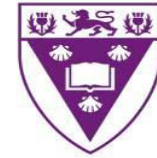


Marion Island vegetation and root associated fungal diversity

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Introduction

- Dark septate endophytic (DSE) fungi and arbuscular mycorrhiza (AM) fungi are root endophytes that colonize plant roots to form a symbiotic relationship with host plants
- AM fungi gain photosynthetic carbon from the host plant
- Host plant is provided with improved nutrient uptake, resistance to pathogens and abiotic stress
- DSE have been shown to have a positive effect on plant growth

Motivation

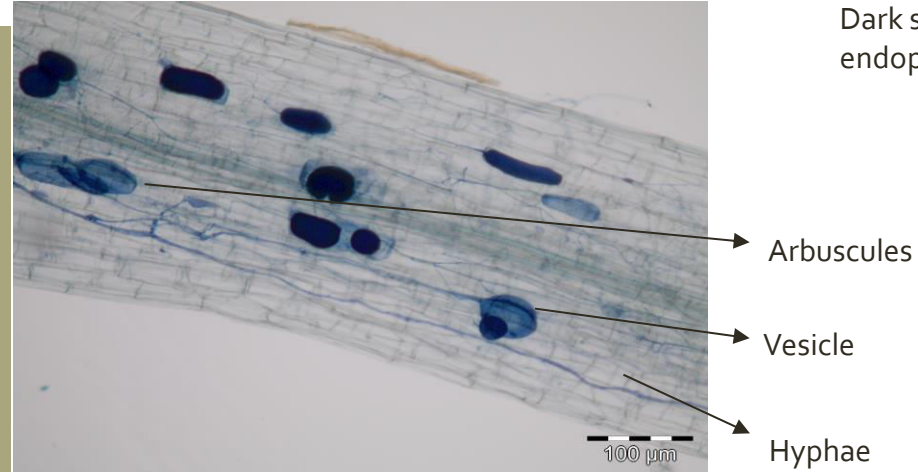
- The diversity of plants and endophytic fungi can be inter-related
- Roots of selected plant species will form a symbiotic relationship with DSE and AM fungi, allowing both species to thrive in cold-stressed environments.
- Literature shows a consistent occurrence of AM fungi and DSE in the sub-Antarctic

Objectives

1. Assess AM fungal and DSE colonization in roots of selected plant species
2. Isolation and identification of DSE fungi
3. Determination of fungal diversity within roots

