

Site characteristics of 4 hybrid poplar riparian buffers				
Sites	Land use	Annual Fertilisation	Cattle density (per ha ⁻¹)	Elevation (m)
Brompton	Pasture	Cow manure	0.6	140
Magog	Pasture	none	0.2	208
Roxton	Hayfield	none	none	147
St-Isidore	Pasture	Cow manure + N (18 kg ha ⁻¹) & lime (800 kg ha ⁻¹) every 5 years	0.5	360

Nutrient supply rate (µg10cm ⁻² 20d ⁻¹) in soils of 4 hybrid poplar riparian buffers						
Sites	NO ₃	NH ₄	P	Ca	K	Mg
Brompton	37.2	5.06	5.28	748	519	172
St-Isidore	52.4	5.23	2.94	1014	108	135
Roxton	9.2	4.05	3.18	1331	70	189
Magog	10.3	6.28	1.85	644	60	524
SE	8.1	0.46	0.70	46	26	21
p<	0.01	0.05	0.05	0.001	0.001	0.001

Brompton

Hybrid poplar riparian buffers
(3 clones x 4 blocks / site x 4 sites = 48 plots)
Aboveground biomass, carbon & nutrient content

3 clones:

Populus deltoides x nigra (DxN-3570)

P. canadensis x maximowiczii (DNxM-915508)

P. maximowiczi x balsamifera (MxB-915311)

Stem and branches (harvested October 2011)

48 trees harvested: clonal allometric relationships obtained for stem vol. & biomass, & branch biomass of each tree; 48 stem and branch subsamples for C, N, P analyses

Herbaceous vegetation (harvested October 2011)

48 herbaceous veg. samples (3 x 0.25m² (0.75 m²)); 48 samples for C, N, P analyses





Brompton

Hybrid poplar riparian buffers

(3 clones x 4 blocks / site x 4 sites = 48 plots)

Belowground biomass, distribution, C & nutrient content

Large roots (>2mm)

48 pits (0.5 m x 0.5m x 0.6 m), biomass was collected from three depths (0-20, 20-40, 40-60 cm) for a total of 144 large root biomass samples (48 samples/depth);
48 large root subsamples (one from each pit) for C, N, P analyses

Fine roots (<2mm)

In each 48 pits, fine root biomass was collected from 3 depths (0-20, 20-40, 40-60 cm) for a total of 144 fine root biomass samples (one sample = 2 cores from pit wall);
48 small root subsamples (one from each pit) for C, N, P analyses

Brompton

Hybrid poplar riparian buffers

(3 clones x 4 blocks / site x 4 sites = 48 plots)

