INTRODUCTION

• Gravel mining operations typically leave large disturbed areas that lack natural cover and medium for plant growth (topsoil).
• Gravel pits located in central-interior British Columbia (BC) have soils with weak profile development that lack soil horizons and organic forest floor.
• Atmospheric nitrogen (N) inputs are also very low in this region, however, lodgepole pine (Pinus contorta) trees have been growing well in these pits.
• A previous study compared the lodgepole pine trees growing at these unreclaimed gravel pits to nearby undisturbed forest and reported that:
  - Soil N levels were six-fold lower in gravel pits, however tissue N content and growth rate of pine trees were similar at both sites.
  - This indicates that pine trees growing at these gravel pits are able to meet their N requirements from an unknown source (Figure 1).

OBJECTIVES

1. Isolate potential endophytic diazotrophs from internal tissues of pine trees growing at these N-limited gravel pits in central-interior BC.
2. Examine the in vitro N-fixing ability of the isolated bacteria.
3. Identify the bacteria that were tested positive for N-fixing ability.

HYPOTHESES

• Endophytic diazotrophs inhabit the internal tissues of pine trees growing at these N-limited gravel pits.
• These endophytic diazotrophs have the ability to fix atmospheric N to support the growth of pine trees.

RESULTS

• Seventy-seven potential endophytic diazotrophs were isolated from pine trees tissues (Anah pit = 29; Skulow pit = 48).
• Thirty-two isolated bacteria showed positive results for ARA, thus confirming their N-fixing ability (Anah pit = 15; Skulow pit = 17) (Table 1).
• Bacteria of genus Pseudomonas were the most common and produced relatively high amounts of ethylene in the ARA (Table 1).

Table 1. List of bacterial strains isolated from lodgepole pine trees and amount of ethylene produced by each strain in acetylene reduction assay.

CONCLUSIONS & FUTURE WORK

• Lodgepole pine trees at these unreclaimed gravel mining pits naturally harbor endophytic diazotrophs capable of fixing atmospheric N.
• These endophytic diazotrophs could be providing significant amounts of fixed N to pine trees which will be quantified in vivo using 15N foliar dilution technique in a yearlong greenhouse experiment.

SIGNIFICANCE

• Unreclaimed gravel mining pits in BC have extremely N-limited soils and understanding the sources of N inputs could be helpful in their effective reclamation or reclamation.
• Determining the role played by endophytic diazotrophs is crucial in estimating the potential of such N-fixers to support tree growth at these pits.

REFERENCES


This research is supported by NSERC Discovery Grant.

*Corresponding author: Kiran Preet Padda (kiranpreet.padda@ubc.ca)