

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



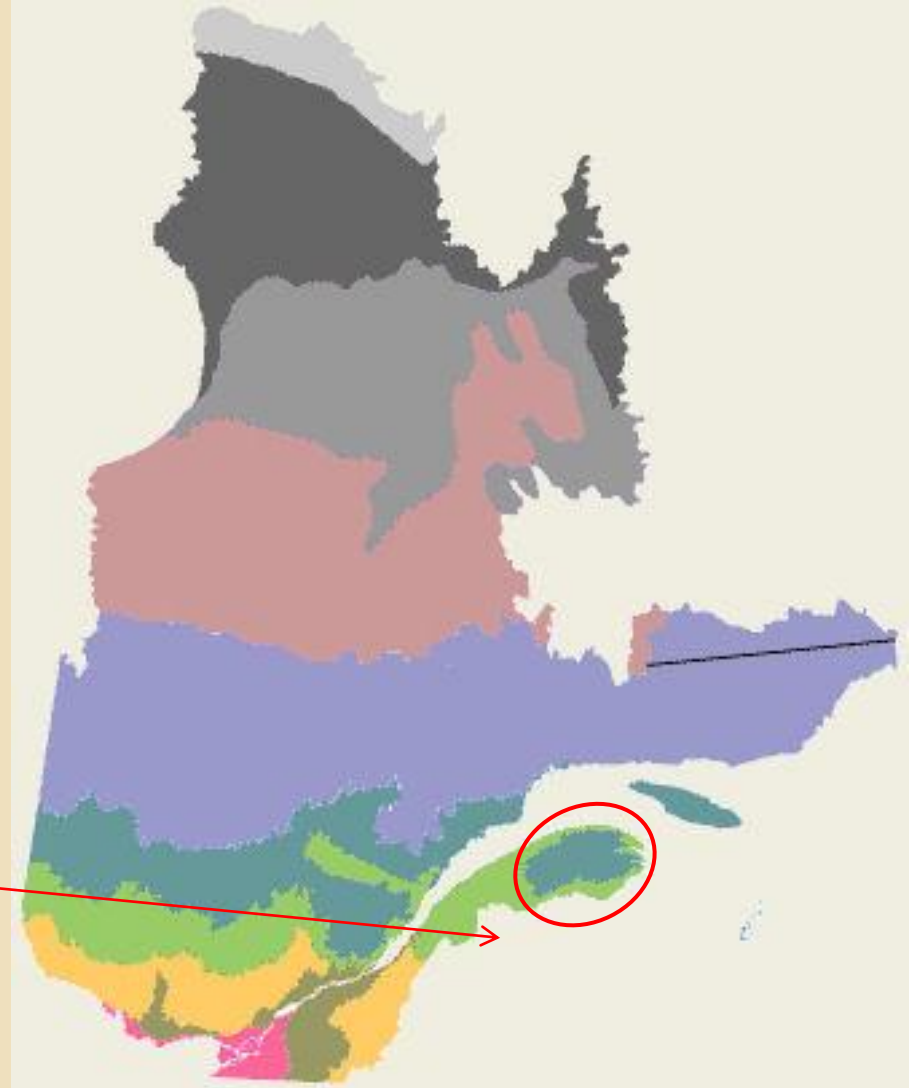
Sugar maple
(*Acer saccharum* Marsh)



