How soil microbes drive and respond to plant invasions in Mediterranean ecosystems: insights from Australian acacias



Cal-IPC 30-Year Anniversary Symposium Johannes (Jaco) Le Roux

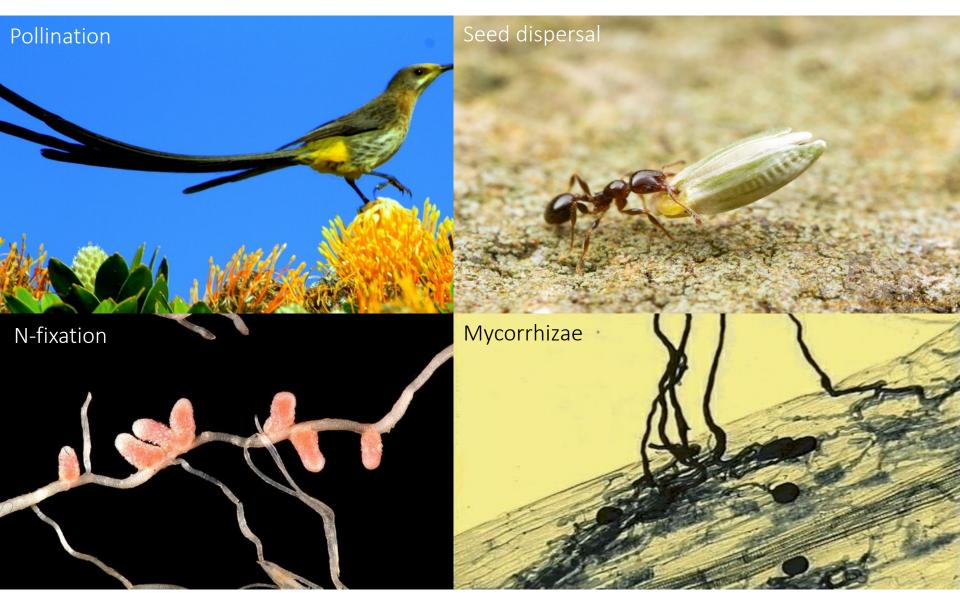






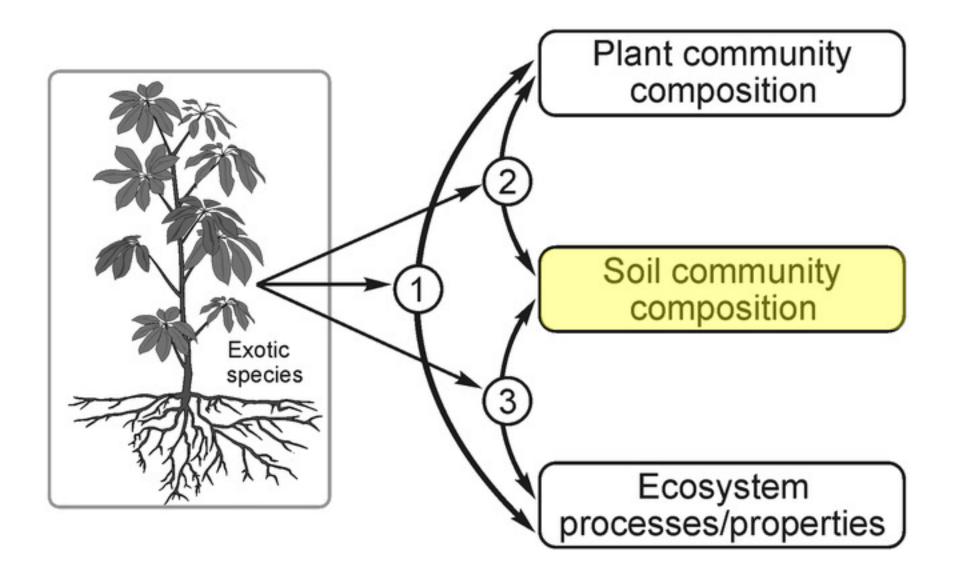


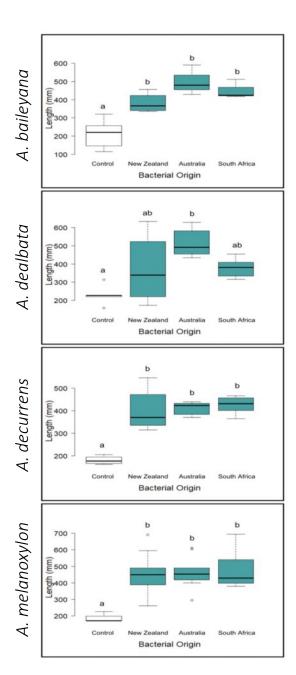
Microbial mutualists and invasion success



