Co-VITAS:
Understory plants as sentinels of change in ecosystem function

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TOPIC
Traits Of Plants In Canada

Understory plants as sentinels of changes in ecosystem function

Understory plant communities are expected to be strongly affected by changes in climate, and compositional shifts in these communities are likely to have impacts on ecosystem function. The knowledge gap surrounding ubiquitous understory plants currently undermines our ability to forecast the future of Canadian forests.

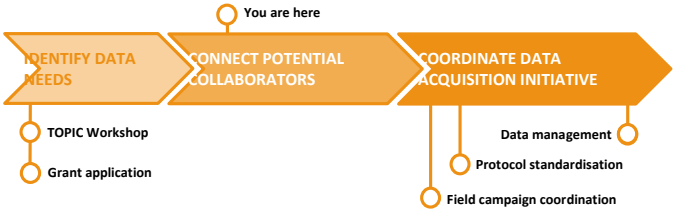
The variability of functional traits across species' ranges can inform us of their adaptive capacity, and represents an important step in addressing the complex question of vegetation community response to climate change. In addition, knowledge on this topic is also of significant value for integrating understory plants into large scale vegetation modelling exercises.

General objectives

- **Using a hierarchical design (region, site, population), evaluate intra-specific variability of foliar and root traits across important environmental gradients:**
  - A continental east-west precipitation gradient
  - A north-south temperature gradient
  - A gradient of disturbance severity (i.e. unmanaged, fire or harvesting, and high severity harvesting or fire)
- **Partition the relative importance of local biotic factors and large scale abiotic factors,** to arrive at the drivers of adaptive capacity in understory plants.
- **Integrate functional traits into modelling** of vegetation dynamics (LANDIS-II)
- **Make available the collected information** via the TOPIC database, in order to foster and support future large- scale projects

These complex questions challenge us to develop innovative approaches for collaborative science.

In July 2014, we are coordinating the efforts of research teams across Canada to investigate key aspects of understory species response and adaptive capacity to changing environmental pressures



Detailed rationale

Trait variability across a species' range can be a product of **phenotypic plasticity** or of the **genetic variability** among ecotypes. Both of these mechanisms are expected to play important roles in species' capacity to adapt to climate change, either in their early response (phenotypic plasticity) or in their long-term evolutionary response. We therefore focus our effort to quantify intraspecific variability in 6 ubiquitous boreal understory plants on traits that are most likely to respond strongly to environmental gradients (specific leaf area, leaf nitrogen concentration, etc.).

Furthermore, the **co-variation of above- and belowground traits** across environmental gradients can potentially indicate a common genetic basis. Alternatively, the lack of such a relationship could suggest that leaf and root traits offer complementary information on the functional role of the plants. While several studies have found a strong correlation between these traits at the site level, only few studies have examined the relationship over spatial scales approaching that of the species' range.

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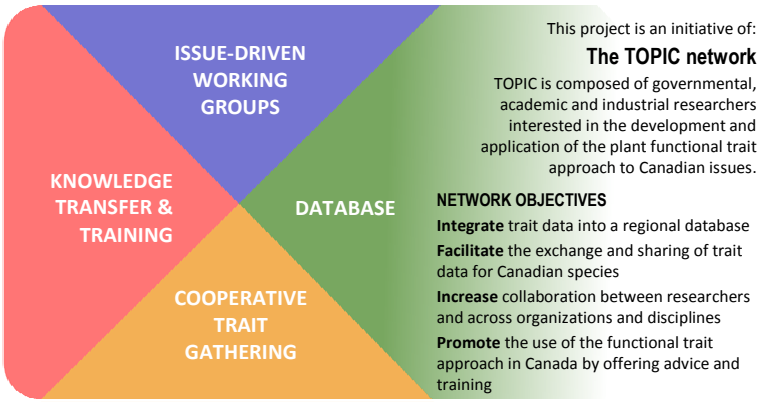

This project is an initiative of:

The TOPIC network

TOPIC is composed of governmental, academic and industrial researchers interested in the development and application of the plant functional trait approach to Canadian issues.

NETWORK OBJECTIVES

Integrate trait data into a regional database

Facilitate the exchange and sharing of trait data for Canadian species

Increase collaboration between researchers and across organizations and disciplines

Promote the use of the functional trait approach in Canada by offering advice and training

TARGET SPECIES

- *Vaccinium angustifolium* (ericaceae)
- *Cornus canadensis* (cornaceae)
- *Maianthemum canadense* (asparagaceae)
- *Aralia nudicaulis* (araliaceae)
- *Trientalis borealis* (primulaceae)
- *Kalmia angustifolia* (ericaceae)

TRAITS

Specific Leaf Area -
Specific Root Length -
Leaf Nitrogen content -
Root Nitrogen content -
Leaf Carbon content -
Root Carbon content -

WANT TO PARTICIPATE?

We are actively seeking collaborators who are heading out into the field in July 2014 and who would be willing to spend a few days harvesting samples and performing minimal lab-based measurements on targeted understory plants. Participation involves:

- **Sampling period:** July 14 to 25, 2014
- **Time commitment:** approx. three days in the field (for two people) and half a day in the lab (one person)

If you are interested in joining our initiative, please contact Françoise Cardou:
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Fonds de recherche Nature et technologies Québec