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



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



SEEDLINGS VIGOR

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



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



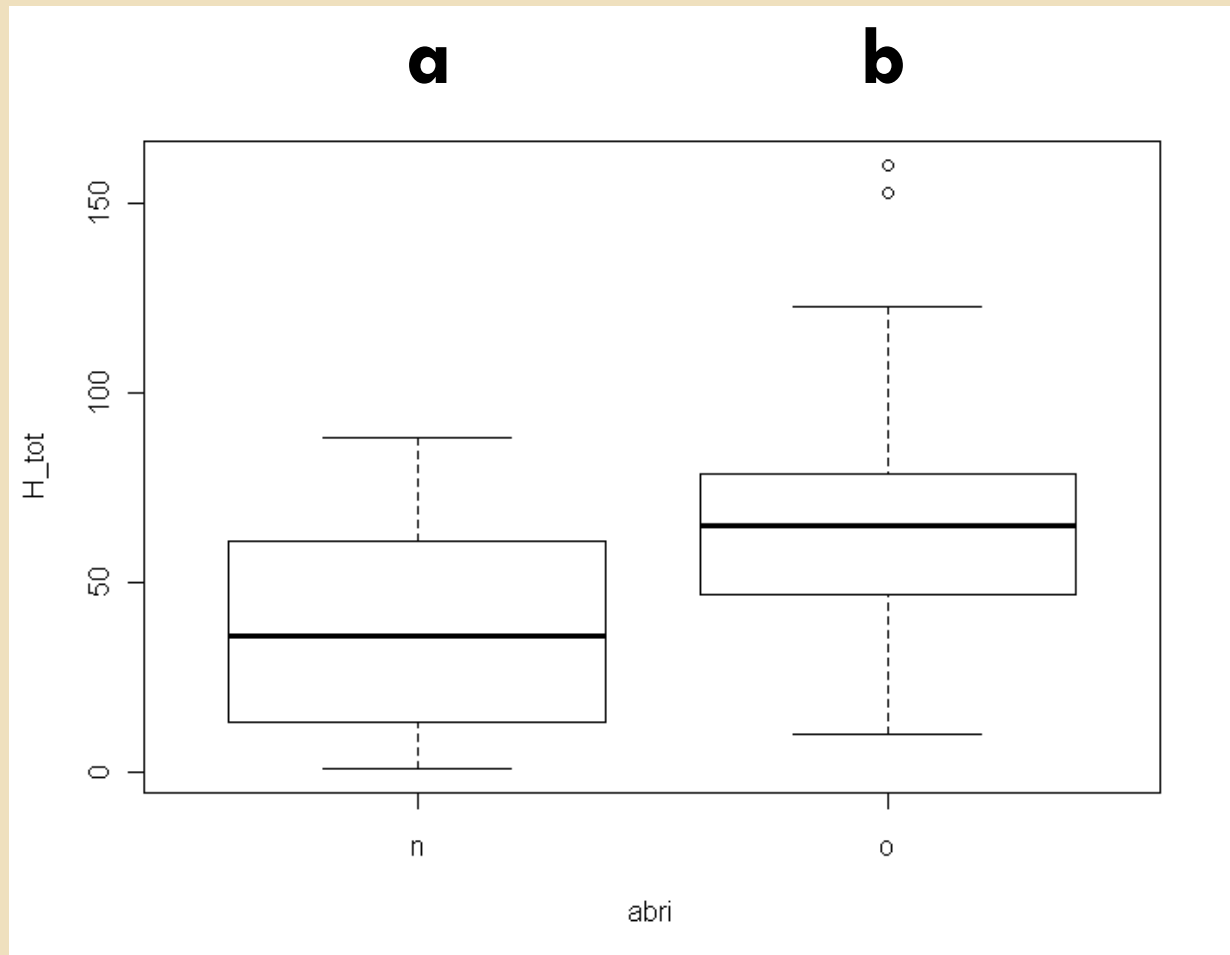
GROWTH RESPONSES

Sugar maple seedling

Mean height
with : 66.9 cm
without : 39.2 cm

Height,
diameter and
H/D ratio
increased

SHELTER USE



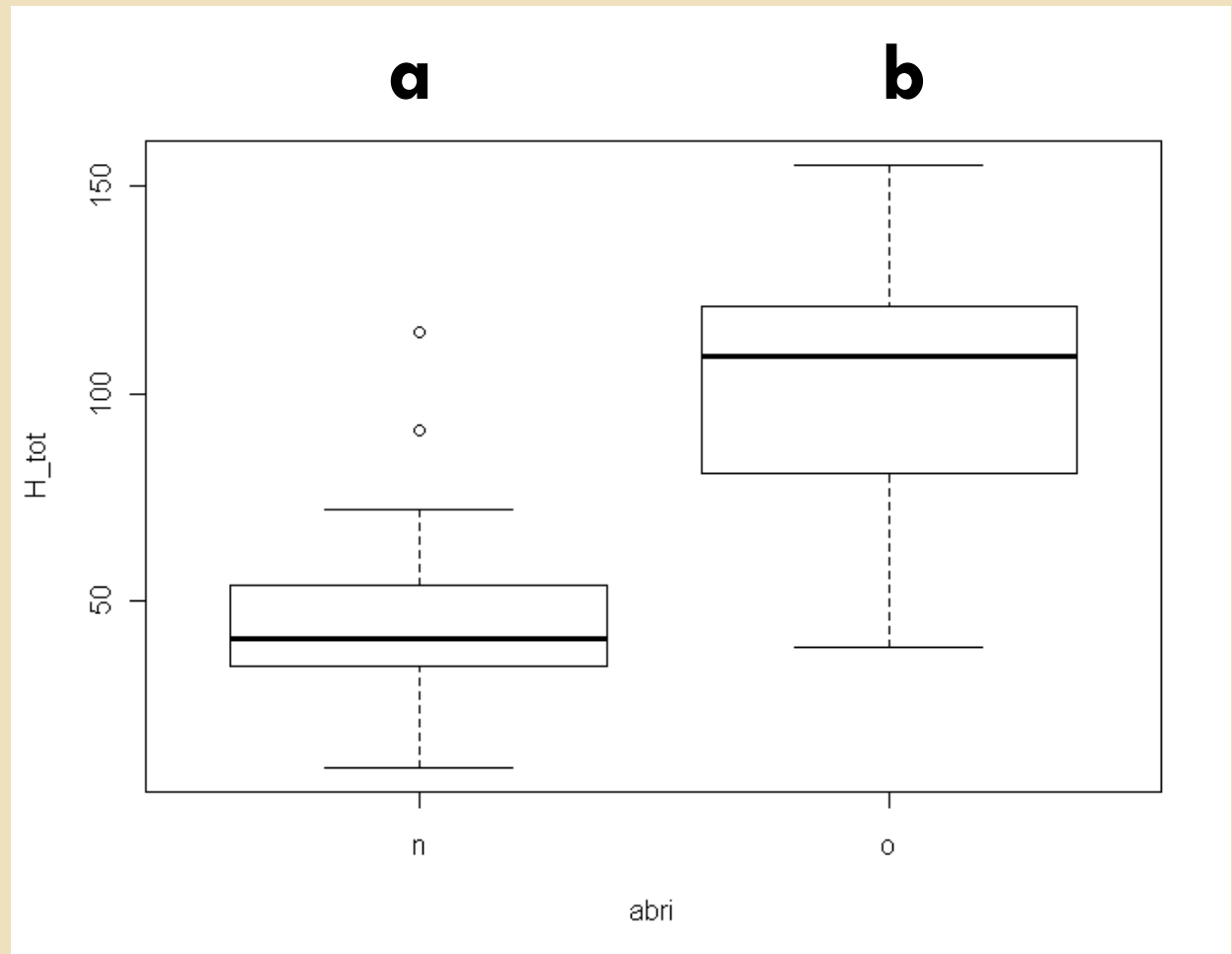
GROWTH RESPONSES

Yellow birch seedling

Mean height
with : 101.0 cm
without : 45.3 cm

Height,
diameter and
H/D ratio
increased

SHELTER USE



EFFECT OF SHELTER



EFFECT OF VEGETATION TYPE



NO OBVIOUS INTERACTIONS

EFFECT OF SHELTER

For both species,
Increased

- height
- diameter
- H/D ratio

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*

MANAGEMENT RECOMMENDATIONS



Without shelters, control of **herbaceous vegetation** competition seems essential during the early stages of **sugar maple** plantation establishment

Despite a increase in stem etiolation, the use of shelters is **beneficial** for seedling vigour and growth