Results

AM Fungal colonization



Dark septate endophyte colonization



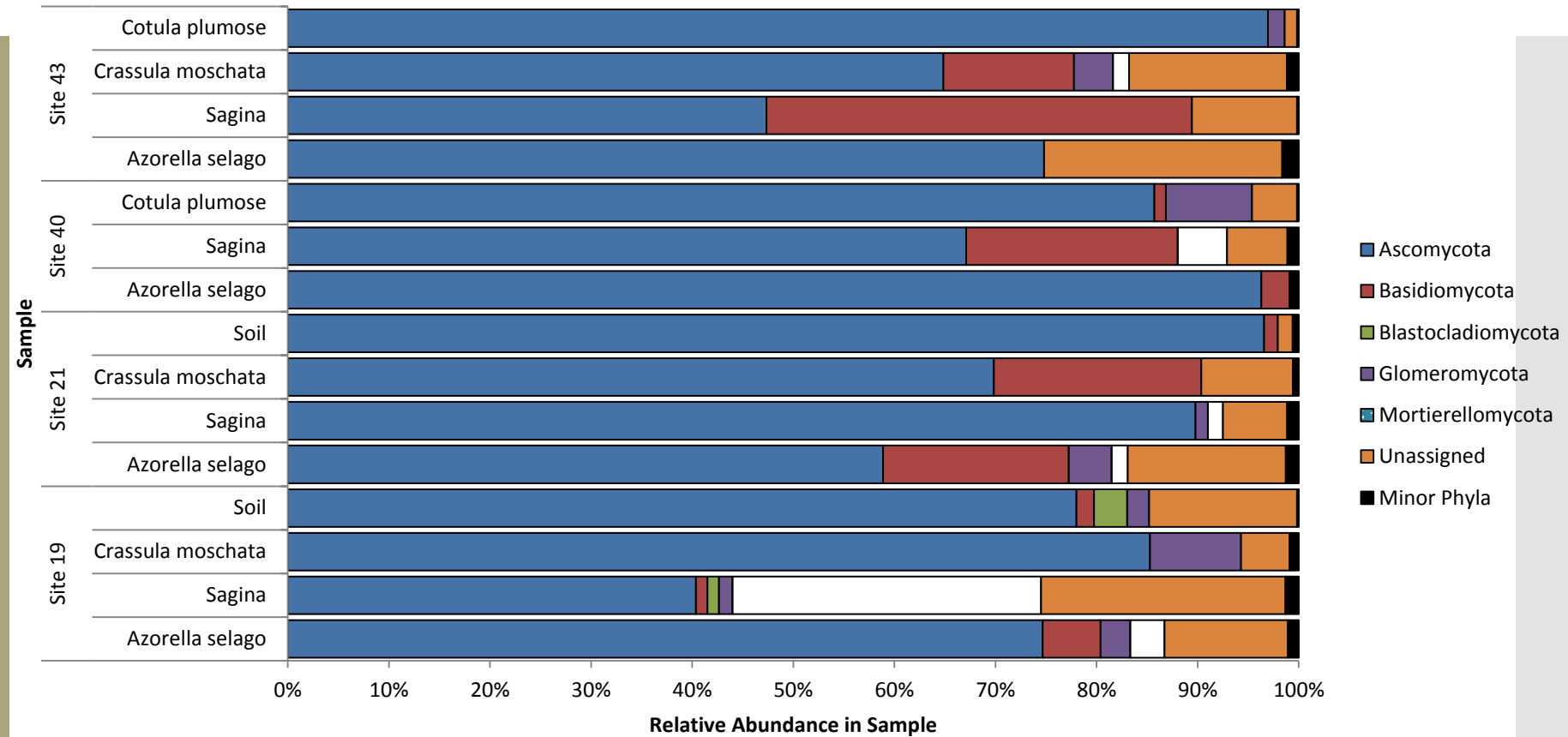
Colonization percentage

Selected plant species	No. of root samples analyzed	Root associated fungal endophytes (%)	
		AM fungi	Dark septate endophyte
<i>Agrostis magellanica</i>	6	41±24	0.83±2
<i>Azorella selago</i>	6	60±51	8±14
<i>Poa cookie</i>	6	38±33	52±33
<i>Blechnum penna-marina</i>	1	93	9
<i>Acaena magellanica</i>	6	66±15	8±13
<i>Cotula plumose</i>	4	96±6	16±19

Isolate identification using BLAST analysis tool

Isolate	Accession Number	Description	Percentage coverage (%)	E-value	Percentage identity (%)
aa/RK 041	HQ339883.1	<i>Elaphocordyceps sp</i>	100%	0.0	100%
ab/RK 045	NR137916.1	<i>Penicillium sp</i>	100%	0.0	100%
ac/RK 020	AB208110.1	<i>Tolypocladium cylindrosporum</i>	100%	0.0	100%
A/RK 031	MG050121.1	<i>Cladosporium allicinum</i>	100%	0.0	100%
B/RK 045	NR137916.1	<i>Penicillium sp</i>	100%	0.0	100%
C/RK 040	KC965450.1	Uncultured fungus	100%	0.0	93%
D/RK 081	HM069369.1	Uncultured fungus	100%	0.0	100%
E/RK 040	KT269003.1	<i>Hypocreales sp</i>	100%	0.0	99%
F/RK 019	KC352935.1	<i>Acremonium sp</i>	100%	0.0	99%
G/RK 019	NR136979.1	<i>Beauveria malawiensis</i>	100%	0.0	99%
H/RK 038	KC771448.1	<i>Boeremia exigua</i>	100%	1e-100	99%
I/RK 023	KC485446.1	<i>Penicillium sp.</i>	100%	0.0	100%
J/RK 043	KC965450.1	Uncultured fungus	98%	1e-141	95%
K/RK 026	AB540571.1	<i>Acremonium cereale</i>	100%	0.0	100%
L/RK 038	KU954336.1	<i>Antarctomyces psychrotrophicus</i>	100%	0.0	100%
M/RK 026	KC965450.1	Uncultured fungus	100%	0.0	93%
N/RK 020	HQ630366.1	<i>Umbelopsis vinacea</i>	100%	0.0	98%
O/RK 031	KU981162.1	<i>Paraphaeosphaeria neglecta</i>	100%	0.0	100%
P/RK 023	MF326629.1	<i>Hypocreales sp</i>	99%	1e-174	93%
Q/RK 038	KJ188591.1	Uncultured <i>Tetracladium clone</i>	100%	0.0	100%
R/RK 023	DQ914672.1	<i>Cystodendron sp.</i>	100%	0.0	100%
S/RK 030	KP714650.1	<i>Thelebolus sp.</i>	100%	0.0	100%
U/RK 027	KX868623.1	<i>Penicillium glabrum</i>	100%	0.0	100%
V/RK 040	MF276664.1	<i>Trichoderma longibrachiatum</i>	100%	0.0	100%
Y/RK 161	EU272493.1	<i>Leptosphaerulina chartarum</i>	100%	0.0	100%
Z/RK 022	MF326612.1	<i>Tolypocladium cylindrosporum</i>	100%	1e-80	100%

Fungal diversity



Conclusion

- Fungal diversity is able to thrive in the cold intolerable environmental conditions of Marion Island

References

1. Gremmen, N.J.M. ,and Smith, V.R., 2008. Terrestrial vegetation and dynamics. The Prince Edward Islands. Land-sea interactions in a changing ecosystem. African SunMedia, Stellenbosch, pp.215-244
2. Petrini, O., 1991. Fungal endophytes of tree leaves. In Microbial Ecology of Leaves (pp. 179-197). Springer New York

Acknowledgements



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