


Soil native microbes and multi-species planting for restoring soil function in dryland rehabilitation



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There are several challenges to achieve success in mine site restoration



Deficit of original topsoil (previously stockpiled and subsequently respread): major constraint for plant establishment in degraded semiarid landscapes.



Direct-seeding: to replace seedbank



Alternative growth media



To overcome these challenges, an integrative approach can be more effective for soil assessment, including the following components:



Soil characterization

(reference ecosystems)



Soil quality/function assessment

(in mine rehab sites)

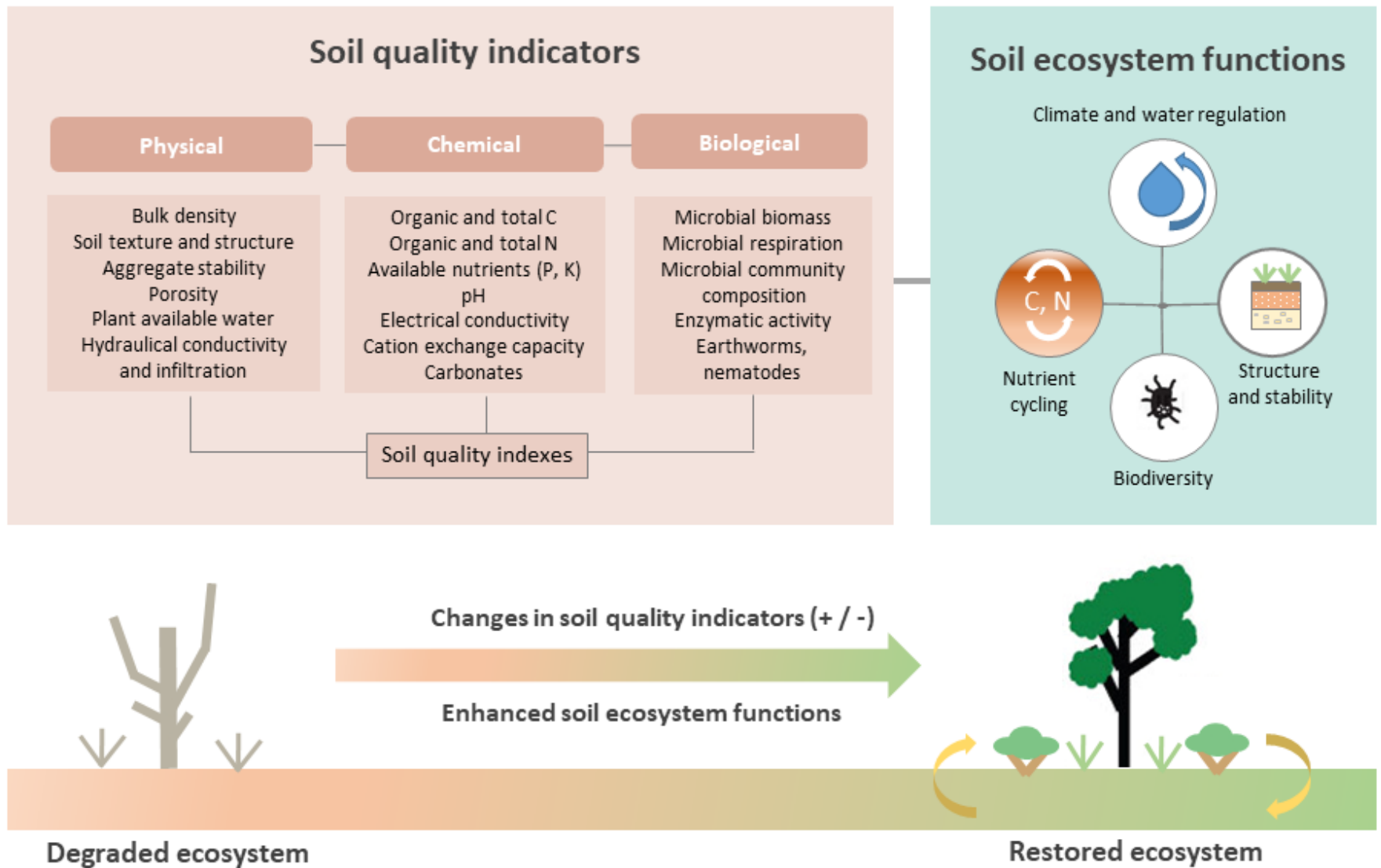


Design of growth media

(functional soil)