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Gaspé

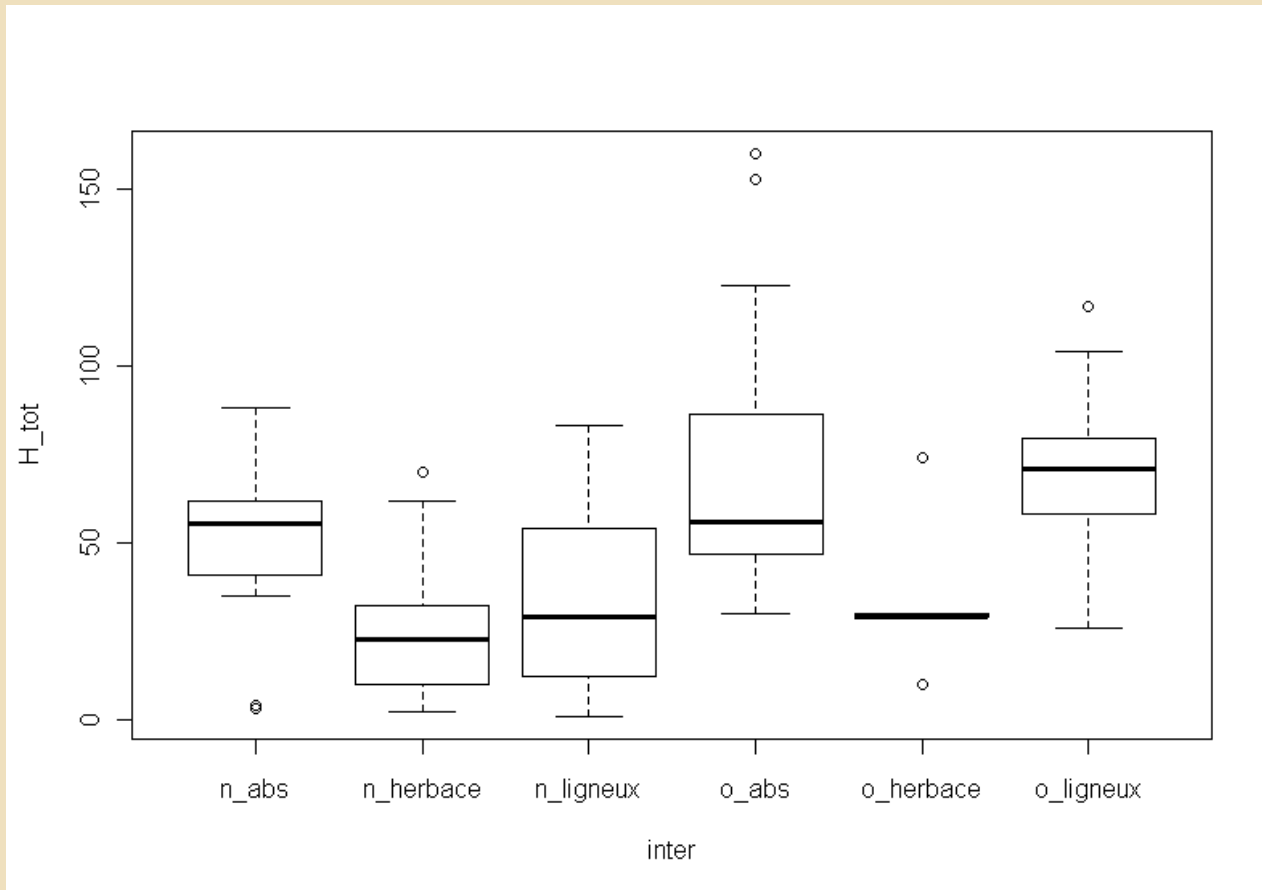


Ressources naturelles
et Faune

Québec

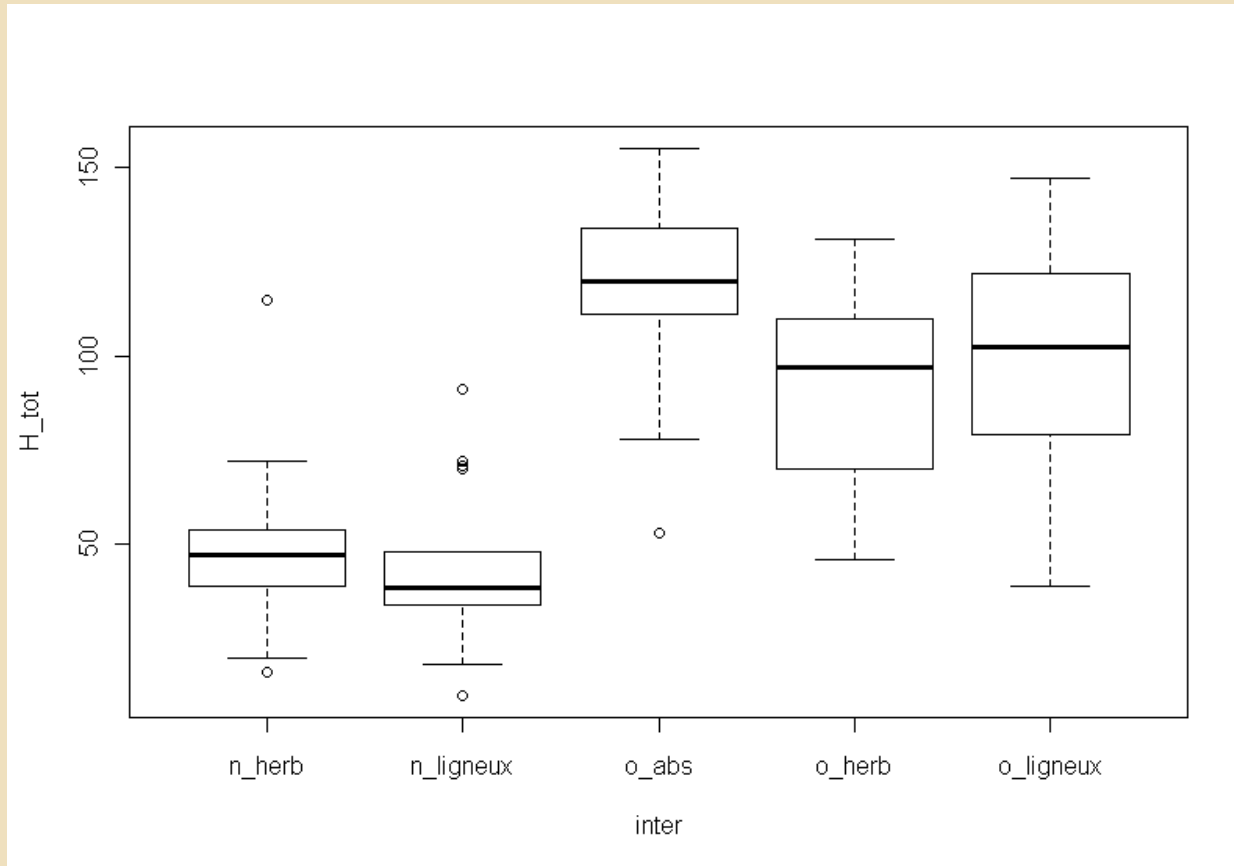


Sugar maple seedling



