NEWS CROPS
NEW SOURCES OF BEDDING

CENTRE DE RECHERCHE ET DE DÉVELOPPEMENT
TECHNOLOGIQUE AGRICOLE DE L'OUTAOUAIS

by
PIERRE BÉLANGER, agr.
BÉLANGER Agro-consultant Inc.
with the collaboration of CRÉDÉTAO
and the financial participation of the MRC and CLD of Papineau

Introduction and local context

- General decrease in the forest industry activities in Québec and particularly in the Ottawa river valley
- Rarity of by-products of the forest industry and price increases
- Supply problems for products such as bedding for agricultural community

OBJECTIVES

1. New sources of bedding

- Willow
- Switch grass
- Reed canary grass

2. Planting of demonstration plots

- N.D de la Paix: Willow and switch grass
- Lochaber: Willow

3. Feasibility of these new types of crops at the farm level

Willow characteristics

Willow (Salix Myabaena/ Salix viminalis): Silicaceaes group

- **Origin of the word Saule (Willow) : sal=shallow, lis= water (salix in latin)**
- **Grows in heavy soil texture, poor fertility, cool and humid climate**
- **Harvest cycle: 1st cycle is 4 years followed by 6 cycles of 3 years each over a 22 year period.**
- **Perennial and woody plant, which the height at maturity, could vary from a few cm to 25 m. Fast growing plant.**

Willow characteristics

Advantages:

- ✓Perennial plant (+ 20 years in production)
- ✓High yield potentiel (+ 11 mt/ha/yr dry basis)
- ✓Growing in wet soils, near watercourse
- ✓% ash: 1 to 2,7 %

Disadvantages:

- ✓High establishment cost (4 500 $/ha)
- ✓Establishment by cuttings
- ✓Production and harvest require specialized machinery
- ✓Moisture content at harvest (about 50 %)

