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Phenology and frost hardiness in sugar maple populations

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CONTEXT

- Trees regulate their frost hardiness through a series of physiological processes responding to environmental cues.
- As global climate change intensifies, warming temperatures may create a mismatch between the phenology of locally-adapted tree populations and their surrounding environmental conditions, leading to increased risk of frost damages.
- More information on how these traits change in tree populations is necessary to inform forest management choices.

RESEARCH QUESTION

How do phenology and frost hardiness change in sugar maple (*Acer saccharum*) provenances (red dots) growing in two different sites (green triangles)?



METHODS

PHENOLOGY:
Chilling/forcing
Experiments
(Will be performed in 2022/23)

FROST HARDINESS:
LT50 (T inducing 50% cell damage)
measured by
REL (Relative Electrolyte Leakage)

DYNAMIC MODEL OF FROST DAMAGES

Parametrization of an existing model (Leinonen, 1996;
Charrier et al., 2018) for sugar maple

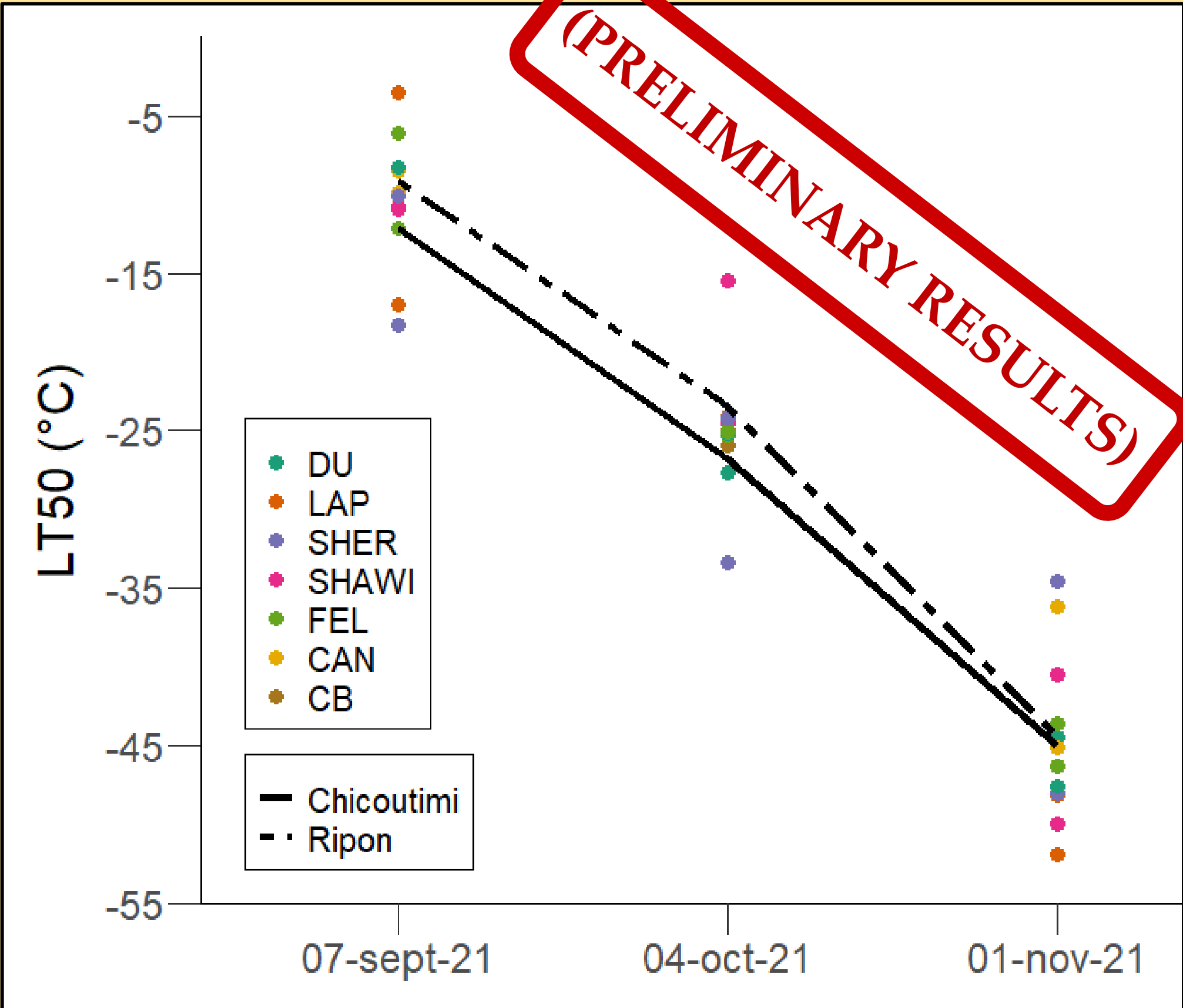


Figure: preliminary results from frost hardiness analyses. Points are the LT50 values for each provenance, lines link the mean LT50 values for all provenances of one site.

EXPECTED RESULTS

- Northern provenances reach higher levels of frost hardiness
- Once chilling requirements are fulfilled, northern provenances are more responsive to spring temperatures
- 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.

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