*Vegetation effect on growth pattern
is still investigated*

Yellow birch seedling



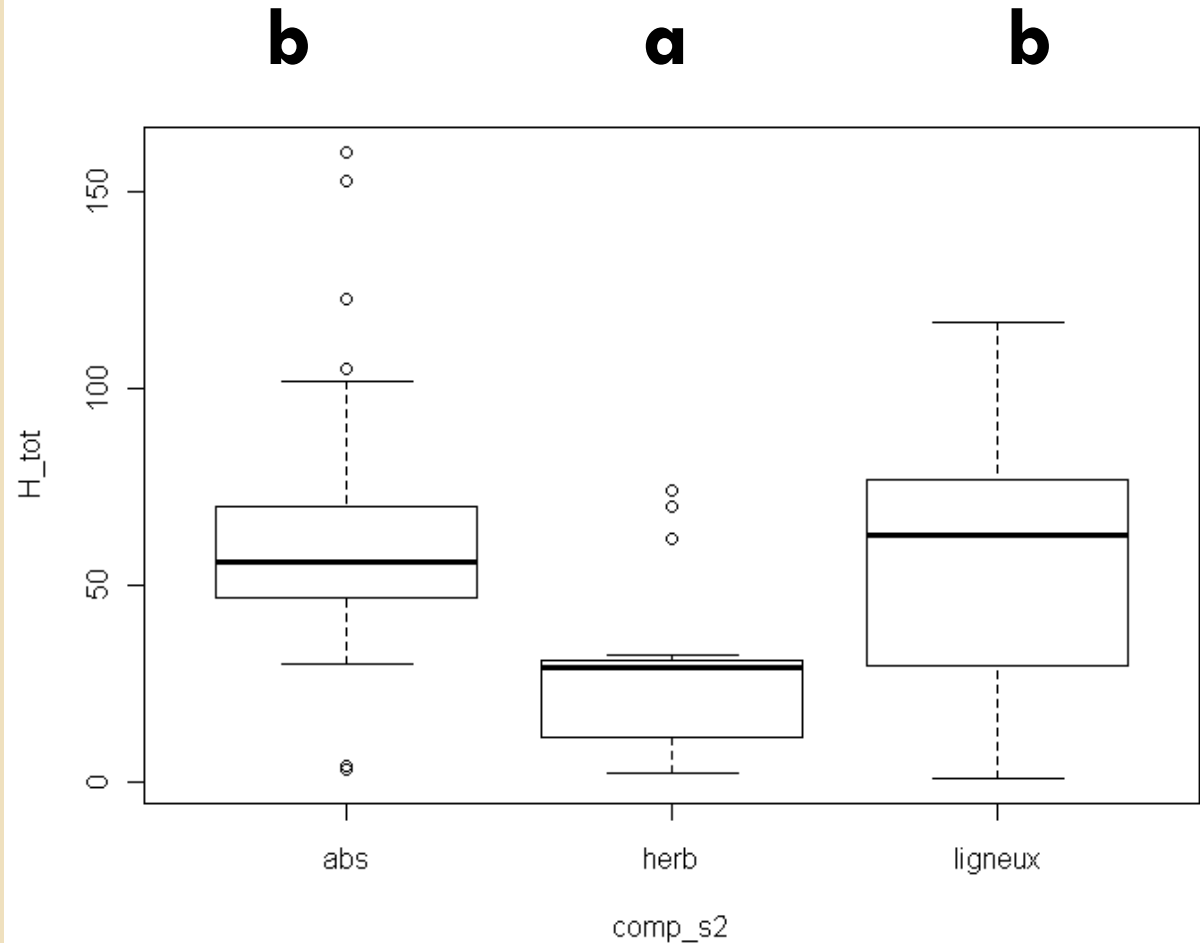
*Vegetation effect on growth pattern
is still investigated*