Mutualists and invasion success - Australian acacias and rhizobia

Microbiomes and invasion success







What are the impacts of co-introduction on **native soil rhizobial communities**?

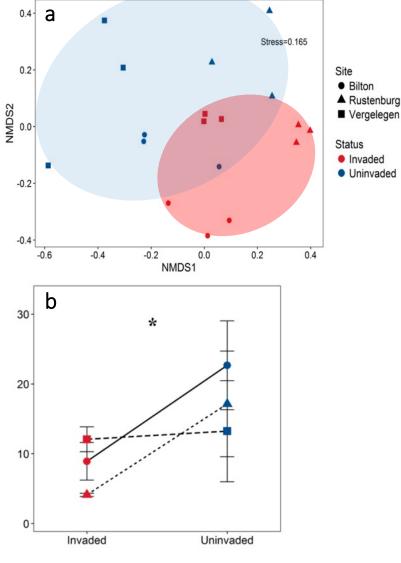
Acacia-uninvaded

Acacia-invaded

What are the impacts of co-introduction on **native soil rhizobial communities**?

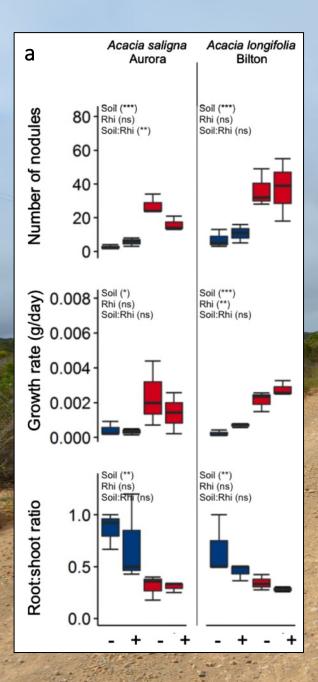
Acacia-uninvaded





Le Roux et al. 2018 Journal of Ecology

Acacia-invaded





What are the impacts on whole soil bacterial community structure and function?