Multiple soil properties can serve as indicators or soil health/quality when designing growth media



Multi-species planting can promote soil health and plant growth in reconstructed soils

Combination of native plant species and soil substrates on soil function and plant-soil interactions



Mixed communities of (x1)Triodia; (x2) Triodia+ Acacia (x4) Triodia + Acacia + Ptilotus + Grevillea



Topsoil

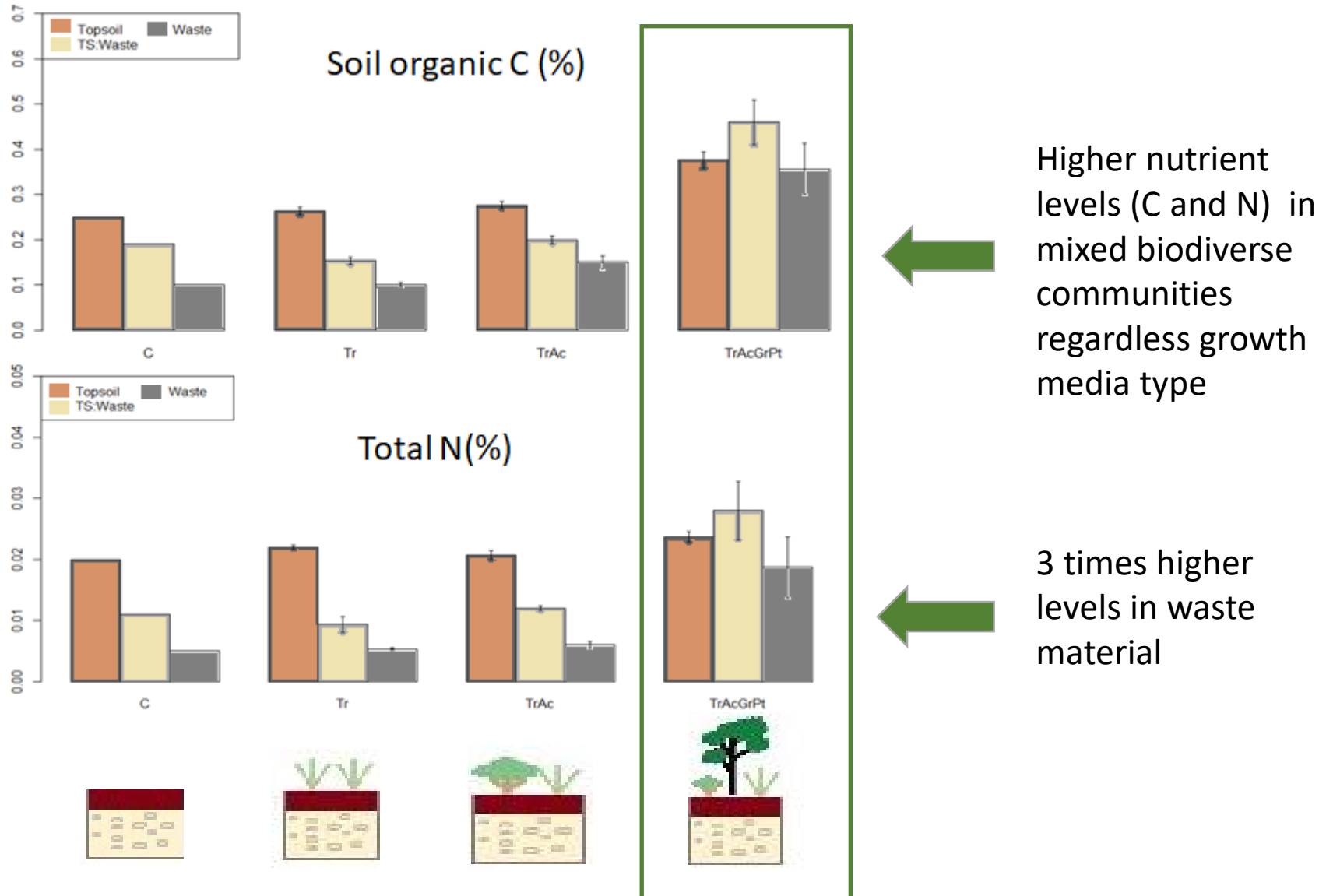


Topsoil:Waste

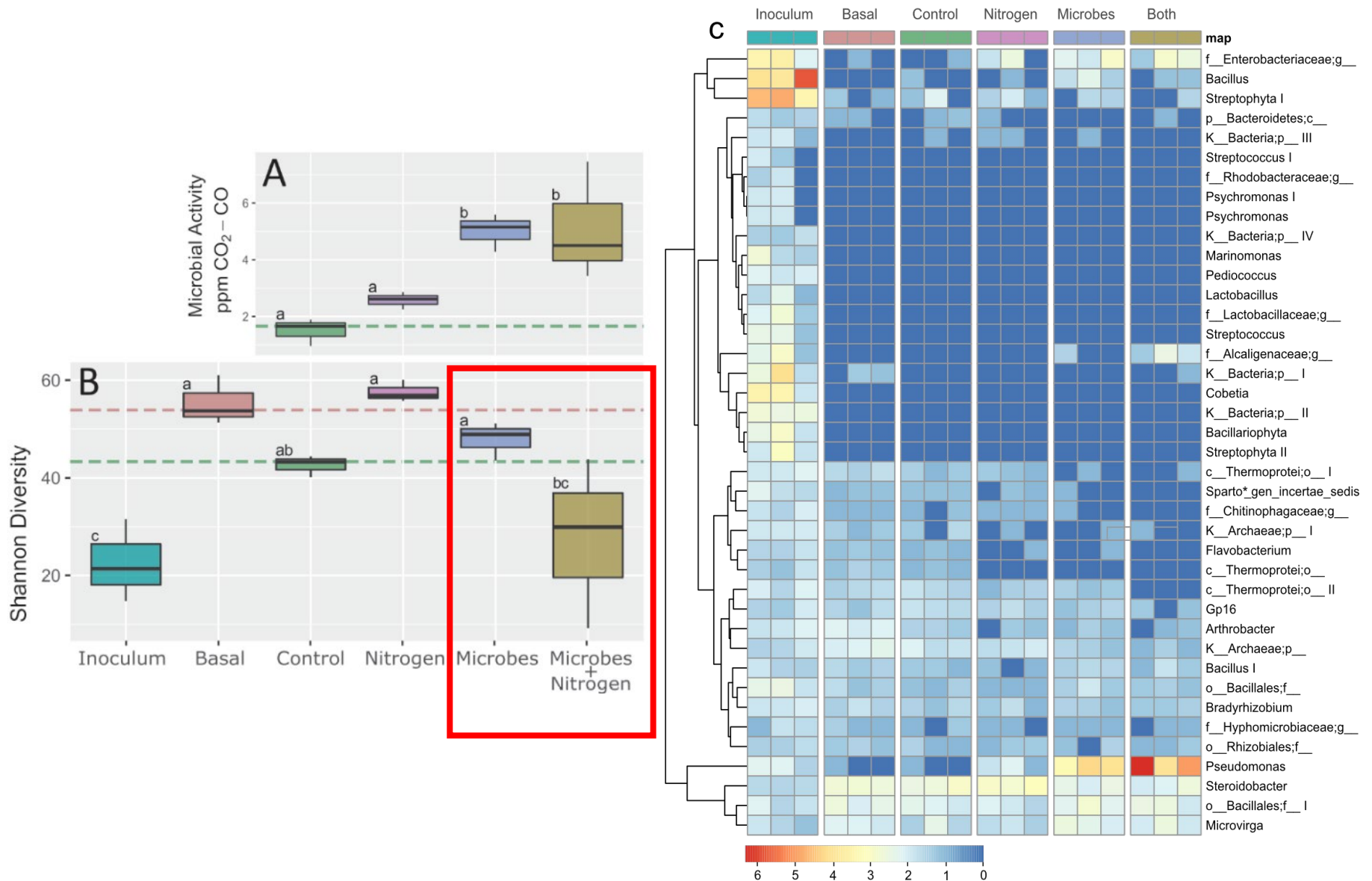


Waste

Multi-species planting can promote soil health and plant growth in reconstructed soils

