

Microbiome of the cool season forage grass timothy (*Phleum pratense* L.) and its potential role in stress tolerance

Introduction

PGPR are associated with plant roots and augment plant productivity and immunity. Root exudates play a significant role in a successful colonization of plant roots by rhizospheric PGPR.

Objectives

- 1- Molecular and biochemical characterization of bacterial isolates associated with tissues of timothy.
- 2- Selection of top performing isolates.

Literature cited

[1] Burkholder, P.R., Evans, A.W., McVeigh, I., and Thornton, H.K. 1944. Antibiotic activity of lichens. Proc Natl Acad Sci USA 30(9): 250-255.

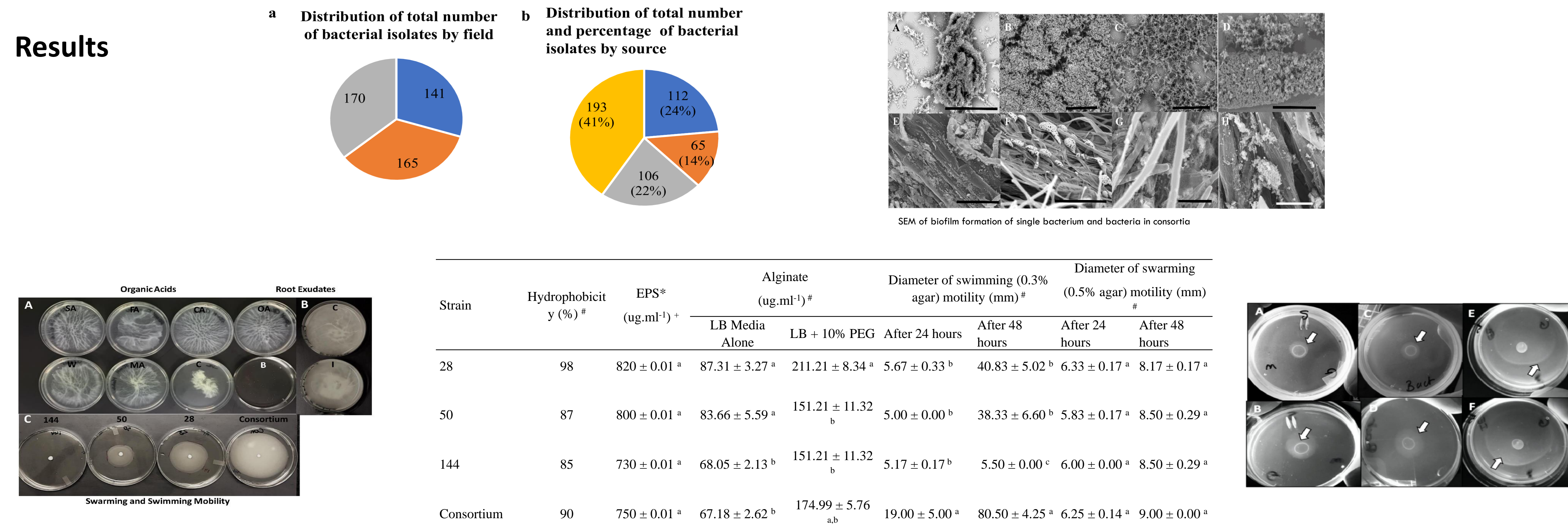
[2] Kadouri, D., Jurkevitch, E., and Okon, Y. 2003. Involvement of the reserve material poly- β -hydroxybutyrate in *Azospirillum brasilense* stress endurance and root colonization. Appl. Environ. Microbiol. 69(6): 3244.

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Methods

Three field sites located in Sainte-Anne-de-Bellevue, Québec, Canada were selected for sampling. Samples of the rhizosphere and bulk soils, leaves and crowns were processed. A range of functional biochemical tests were performed in triplicate. Strains 28 and 144, and 50 isolated from the rhizosphere of timothy were selected because of their growth-promoting abilities in timothy. The compatibility and interaction among the three bacteria of the consortium was tested using the Burkholder agar diffusion assay [1] and through the co-culture plating method. The response of the multispecies consortium to organic acids was quantified using a modified capillary chemotaxis assay and qualitatively evaluated using the drop assay in carbon-free medium [2]. Additionally, biofilm traits, including exopolysaccharide and alginate production, hydrophobicity and swimming and swarming motility were studied, and biofilms were visualized using SEM.

Results



Number of genera	Genus (No. of strains)	Plant colonization traits				Plant growth promotion traits				Antimicrobial traits		
		Protease	Amylase	Cellulase	Calcite hydrolysis	Ca Phosphatase	Urease	Siderophores	IAA [†] (µg/ml) ± S.D.	Chitinase	Chitosanase	HCN
1	<i>Arthrobacter</i> (9)	++	+	+	+	-	+	+++	13.52 ± 0.52	+	+	-
2	<i>Bacillus</i> (89)	++	+	+	+	+	+	++	13.27 ± 0.17	+	+	+
3	<i>Brevibacterium</i> (6)	++	+	+	+	+	+	+++	14.42 ± 0.94	+	+	-
4	<i>Chryseobacterium</i> (10)	++	+	+	+	+	+	+++	14.07 ± 1.09	+	+	-
5	<i>Curtobacterium</i> (10)	++	+	+	+	+	+	+++	16.23 ± 1.68	+	+	-
6	<i>Microbacterium</i> (11)	+	+	+	+	-	+	+++	13.29 ± 0.41	+	+	-
7	<i>Methylobacterium</i> (6)	++	+	+	+	+	+	+++	13.31 ± 0.8	+	+	-
8	<i>Paenibacillus</i> (8)	+	+	+	+	+	+	+++	13.35 ± 0.62	+	+	-
9	<i>Pantoea</i> (15)	-	+	+	+	-	+	+++	13.67 ± 0.48	+	+	-
10	<i>Pedobacter</i> (17)	+	+	+	+	-	+	+++	14.27 ± 1.09	+	+	-
11	<i>Pseudomonas</i> (23)	++	+	+	+	-	+	+++	12.38 ± 0.19	+	+	+
12	<i>Rahnella</i> (6)	-	-	+	+	-	+	+++	12.44 ± 0.41	+	+	-
13	<i>Stenotrophomonas</i> (14)	++	+	+	+	+	+	+++	13.71 ± 0.68	+	+	-
14	<i>Streptomyces</i> (18)	++	+	+	+	-	+	+++	13.50 ± 0.11	+	+	+
15	<i>Xanthomonas</i> (5)	++	++	+++	+++	+	++	+++	17.39 ± 4.51	+++	+++	-
16	<i>Variovorax</i> (7)	+	+	+	+	-	+	+++	13.15 ± 0.78	+	+	-
Total		14	15	16	16	8	14	16		16	16	3

Discussion

-First report on the abundance, diversity and distribution of bacteria associated with different tissues of two cultivars of timothy grass (*Phleum pratense* L.) grown under field conditions, along with their biochemical and molecular characterization.

-First insight on the effect of individual organic acids and root exudates released from *Brachypodium distachyon* on the multispecies consortium.

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