TRANSPLANTATION EQUIPMENT

Willow establishment

MAINTENANCE EQUIPMENT

HARROWING

Herbicide

Dry sludge or mineral fertilizer

Liquid manure or sludge

Different stages of growth

Cycle of production

Transplantation

Year 1

Year 1

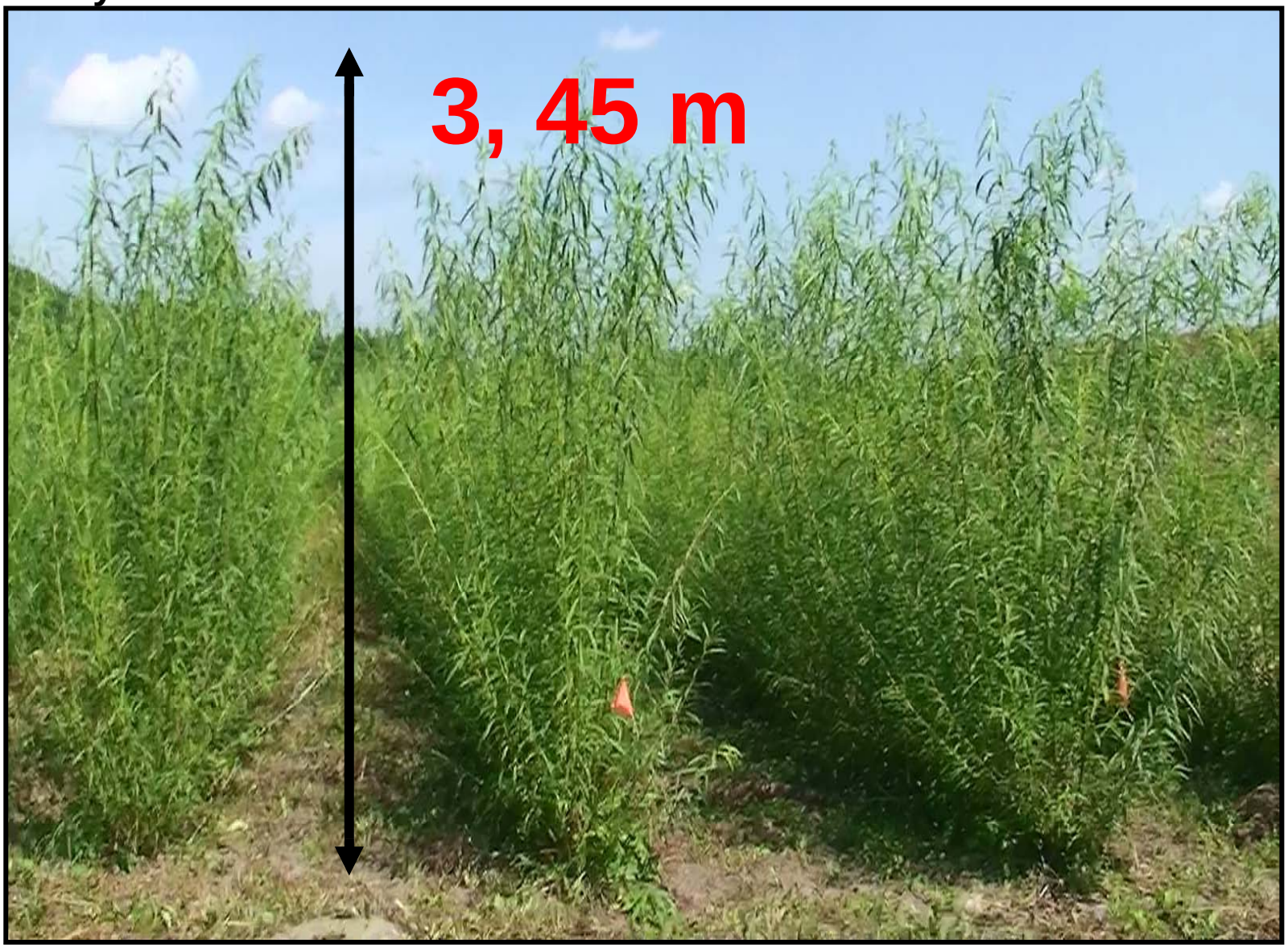
Year 1

Year 2

Year 2

Willow a fast growing crop

2nd year >establishment



Willow clones

Hybrid SX- 64

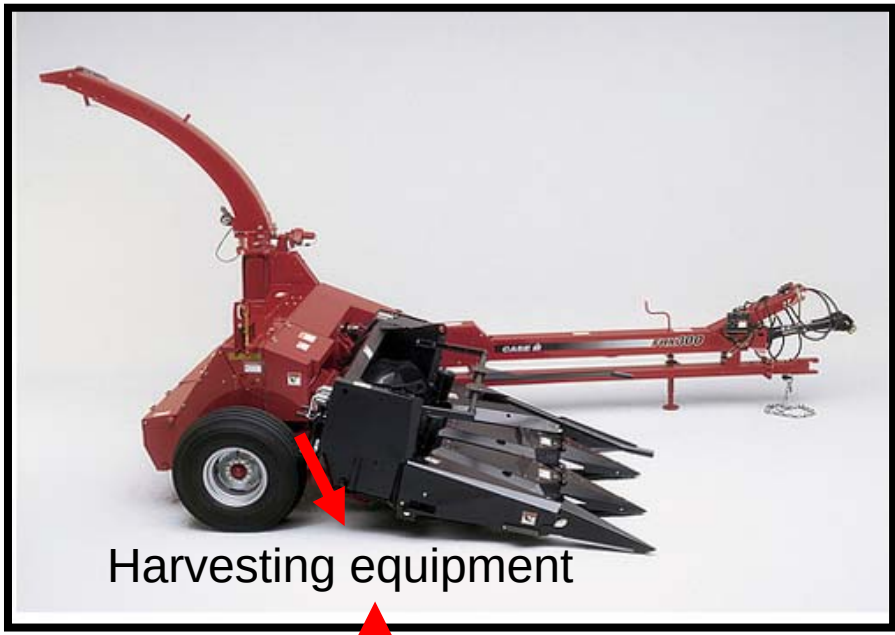
Hybrid SX- 67

Viminalis

Willow yielding at 2nd year

	Clones		
	Viminalis	Hybrid SX- 67	Hybrid SX-64
Dry matter (%)	53	52	50
Productivity (Mt/ha) (w.b)	1.4	7 à 20	3 à 9

Harvesting equipment



Switch grass characteristics

Switch grass (Panicum virgatum L.)

- **Herbaceous plants from the Poaceae family indigenous to the great plains of western North america**

- **Perenial grass of warm climates which is fibrous. Potential for making wood pellets.**

- **Production of large quantities of tall stems (1,6 à 2 m)**

- **Propagation by underground root system (rhizomes)**

Switch grass characteristics

Switch grass (Panicum virgatum L.)

Advantages

- ✓**Perenial plant (> 10 years)**
- ✓**Higher yield potentiel in the 2600+ corn heat unit area of Quebec (>10 mt/ha dry basis)**
- ✓**Low establishment cost at the exception of seed (30- 40$/kg)**
- ✓**Seeded with a conventionnal seeder (10 kg/ha)**
- ✓**Harvested with same hay equipment**
- ✓**No drying cost**
- ✓**Multiple uses: Biomass, bedding, animal feed…**
- ✓**Less ash than common grass species: Market potentiel for woods pellets sold for heating purposes**

Disadvantages

- ✓**Maximum yield potentiel is reached only at the 3rd year**
- ✓**Lower yield potentiel in low corn heat units area**

Switch grass characteristics

Switch grass :year 1

Reed canary grass characteristics

Reed canary grass (Phalaris arundinacea)

- **Indigenous plant from North America, forage cultivars are imported from Europe**
- **Perenial grass with rhizome (underground root system) which could reach up to 2 m in height**
- **Grows in wet, swampy lands and along watercourses**
- **Vigorous growth which does not leave space for the establisment of other plant species**

Reed canary grass characteristics

Reed canary grass (Phalaris arundinacea)

