Responses of sugar maple and yellow birch seedlings towards different competitive vegetation types and fabric shelter use

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To increase the likelihood of plantation success it is important to:

• develop proper techniques

• understand the limiting ecological factors
Competing vegetation control
Generally, positive effect on the survival and growth of planted seedlings

also favours browsing by white-tailed deer
Using tree shelter improve seedling growth and protect against herbivores.

But, response can vary depending:
- species,
- environment,
- type of protector.
Species

Sugar maple
(Acer saccharum Marsh)

Yellow birch
(Betula alleghaniensis Britton)
Regional conditions:
Gaspé Peninsula
northern distribution limit of both studied species

We are about here
We assessed:

• the use of a fine mesh fabric shelter (Freegro ®)

in interaction with

• the effects of different types of competing vegetation
  i.e. Herbaceous or woody competition
In the spring 2008, we monitored six plantations

• 108 three-years-old sugar maple seedlings in three plantations (2005) (51 sheltered and 57 unsheltered)

• 117 two-years-old yellow birch seedlings in three plantations (2006) (59 sheltered and 58 unsheltered)
All study sites were formerly clearcut and windrowed.
STUDY METHODOLOGY

Variables measured:
- seedling height
- diameter at collar
- H/D ratio
- vigour
- browsing signs
- type of competing vegetation

We used multiples logistics regressions and ANOVA’s statistics
SEEDLINGS VIGOR

Shelters reduced significantly the proportion of dead and moribund seedlings of both species.

NO seedlings died within shelters.

moribund seedling:
24 to 8 % for sugar maple
28 to 2 % for yellow birch
Herbaceous vegetation has a negative effect on sugar maple seedling vigor

Not for yellow birch

Sugar maple moribund seedling:
- 5% free of competition
- 17% woody competition
- 40% herbaceous competition
RESULTS

HERBIVORE DAMAGE

Significantly reduced except in the case of ungulate browsing

Sugar maple = low browsing intensity (4 observations)

Yellow birch = high browsing intensity (31 observations)

seedlings can exceed the height of the protectors (122 cm) after two years but ungulates are still able to reach the twigs
RESULTS

Sugar maple seedling

Mean height
with: 66.9 cm
without: 39.2 cm

Height, diameter and H/D ratio increased
Yellow birch seedling

Mean height
with : 101.0 cm
without : 45.3 cm

Height, diameter and H/D ratio increased
RESULTS

EFFECT OF SHELTER

EFFECT OF VEGETATION TYPE

NO OBVIOUS INTERACTIONS
EFFECT OF SHELTER

For both species, increased:
- height
- diameter
- H/D ratio

RESULTS

GROWTH STIMULATED BY ETIOLATION? LIKELY

BETTER MICRO-ENVIRONNEMENTAL CONDITIONS? MAYBE

LOWER SPACE COMPETITION? IN PART

GROWTH STIMULATED BY ETIOLATION? LIKELY

VEGETATION EFFECT

For sugar maple, herbaceous vegetation affect vigor

WATER STRESS?

ALLELOPATHY?

Effect of vegetation type on growth pattern is still studied
Despite a increase in stem etiolation, the use of shelters is beneficial for seedling vigour and growth.

Without shelters, control of herbaceous vegetation competition seems essential during the early stages of sugar maple plantation establishment.
Field technicians
Forest consultants
Private forest owners
Alain Caron (UQAR)
Sugar maple seedling

Vegetation effect on growth pattern is still investigated
Yellow birch seedling

Vegetation effect on growth pattern is still investigated
GROWTH RESPONSES

Sugar maple seedling

Effect of herbaceous competition on height higher than woody competition

COMPETITIVE VEGETATION TYPE
GROWTH RESPONSES

Sugar maple seedling

Effect of herbaceous competition on H/D ratio higher than woody competition
No different effect of herbaceous and woody competition on height
GROWTH RESPONSES

Yellow birch seedling

NO vegetation type effect on H/D ratio

COMPETITIVE VEGETATION TYPE

RESULTS