



Introduction

Canola (*Brassica napus* L.) is Canada's largest acreage oilseed crop, contributing over \$43 billion annually to the economy [1]. The soil-borne pathogen *Plasmodiophora brassicae*, which causes clubroot, significantly reduces canola yield and quality [2]. The rhizosphere microbiome may influence plant health, including defense against soil-borne pathogens [3].



Figure 1: Clubbed canola root, Temiskaming ON.

Objective

To compare microbial communities associated with clubbed roots, non-clubbed roots, and bulk soil in commercial canola fields.

Materials & Methods

Sampling: Ten clubbed roots, 10 non-clubbed roots, and 10 bulk soil cores collected from each of 10 fields near Temiskaming Shores, ON, Sept. 2024.

Processing: Rhizosphere soil collected with phosphate-buffered saline.

Sequencing: DNA extracted and genomes assembled at MetaGenom Bio (Waterloo, ON).

Primers:

16S rRNA for bacteria and Archaea

- 515FB: 5' GTGYCAGCMGCCGCGGTAA 806RB: 5' GGACTACNVGGGTWTCTAAT

ITS for fungi

- BITS: 5' ACCTGCGGARGGATCA B58S3: 5' GAGATCCRTTGYTRAAAGTT

18S rRNA for Oomycetes

- 574f: 5' CGGTAAYTCCAGCTCYV 1132f: 5' CCGTCAATTHCTTYAART

Analysis: Principal coordinate analysis (PCoA) based on Bray-Curtis dissimilarity using RStudio and SAS.

Discussion & Future Work

Clubroot infection did not alter overall species richness or diversity between clubbed and non-clubbed roots. However, significant differences in soil fungal and bacterial species richness were observed between non-clubbed roots and bulk soil samples.

Study limitations: Absence of non-clubbed roots at some sites and incomplete oomycete reads.

Future work: Incorporate samples from 2025 and investigate the functional roles of key microbial taxa.

Acknowledgements

Funding was provided by the Ontario Agri-Food Innovation Alliance, Ontario Canola Growers Association, National Science and Engineering Research Council, Ontario Graduate Scholarship, and the Canadian Agri-Food Partnership through AAFC and the Canola Council of Canada.



References

- [1] Canola Council of Canada (2024). Economic Impact of Canola on the Canadian Economy. https://www.canolacouncil.org/download/131/economic-impact/37664/gd_the-economic-impact-of-canola-on-the-canadian-economy_august-2024
- [2] Dixon, G. R. (2009). The occurrence and economic impact of *Plasmodiophora brassicae* and clubroot disease. *Journal of Plant Growth Regulation*, 28(3), 194–202. <https://doi.org/10.1007/s00344-009-9090-y>
- [3] Zhao, Y., Gao, Z., Tian, B., Bi, K., Chen, T., Liu, H., Xie, J., Cheng, J., Fu, Y., & Jiang, D. (2017). Endosphere microbiome comparison between symptomatic and asymptomatic roots of *Brassica napus* infected with *Plasmodiophora brassicae*. *PLoS One*, 12(10), Article 0185907. <https://doi.org/10.1371/journal.pone.0185907>

Results

Table 1: Species richness (A) and Shannon diversity (B) at the genus level.

A) Species richness			
	Bacteria	Fungi	Oomycetes
Bulk soil	181.6 b*	169.4 a	3.3 b
Clubbed roots	206.4 ab	144.2 ab	16.0 a
Not clubbed	230.2 a	117.8 b	7.3 ab
B) Shannon diversity			
	Bacteria	Fungi	Oomycetes
Bulk soil	3.77	3.33 a	0.41
Clubbed roots	3.87	2.66 b	0.77
Not clubbed	4.21	2.98 ab	0.58

*Different letters within columns indicate significant differences in genus proportion ($p < 0.05$), Tukey's test.

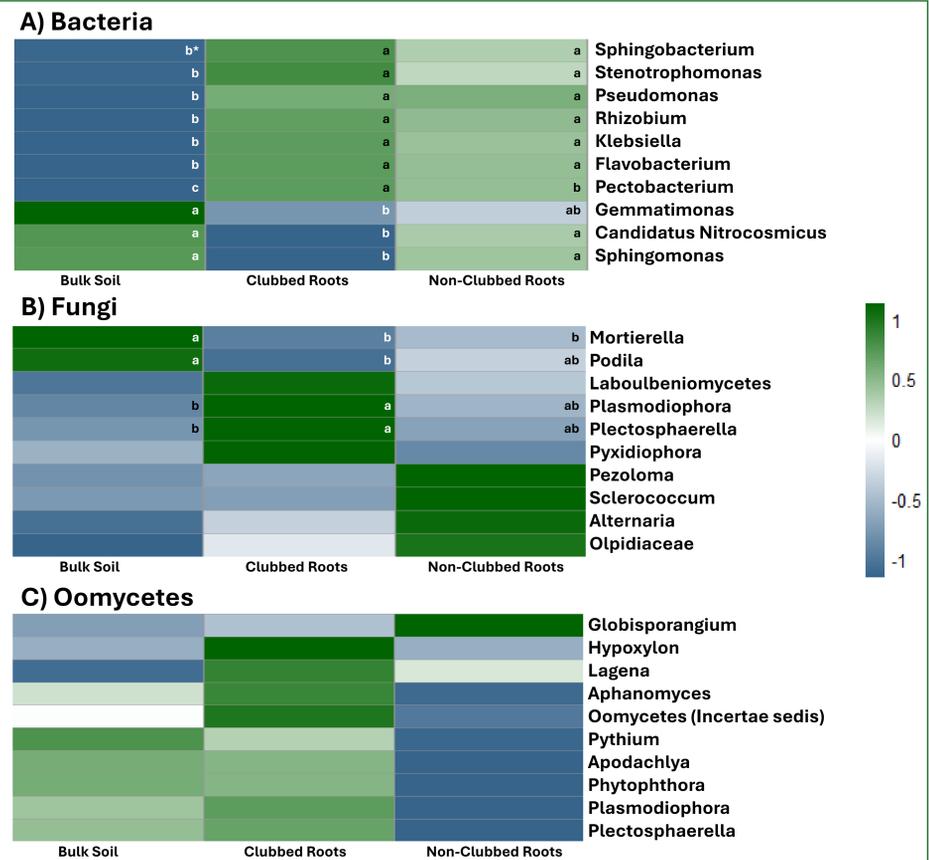


Figure 2: Heatmaps of A) bacterial, B) fungal, and C) Oomycete microbial community composition. Values represent \log_{10} -transformed and z-score standardized proportions. *Different letters within rows indicate significant differences in genus proportion ($p < 0.05$), Tukey's test.