Soil nutrients

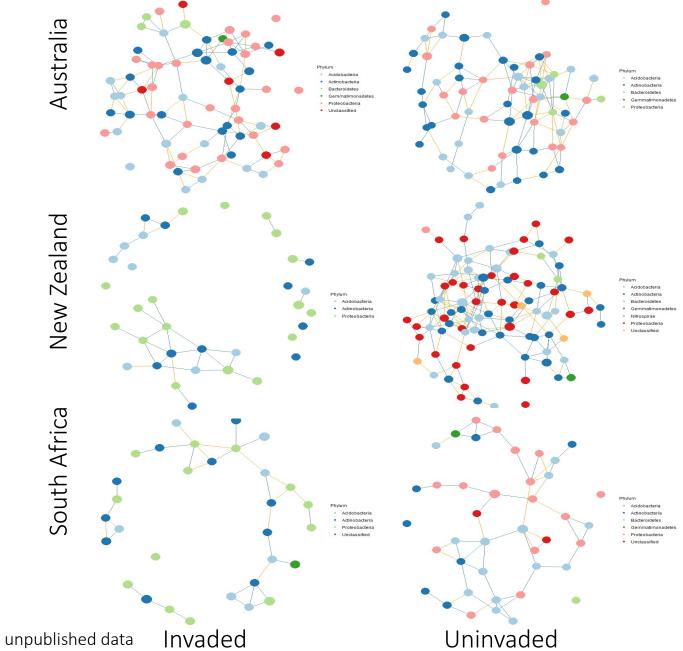
Acacia-invaded

Acacia-uninvaded

Soil microbes

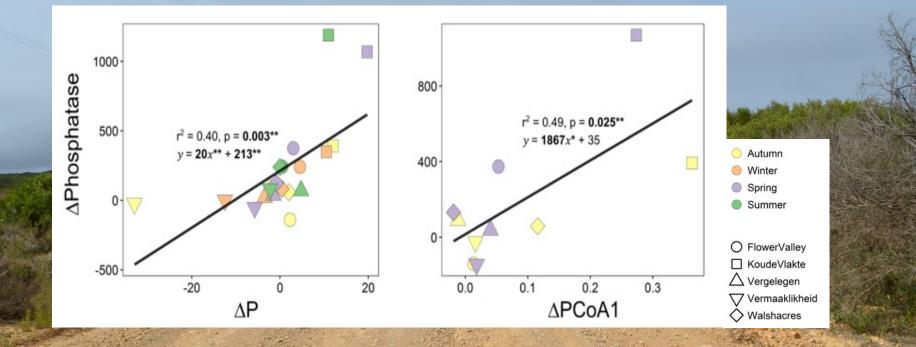
Nutrient cycling

Whole soil bacterial community structure



Rodriquez et al. unpublished data

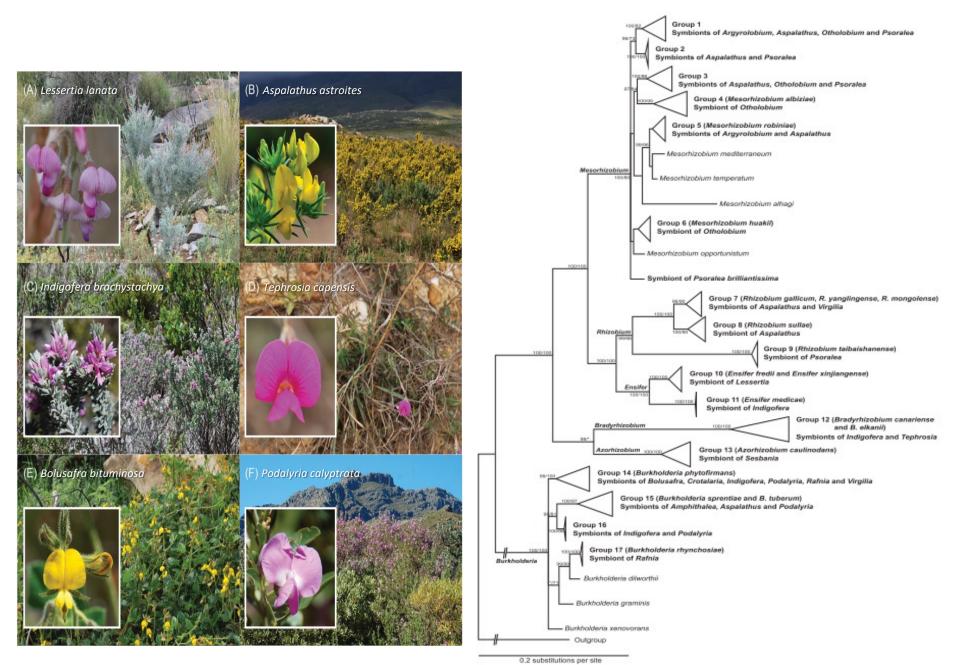
Whole soil bacterial community structure



Keet et al. (2021) Microbial Ecology

What does this mean for native biodiversity and management?