Soil C & nutrient stocks, distribution & availability

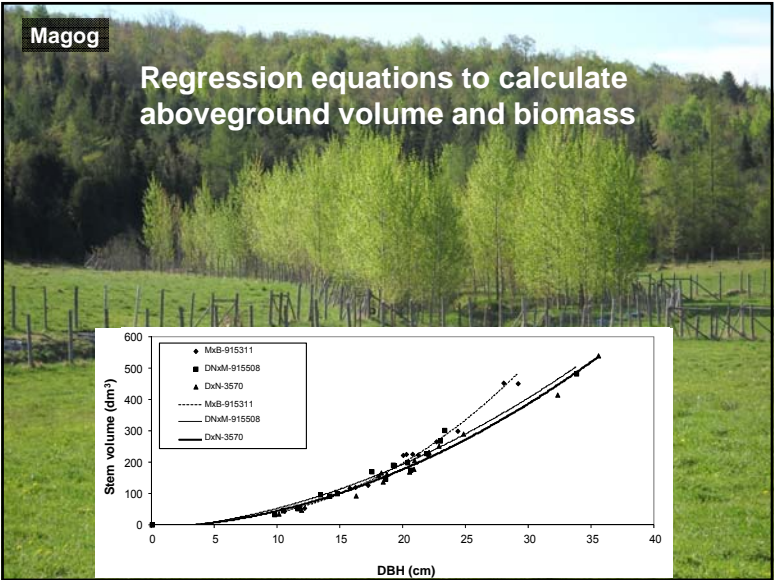
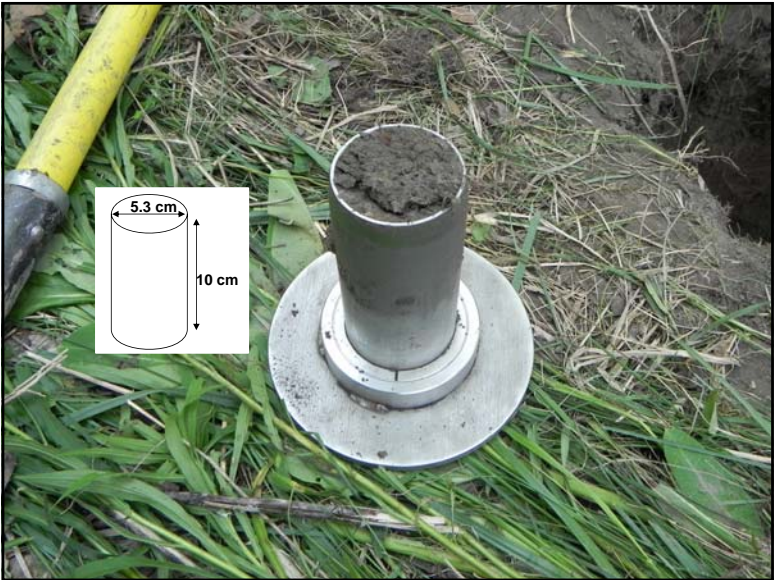
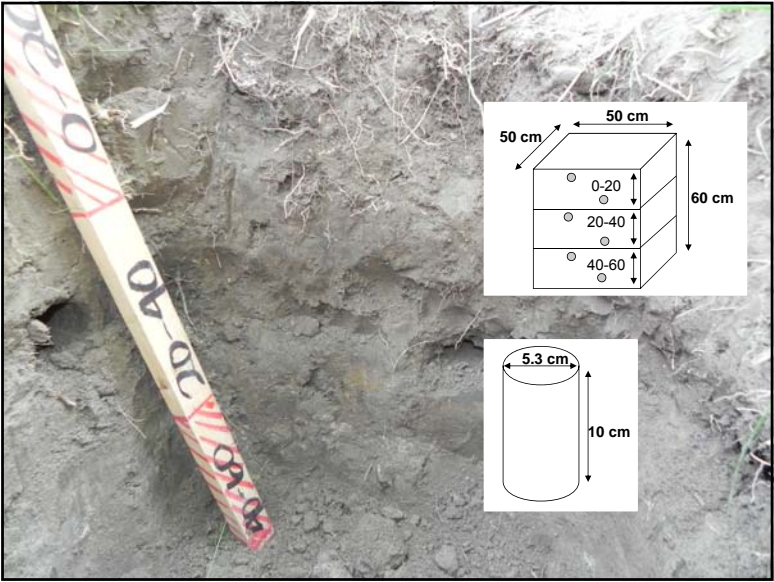
Mineral soil

