pruning done at R-4

- Date: 11 June 2008 (Right)
  - R-6 crop
  - Crop affected again by rust in 2007
  - Clone Walker cannot close canopy
  - Note heavy dandelion competition

- Good crop; however, affected by rust early in R-4 season
Outlook (SK)

- Date: 11 June 2008 (Left)
  - R-2 crop of clone Green Giant
  - This clone is on pure H2O. Other reps are on effluent and dry-land (no irrigation).
  - Planted as unrooted cuttings

- Right
  - R-1 crop of acute willow on 2-year-old rootsystem
  - This clone is on pure H2O. Other reps are on effluent and dry-land (no irrigation).
  - Planted as unrooted cuttings and coppiced after year 1
Saskatoon (SK)

- Date: 11 June 2008
- Location: University of Saskatchewan, Saskatoon, SK. - Ken Van Rees' trials.
- Non-irrigated woody crops trial - Left
  - Salix 'India'. Nice clone with dense foliage.
  - At start of the R-3 stage on a 3-year old root system.

- Non-irrigated woody crops trial - Right
  - Salix 'Charlie', coppice vs. non-coppice.
  - Left at start of R-3 stage on a 3-year old root system
  - Right at start of R-2 stage on a 3-year old root system, - coppiced after yr 1 (2007) and grown in 2007 and start of 2008 as coppice.
  - Compares biomass of coppiced vs. non-coppiced willow.
Indian Head (SK)

- Date: Summer 2007
- Location: Shelterbelt Centre – Prairie Farm Rehabilitation Administration (PFRA) of Agriculture and AgriFood Canada
- Willow common garden
Boyle (AB)
Alberta-Pacific Forest Industries Inc.
- SRIC hybrid poplar crop growing on farmland next to the mill.
Boyle (AB)
Alberta-Pacific Forest Industries Inc.
- Currently planting 1,000+ hectares per year
- Expected rotation age 18 years
- Projected yield; 16-18 m³/ha/yr
- First trial plantation in 1993 near the mill
- First operational plantation in 2000
Drayton Valley (AB)
Weyerhaeuser Company Ltd.
- Date: Spring 2005
- Planted in 1999
- Starting R-7 *Populus tremula* just flushing in spring 2005
- Native *Populus tremuloides* (green) in foreground

Photo courtesy: Tim Gylander – Weyerhaeuser Company Ltd.
Kootenay Valley (Interior B.C.) - Right
Huskcroft Farm (non-irrigated)
- Date: Fall 2006
- R-10 hybrid poplar trial planting

Photo courtesy: Michael Carlson - MOF

Agassiz (coastal B.C.) - Left
Kruger Products Ltd.
- Date: 4 November 2008
- R-5 crop on leased farmland
Harrison Mills (coastal B.C.)-R
Kruger Products Ltd.
- Date: 23 October 2006
- Density trial at end of R-19

Sayward Valley (coastal B.C.) - Left
MB Poplar Ltd. (and successor companies)
- Date: March 2002
- Rare snowfall
- Density trial at end of R-10
- 4x4 m or 625 spha (250 spac)
Kingcome Inlet (up-coast B.C.)
Kruger Products Ltd.
- Date: August 2008
- Extensively managed crops of hybrid poplar
- Rotation 22-25 yrs
- Density 450 spha or (180 spac)
- Spot site prep
- Fertilizer at time of planting

Photos courtesy:
Dan Carson – Kruger Products
Kingcome Inlet (coastal B.C.)
Kruger Products Ltd.

- Date: August 2008
- R-3 crop
- Planted as unrooted whips
- Spot site prep
- Fertilizer at time of planting

Photos courtesy:
Dan Carson – Kruger Products
Challenges
Weed control remains a major issue

Photos courtesy:
Al Bertschi – Al-Pac

What about him?

100% weed control
at R-2

And so is ............

Recognize this guy?

No weed control
at R-2
Disease

**Septoria musiva**
- 1st time disease present in B.C. - west of the Rockies
- *Septoria* is major threat to poplar in all of Canada (and most of US)

**Melampsora spp.**
- *Melampsora* remains the major leaf disease in poplar and willow in North America

And so is .............
Lack of improved clones

- Clonal deployment has relied on:
  - too few clones
- Too few clones planted in large areas
  - what is the favourite clone in Saskatchewan? **Walker**!
  - what is it in Alberta? **Walker**!
- Many clones in Prairie Provinces:
  - not cold hardy
  - susceptible to diseases
  - not enough drought tolerance
Solutions

- Weed control
  - Better practices
  - More effective pesticides
- Genetics
  - Selections of parental species
  - Breeding programs needed
Pesticides

Poplar Council of Canada

- Pesticide Working Group – PWG
  - Actively pursuing
    - Pre-emergent herbicides
    - Post-emergent herbicides
    - One fungicide
  - Coordinating member of Prairie Pesticide Minor Use Consortium (PPMUC) membership for nine partners in PPMUC membership

Results trickling in

- PMRA not the fastest regulatory agency
Genetics

PFRA – Shelterbelt Centre (SK)

– Collection of *Populus balsamifera* from across Canada
– Collection of local *P. deltoides* from southern prairie region
– Interspecific hybridization with *P. deltoides, balsamifera, nigra* and *maximowiczii*
– Cooperative poplar breeding with Al-Pac
– New collection of various willow species for selection and breeding
Genetics – cont’d

Alberta-Pacific Forest Industries Inc. (AB)
- Cooperative poplar breeding with PFRA
- Program would possibly consider additional partners

Western Boreal Aspen Corp. (AB)
- Currently Weyerhaeuser Company Ltd. and Daishowa-Marubeni International Ltd.
- Collection of *P. tremuloides* from Prairie region
- Collection of *P. tremula* (var. Davidiana) from China and pollen exchange with Finland (*P. tremula*)
- Testing and hybridization
Balsam poplar collected at the northern extent of its range at Kuujjuaq in northern Quebec near Ungava Bay (58° north)

Photo courtesy:  Bill Schroeder - PFRA