9400 plant species764 legume species

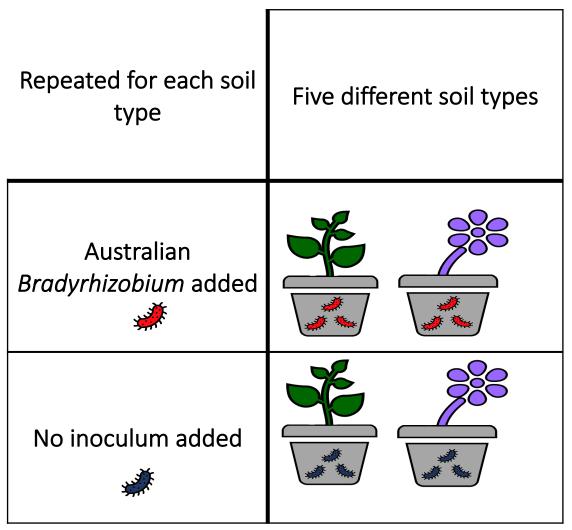


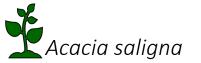




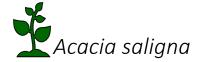
Psoralea pinnata

Acacia saligna

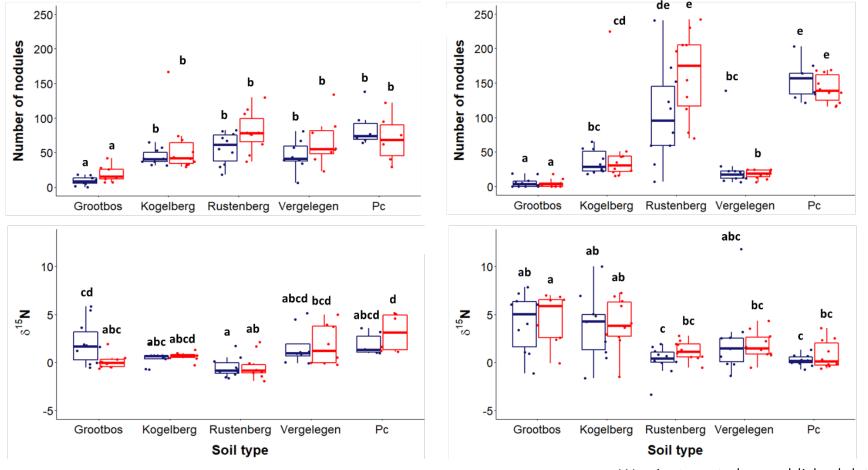




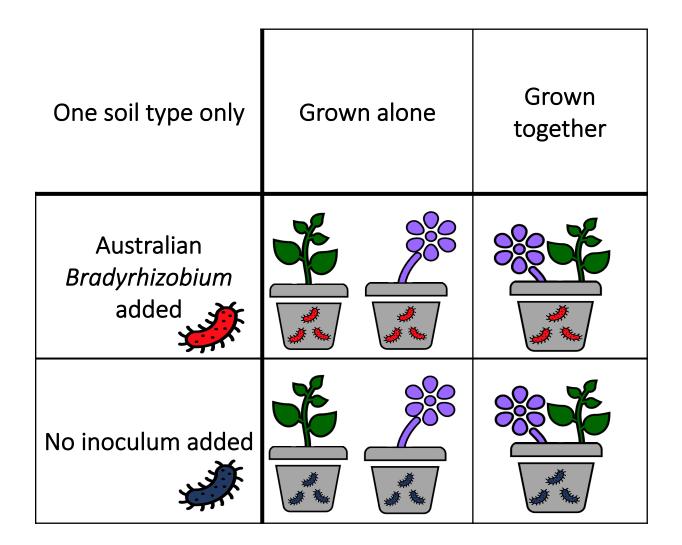




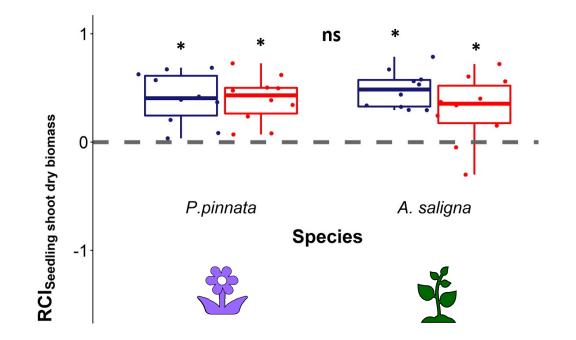




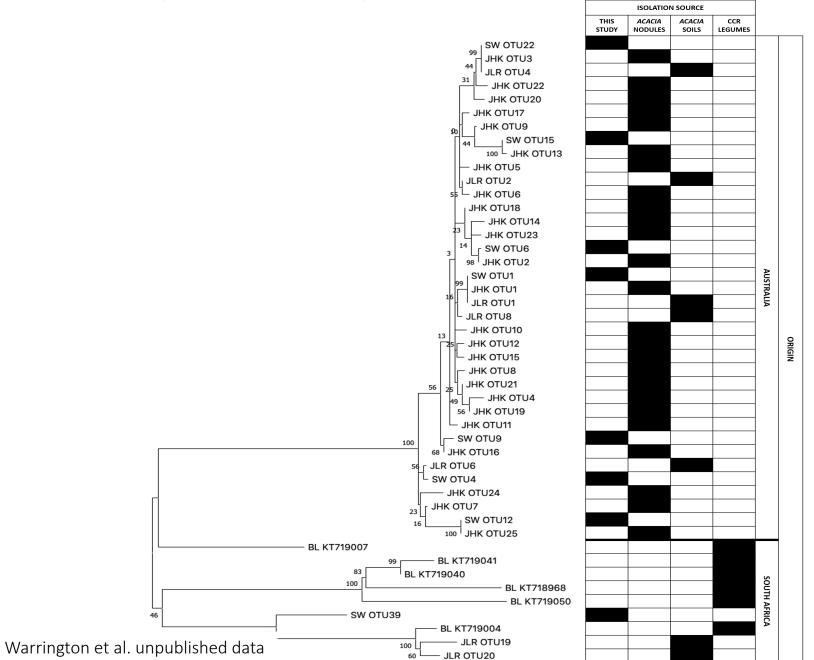
Warrington et al. unpublished data

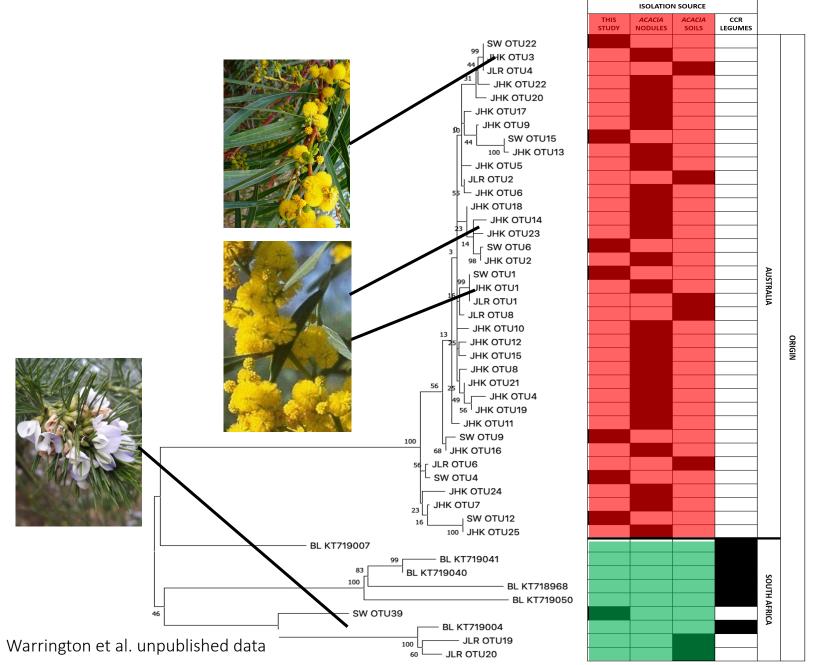






Warrington et al. unpublished data





			COUNTRY OF ORIGIN										
	SOIL TYPE	AUS INOCULUM ADDITION	AUSTRALIA			SOUTH AFRICA				OTHER			
Reference samples used as inoculum	Bradyrhizobium sp. Amel1.2AUS												
	Bradyrhizobium sp. Amel2.3AUS												
	Bradyrhizobium sp. Amel3.4AUS												
eda	Bradyrhizobium sp. Adea4.1AUS												
sn	Bradyrhizobium sp. Adec4.2AUS												
	Grootbos -	No inoculum											
		Inoculum added											
	Kogelberg -	No inoculum											
и		Inoculum added											
Acacia saligna	Rustenberg -	No inoculum											
