How best should we manage hybrid poplar plantations? Interactions of site preparation, vegetation control and fertilization.

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• Silviculture of hybrid poplars is a promising solution to reduce the pressure on natural forests while maintaining the wood supply to industries.

• Hybrid poplars are sensitive to competing vegetation and to inadequate soil conditions and fertility.
Context

Choice of site
Management tools
Objectives

Soil preparation?

Vegetation control?

Growth

Fertilization?
Hybrid poplar clone 915319
(Populus maximowiczii x Populus balsamifera)

Total = 40 ha

Study Sites

Saguenay-Lac-St-Jean
Experimental Design

- Mounding
- Scarifying
  1x
- Harrowing
- Scarifying
  3x

Fertilization
Mechanical Soil Preparation (MSP)

Scarify

Photos: Pierre Gagné, RLQ
Harrow

Mechanical Soil Preparation (MSP)

Photos: Pierre Gagné, RLQ
Mechanical Soil Preparation (MSP)

Mounds

Photo: Louisiana-Pacifique
Mechanical Soil Preparation (MSP)

Mounds

Photo: Louisiana-Pacifique
Mechanical Soil Preparation (MSP)

Mounds

from Sutton, 1993
Tree planting

Photos: Louisiana-Pacific
Vegetation control

Photo: Pierre Gagné, RLQ
What effect of MSP on growth?
What about soils, then?

Mounds:
• warm
• uncompacted
• dry
• poor
What effect of vegetation control?

5-yr height growth (2004-2008) vs Veg Control

- Mounding
- Harrow
- Scarifying_3x
- Scarifying_1x
- Unprepared

* indicates significant difference from Veg Control.
MSP as a form of vegetation control

e.g., mounds

Photo: Pierre Gagné
Fertilization and growth

N & N+P

30 %
Do mounds favour root growth?
Do mounds favour root growth?

Unprepared

Mounds

Photos: Simon Bilodeau Gauthier
Distribution of roots in soil

Roots: mineral > organic

Unprepared

organic

mineral
Distribution of roots in soil

Mounds

organic

mineral

mineral
Distribution of roots in soil

Mounds

Fine roots: mineral = organic

organic

mineral
Future Management Strategies

- Globally, mounding is the best MSP

- Veg Control has more effect in less intense MSP

- Fertilization, when done after a few years, is optimal for well-developed trees.

- Prioritize management techniques thus:
  MSP >> VC > Fertilization.
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