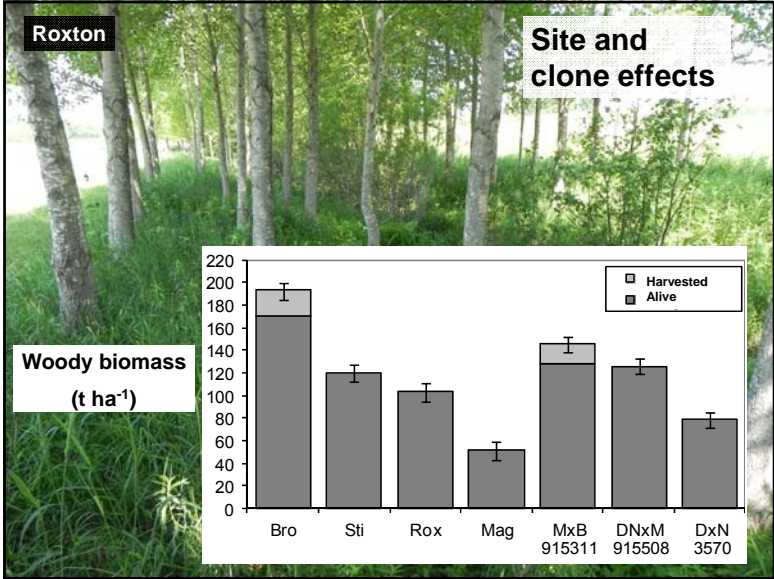
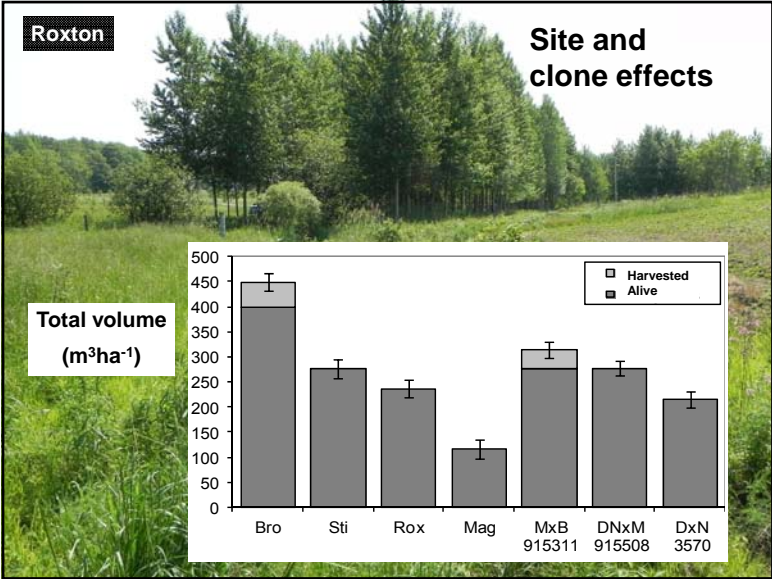
In each 48 pits, samples were collected from 3 depths (0-20, 20-40, 40-60 cm) for a total of 144 soil samples (48 samples / depth). Sample = 2 cores taken from pit wall
144 soil samples analysed for total C, N, P, K, Ca, Mg, pH, texture

Soil nutrient availability

48 PRS-probe samples (0-10 cm) analysed for NO₃, NH₄, P, K, Ca, Mg, etc.
One sample consisted in a composite of 4 anion and 4 cation PRS-probes







Volume yield and woody biomass yield increases from 6 th yr to 9 th yr at 4 hybrid poplar riparian buffers						
Sites and clones	Volume yield (m ³ ha ⁻¹ yr ⁻¹)		Increase (%)	Woody biomass yield (t ha ⁻¹ yr ⁻¹)		Increase (%)
	6 yrs	9 yrs		6 yrs	9 yrs	
<i>Sites</i>						
Brompton	37.8	44.4-49.9*	15-32	16.1	18.9-21.4*	15-33
St-Isidore	15.6	30.7	98	6.6	13.3	100
Roxton	11.3	26.3	132	4.9	11.4	133
Magog	3.9	12.8	230	1.8	5.7	218
<i>Clones</i>						
MxB	19.7	30.7-34.9*	77	9.2	14.3-16.2*	76
DNxM	17.4	30.9	78	7.5	14.0	85
DxN-3570	14.3	24.0	68	5.3	8.7	65

sites = 3 clones mean clones = 4 sites mean * includes broken / harvested

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<i>Clones</i>						
3.8 x difference between lowest and highest						
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**Biomass accumulated after 9 years
in hybrid poplar compartments
in 4 riparian buffers**

**Carbon stocks for 9 year-old hybrid poplar
riparian buffers**

UNPUBLISHED DATA REMOVED

Conclusions:

- Yields increase **30% to 230%** from 6th to 9th year
- **3.8 x yield difference** from **least prod. site** to **most prod.**
- Total C sequestered is (UNPUBLISHED DATA REMOVED) **tons/ha**
- Abovegr. Biomass C of **least prod. site** is **1/3 of most prod.**
- Total C of **least productive site** is **2/3 of most productive**
- Adding soil and roots C to abovegr. C, **DOUBLES total C** on **most productive site** and **TRIPLES it** on **least prod. site**
- Enormous environmental impact of hybrid poplar riparian buffer strips, through **C capture**, but also **N** and **P** capture, plus **numerous ecosystem services**

