PhD Research Project

Phenology and frost hardiness in sugar maple populations

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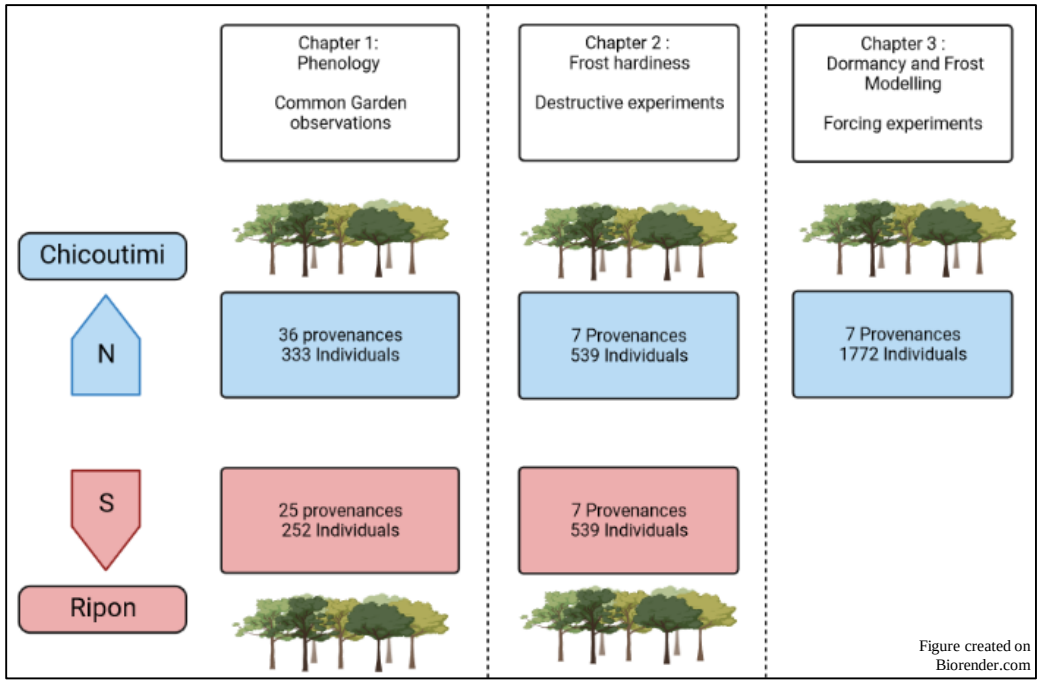
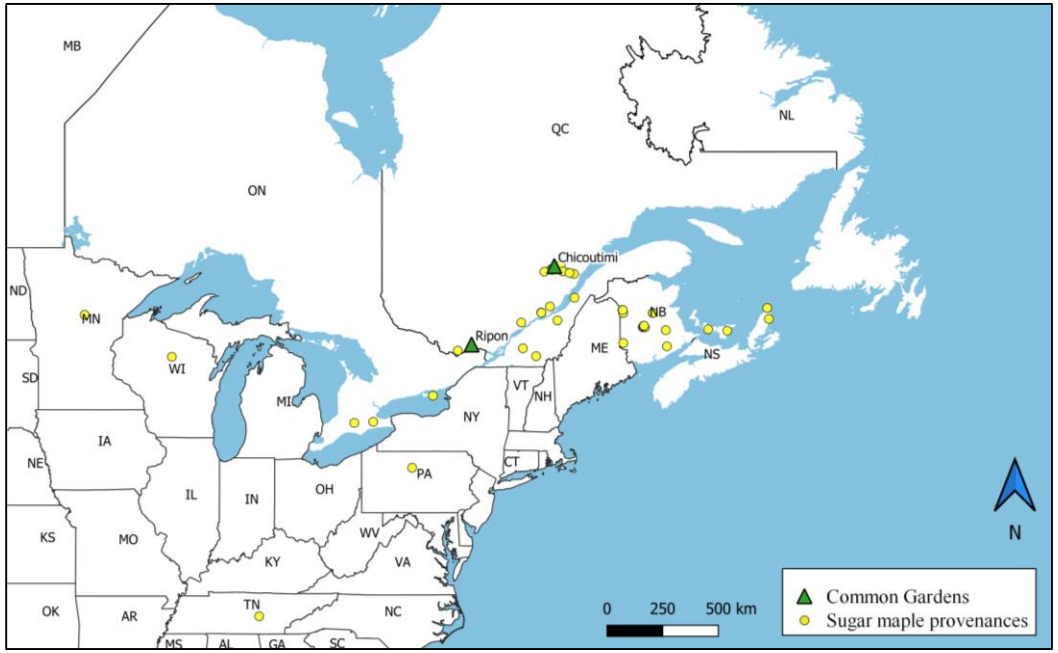
Problematic: as global climate change intensifies, warming temperatures and increased frequency of extreme frost events may create a mismatch between the phenology of locally-adapted tree populations and their surrounding environmental conditions, leading to increased risk of frost damages.

Objective: investigate ecotypic differentiations of phenology and frost hardiness to improve predictions of frost damage risk and support adaptive management actions in a context of climate change.





Hypotheses:

1) Southern provenances show greater plasticity.
2a) Northern provenances reach higher levels of frost hardiness
2b) Once chilling requirements are fulfilled, northern provenances are more responsive to spring temperatures
3) Northern provenances are more susceptible to spring frosts because of an early flushing, but less susceptible to winter and autumn frosts because of higher frost hardiness.

Materials and Methods:

- 2 common gardens established at the northern limit (Chicoutimi) and within (Ripon) the current sugar maple distribution.
- Combination of field observations (phenology) and destructive experiments (frost hardiness).
- Application of a dynamic model to predict frost damages.

Importance and applications:

- Improve prediction of frost damage risk in climate change scenarios
- Guide provenance selection in afforestation and assisted migration projects

Acknlowledgements: This research is funded by CRSNG (Natural Sciences and Engineering Research Council).