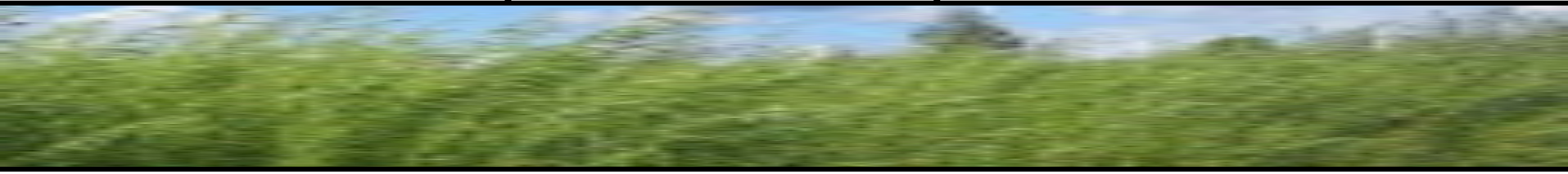
Advantages: Same than switch grass

- ✓Perenial plants (> 10 years)
- ✓Yield potentiel (9 mt/ha)
- ✓Adaptation to low corn heat units area and poorly drained soils
- ✓Seeding with conventional equipment
- ✓Multiple market : animal feed, source of bedding and biomass

Disadvantages

- ✓Higher ash content than switch grass
- ✓Could be invasive
- ✓Slow establisment

Cost of production



❖ Cost of production: is related to various factors:

Operation	Forest residues	Switch grass	Willow
	($/t)	($/t)	($/t)
Supplies	34	73-90	58 à 85

Sources: Agrinova, REAP, CRAAQ, 2008

- ✓Yields
- ✓Price of land
- ✓Surface in production
- ✓Other factors

http://www.reap-canada.com/
(Resource Efficient Agriculture Production)

[3]MAPAQ, 2007 (switch grass hay budget)

Water absorption capacity

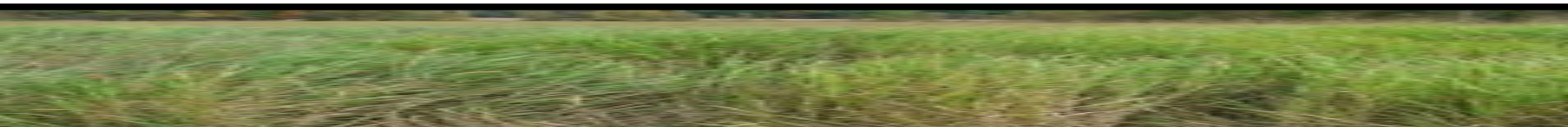
Material	average length of materials (cm)	QEAM (g/g)	initial moisture content %
Unchopped barley straw	20 to 25	4.4	3
Chopped barley straw	10 to 15	4.5	6
Unchopped switch grass	15 à 30	2.9	5
Chopped switch grass	< 12	3.1	5
Wood chip	1 to 3	2.6	23

QEAM: quantity of water absorbed/mass

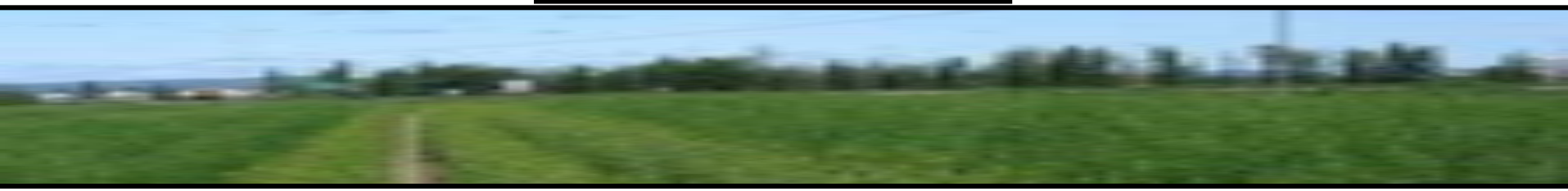
Réf. Gasser, 2008 (IRDA)

Future market development

- **Institutional market**
  - ✓ School, hospital etc…
- **Agricultural market**
  - ✓bedding, mulch
  - ✓Greenhouse
  - ✓Poultry building heating
- **Industrial market**
  - ✓ Pannels
  - ✓Cogeneration
  - ✓Paper & carboard
  - ✓Pellet industry
  - ✓Biofuel



Model recommanded



➢**Short rotation willow crop should be implemented primarely by means of reducing capital expenditures of specialized equipment :**

✓**Cooperative of farm machinery users (CUMA) ex: Biobaler and shredding equipment for wood chip production**

✓**Agreement for renting equipment or buying large quantities of cuttings**

✓**Collective storage facilities**

NEW MARKET

- Industrial and institutional market : utilization of the biobaler at harvest

Example for the institutional market

CONCLUSION

- **Switch grass and reed canary grass are alternatives which do not require any equipment investment for cattle producers.**

- **Willow has many usefull applications agronomically and environmentaly (riparian habitats, wintering yards, hedges used in wind abatement, soil decontamination, etc...)**

- **Many beneficial environmental and economical returns by using willow, switch grass or reed canary grass.**

THANK YOU !!