acia		Inoculum added											
Ac	Vergelegen -	No inoculum											
	vergelegen	Inoculum added											
	Psoralea- condition	No inoculum											
		Inoculum added											
	Grootbos -	No inoculum											
		Inoculum added											
	Kogelberg -	No inoculum											
nata		Inoculum added											
i pin	Rustenberg -	No inoculum											
Psoralea pinnata		Inoculum added											
Psoi	Vergelegen	No inoculum											
	vergelegen	Inoculum added											
	Psoralea-	No inoculum											
	conditioned	Inoculum added											
			SW OTU1	SW OTU6	SW OTU21	SW OTU2	SW OTU3	SW OTU17	SW OTU44	SW OTU4	SW OTU22	SW OTU39	
				Bradyrhizobium Rhizobi um			Mesorhizobium				Bradyrhizobium		

Warrington et al. unpublished data

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			Bradyrhizobium Rhizo um			Mesorhizobium				Bradyrhizobium		

Warrington et al. unpublished data

Management insights – the soil bacterial community perspective

3 sites and 4 plots per sites

Clearing done ~5 years ago Passive restoration

Soil chemistry | Plant communities | Soil bacterial communities



Invaded

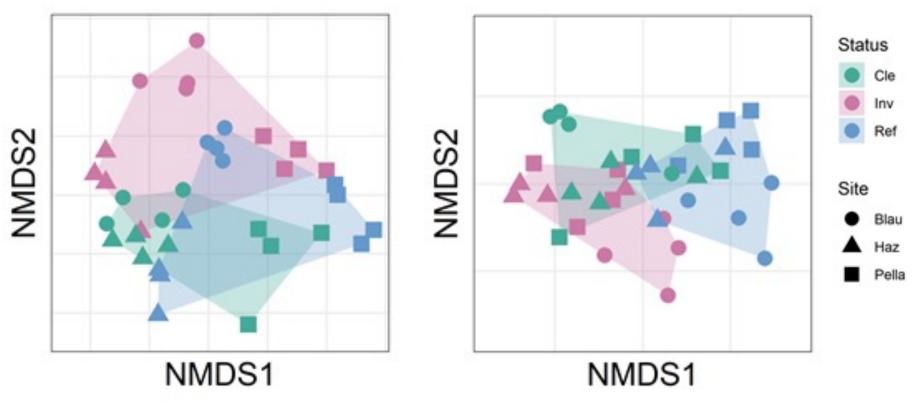
Cleared

Uninvaded

Management insights – the soil bacterial community perspective

Plants

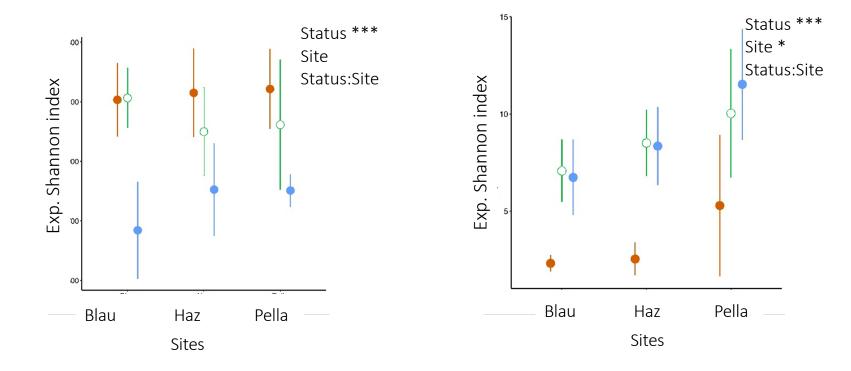




Management insights – the soil bacterial community perspective

Bacterial communities





Cleared Invaded Uninvaded

Yannelli et al. unpublished data

Taken together

Cointroduction of plants & mutualists commonplace

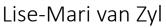
Invasive legumes can homogenize soil rhizobial communities

Generates positive PSFs and legacy effects

Consequences for restoration

Acknowledgements







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Staci Warrington



Jonatan Rodriquez



Allan Ellis



Ana Novoa



Megan Mathese









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Thank you jaco.leroux@mq.edu.au

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