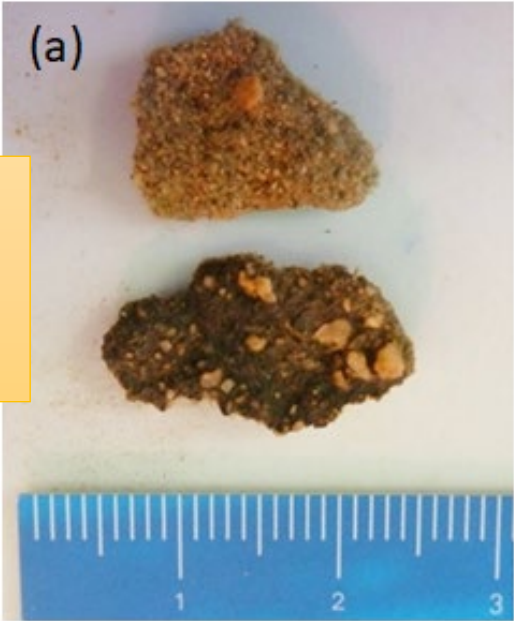


Exogenous soil microbes commercially available can reduce microbial diversity

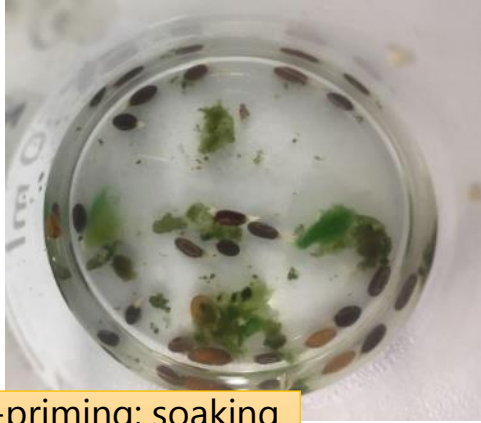
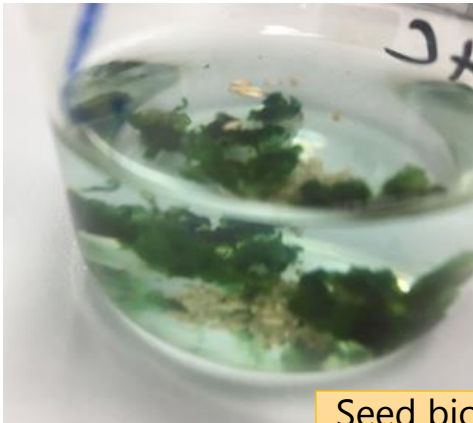
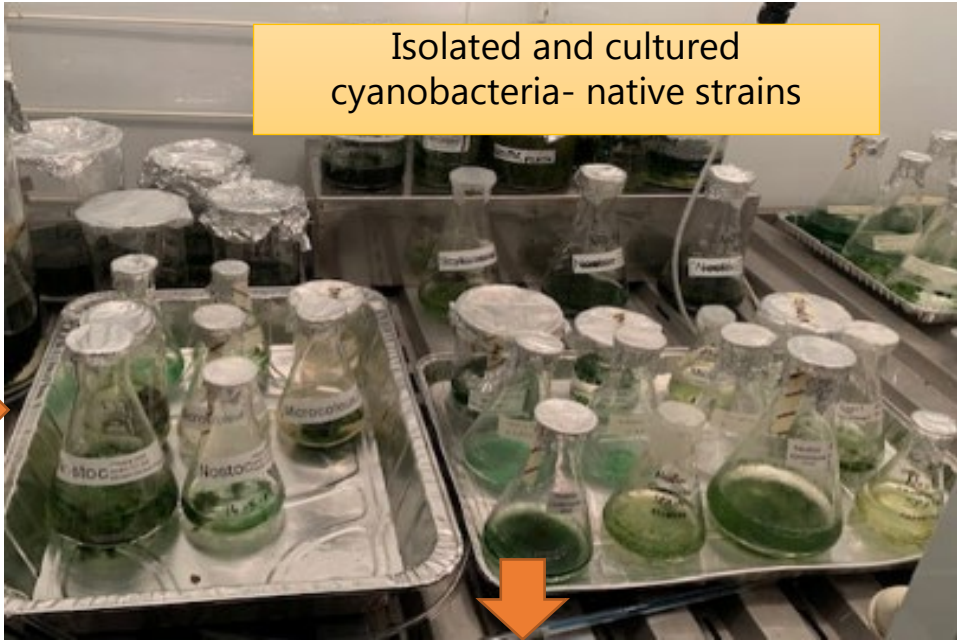


