

# Harvesting of forest biomass for establishment of plantations

Amélie Trottier-Picard<sup>a</sup>, Annie DesRochers<sup>a</sup>, David Paré<sup>b</sup>, Evelyn Thiffault<sup>b</sup>, Christian Messier<sup>c</sup>, Nelson Thiffault<sup>d</sup>

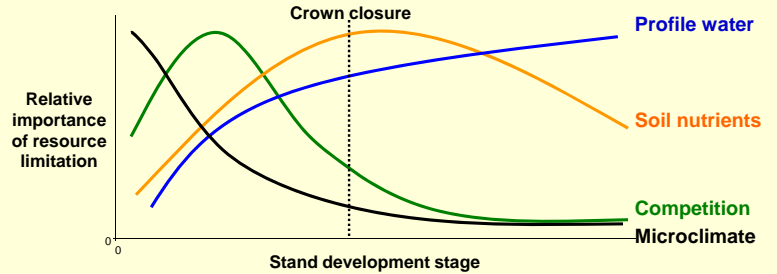
<sup>a</sup>Université du Québec en Abitibi-Témiscamingue; <sup>b</sup>Canadian Forest Service; <sup>c</sup>Université du Québec à Montréal; <sup>d</sup>Ministère des ressources naturelles et de la faune du Québec

\*amelie.trottier-picard@uqat.ca

## Rationale

- Residues from forest harvesting can be used for bioenergy
- Concern on the long run for tree productivity:  
Nutrient export > Nutrient supply
- Other mechanisms are operating such as microclimate and competition
- The response of the regeneration depend on **soil type**, **time**, and the **species regenerating**<sup>2</sup>

## Changes in resource limitations with stand development<sup>1</sup>



## 3 research questions tested on a network of experimental sites

### How much slash can we harvest?

#### Hypothesis

- Increasing slash loads will have a linear effect on tree productivity

#### Treatments



### What are the drivers of the regeneration response?

#### Hypothesis

- Microclimate and competition will be the main drivers of tree growth for the first 2 growing seasons

#### Treatments

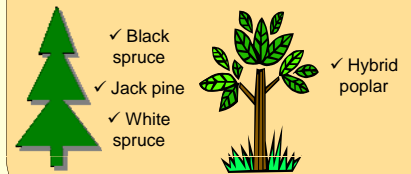


### How differently will species react within a site?

#### Hypothesis

- The ruderal hybrid poplar will be more sensitive to slash removal than the tolerant black spruce

#### Species planted

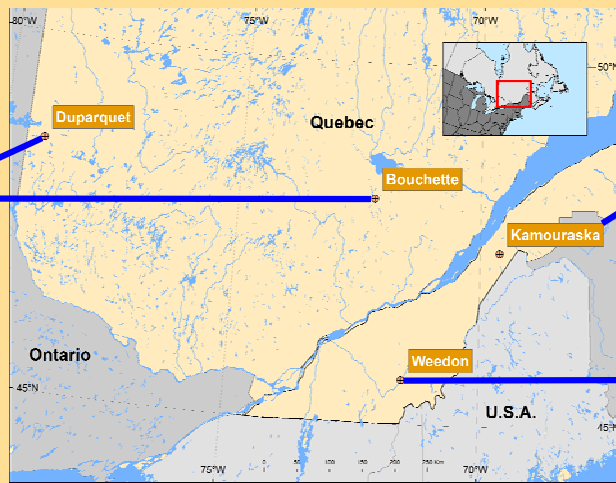


## Network of experimental sites

- Treatments applied locally (9m<sup>2</sup>)
- 7-16 replicates per combination
- 3 site preparations



Harrowing



V Blade



Mounding

## Measurements

### ➢ Environment

- Microclimate: *in situ* soil temperature and moisture
- Competition: visual estimate of vegetation coverage
- Soil chemistry: mixed-bed ion exchange resin



### ➢ Physiological response

- Water stress: pressure chamber and  $\delta^{13}C$  of annual growth
- Nutrition: nutrient concentration in foliage, nutrient content, and foliage mass
- Growth: annual height and diameter growth

## Literature cited

- <sup>1</sup> Fleming, R. L., D. M. Morris, and P. W. Hazlett. In press. Assessing temporal response to forest floor removal: Evolving constraints on initial stand development. *Forest Science*.
- <sup>2</sup> Proe, M. F., J. Craig, J. Dutch, et J. Griffiths. 1999. Use of vector analysis to determine the effects of harvest residues on early growth of second-rotation Sitka spruce. *Forest Ecology and Management* 122:87-105.

## Acknowledgements

Map and photographs by Jacques Morissette. This would have been impossible without the invaluable input and field work of Jacques Morissette, Sébastien Dagnault, and Line Blackburn.

**Financial support:** FQRNT through Program on GHG, NRCan, Réseau ligniculture Québec, industrial collaborators (Domtar, Louisiana-Pacific, Norampac, Tembec)