Examining the impact of stand age, needle age, and sunlight exposure on structural and physiological parameters of White Pines during the 2016 growing season
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Introduction

- Gross Primary Productivity (GPP) is an important component in the global carbon budget.
- However, little is known about how the structure and physiology of conifer trees affect seasonal and spatial photosynthesis, which influences GPP simulations.
- Understanding how various parameters of conifer trees respond to age and light over the growing season may improve the simulation of GPP.
- A more accurate simulation may lead to better predictions of ecosystem response to climate change and different levels of nutrients: essential information for sustainable natural resource management.

Objective

Determine if stand age, needle age, and sunlight exposure have any effect on the structural and physiological parameters of white pines.

Methods

Study Area: Two white pine stands in Turkey Point, ON: TP74 (42 years old) and TP02 (14 years old).
- Samples of varying needle age and sunlight exposure collected from TP74 and TP02 approximately once per month.
- Fresh weight and surface area of all needles measured.

Chlorophyll measurements:
- Samples placed in Dimethylformamide (DMF) for two weeks.
- Needle chlorophyll content measured by spectrophotometer.

Nitrogen measurements:
- Samples baked at 80°C for 48 hours minimum – dry weight recorded.
- Nitrogen content analyzed with LECO.

Results

Structural parameters

3. TP74 Results
4. TP02 Results

Physiological parameters

5. TP74 Results
6. TP02 Results

Preliminary Results

7. TP74 Results
8. TP02 Results

Discussion

- Sunlight exposure has an effect on specific leaf area, needle chlorophyll content, and needle nitrogen content.
- Chlorophyll-a to chlorophyll-b ratio is lower for older and shaded needles.
- The influence of sunlight exposure on chlorophyll and nitrogen measurements is more pronounced in the older pine stand.
- Further research conducted in subsequent growing seasons will provide more insight into these preliminary trends, what implications they have for photosynthesis, and the role of conifer structure and physiology in global GPP simulations.

References


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