

Xiangbo Yin, M. Sc.

Doctorat en sciences de l'environnement

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Institut de recherche sur les forêts de l'UQAT

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Madame Nicole Fenton, Ph. D.,
Institut de recherche sur les forêts de l'UQAT

Codirectrice de recherche

Madame Christine Martineau, chercheure scientifique
Ressources naturelles Canada



445 boul. de l'Université
Rouyn-Noranda (Québec) J9X 5E4
Téléphone : 819 762-0971
Télécopieur : 819 797-4727
uqat.ca

uqat.ca



SOUTENANCE DE THÈSE DE DOCTORAT

**INSTITUT DE RECHERCHE
SUR LES FORÊTS**

Soutenance de thèse de
Xiangbo Yin
Doctorat en sciences de l'environnement

« *Determining the offsite effects of mines and their footprint using vegetation and phyllosphere: integrating forest types and the mine life cycle* »

Le mardi **27 septembre 2022**
à **13 h 30** au local **C-200** du campus de
l'UQAT à Rouyn-Noranda et par vidéoconférence

**HUMAINE
CRÉATIVE
AUDACIEUSE**



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Xiangbo Yin, M. Sc.

2018-2022

Doctorat en sciences de l'environnement

Université du Québec en Abitibi-Témiscamingue

Rouyn-Noranda (Québec)

2014-2017

Master of botany

East China Normal University

Shanghai, China

2010-2014

Bachelor of agriculture faculty of science and engineering

China Agricultural University

Beijing, China

« Determining the offsite effects of mines and their footprint using vegetation and phyllosphere: integrating forest types and the mine life cycle »

Boreal understory vegetation and moss phyllosphere contribute significantly to global biodiversity and ecological services. Increases in mining activities to satisfy mineral requirements are potential threats to ecosystem services provided by understory plants and moss phyllosphere microbiota. The threats are not only in directly disturbed areas but might also spread into relatively intact offsite landscapes. To improve our understanding of offsite effects of mines, we investigated understory plants and phyllosphere microbial DNA of feather moss (i.e., *Pleurozium schreberi* (Brid.) Mitt.) within 1-km mosaic landscapes containing four ecosystem types (i.e., coniferous, deciduous, mixed forest and open canopy ecosystems) around six mines at different mining stages (operation vs. non-operating) in the Canada's boreal zone. Metabarcoding of the bacterial 16S rRNA and fungal ITS2 genes were used for taxonomic identification.

Our results confirmed the presence of offsite effects of mines on the diversity and composition of understory vascular plants, bryophytes and the phyllosphere. The magnitude of the offsite effects was associated with mining stage and ecosystem type. The effects of ecosystem type and mining stage were interacted for vascular plants and bryophytes but not for the phyllosphere microbiota in the offsite landscapes. Understory plants in deciduous and mixed forests were more negatively affected by the offsite effects than those in coniferous forest. Understory diversity was more affected near operating than non-operating mine sites. The strongest effects of mine offsite effects occurred within a 0.2 km distance from mines particularly near operating mines.

Given the predicted changes in boreal forest with encroachment of deciduous species into coniferous forests and the increased sensitivity of mixed and deciduous forests to the offsite effects, the area affected by mines could grow in the future. Therefore, offsite effects of mines should be included in ecological evaluations to maintain biodiversity and ecological services in boreal forest. A buffer zone around mines is recommended to offset potential offsite effects.