GROWTH RESPONSES

Sugar maple seedling

Effect of
herbaceous
competition
on height
higher than
woody
competition

COMPETITIVE VEGETATION TYPE

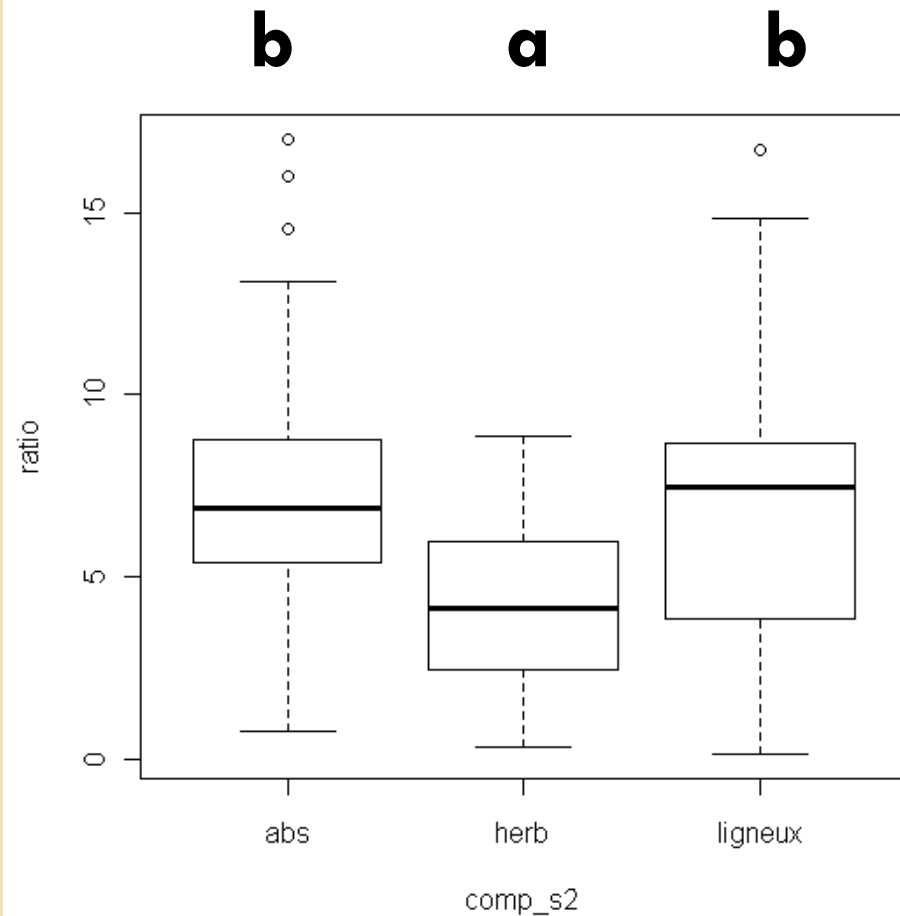


GROWTH RESPONSES

Sugar maple seedling

Effect of
herbaceous
competition
on H/D ratio
higher than
woody
competition

COMPETITIVE VEGETATION TYPE

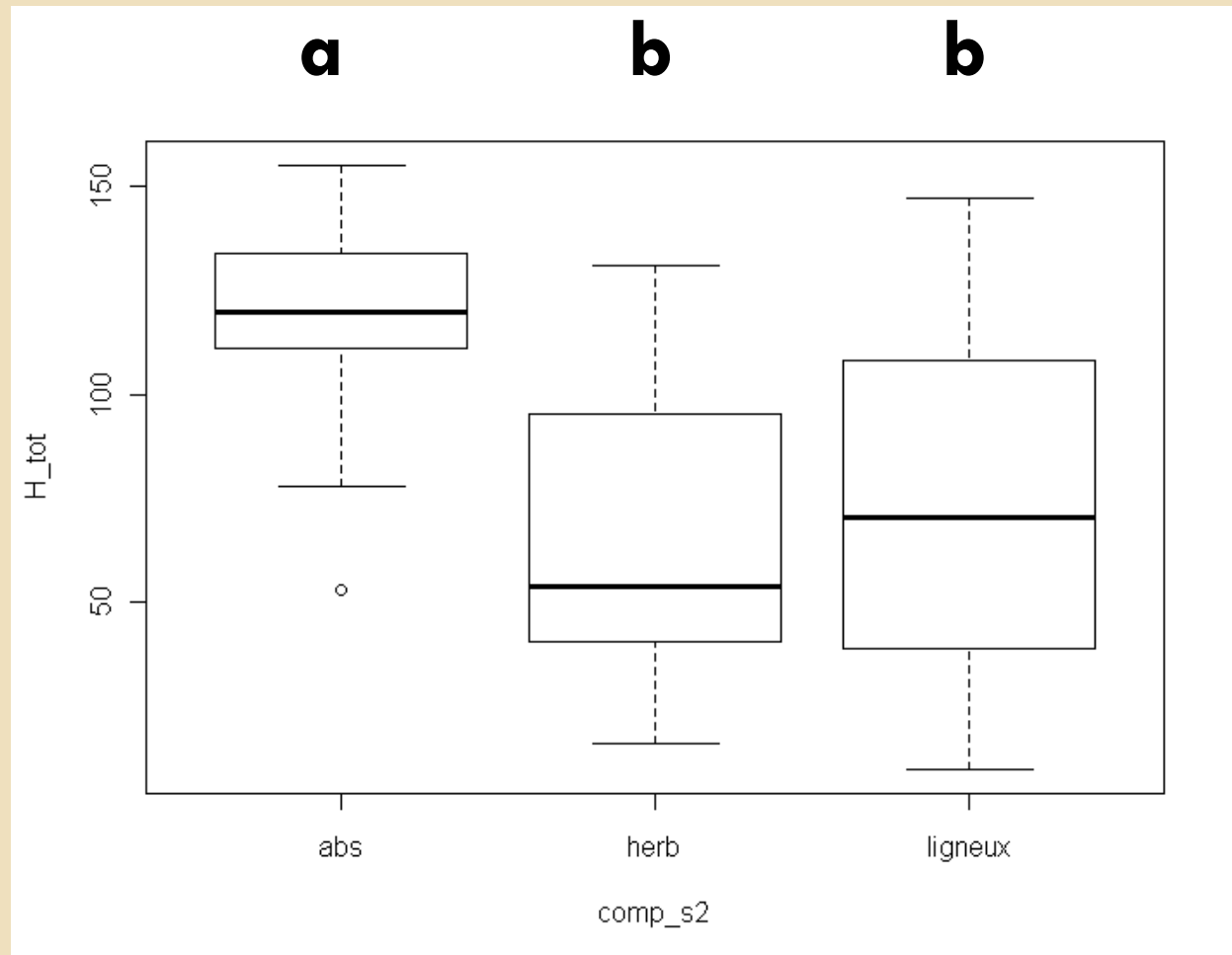


GROWTH RESPONSES

Yellow birch seedling

No different
effect of
**herbaceous
and woody**
competition
on height

COMPETITIVE VEGETATION TYPE



GROWTH RESPONSES

Yellow birch seedling

NO vegetation
type effect on
H/D ratio

COMPETITIVE VEGETATION TYPE