Cyanobacteria from biocrust are native microbes that can help in mine site restoration

Soil biocrust from the upper surface

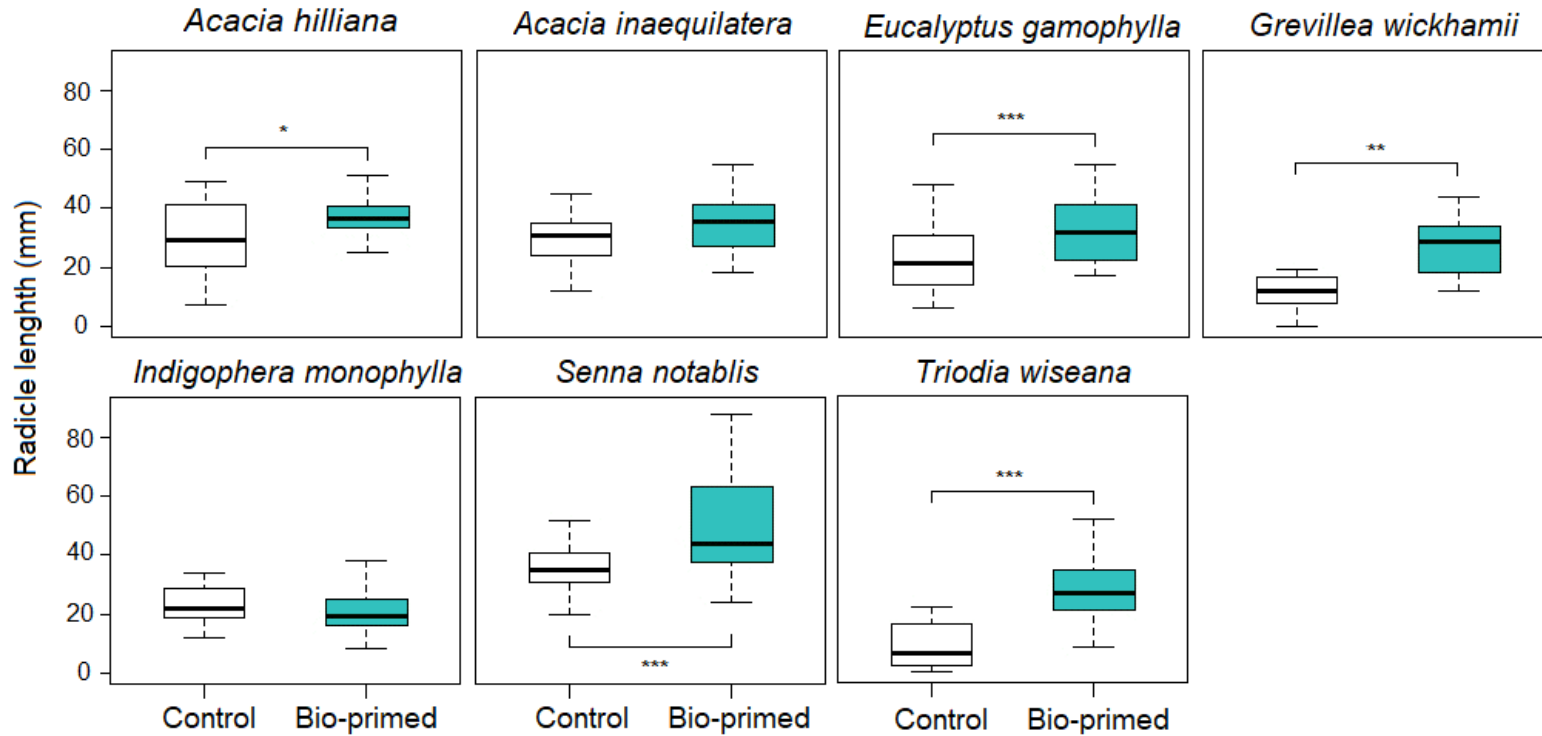


Isolated and cultured cyanobacteria- native strains



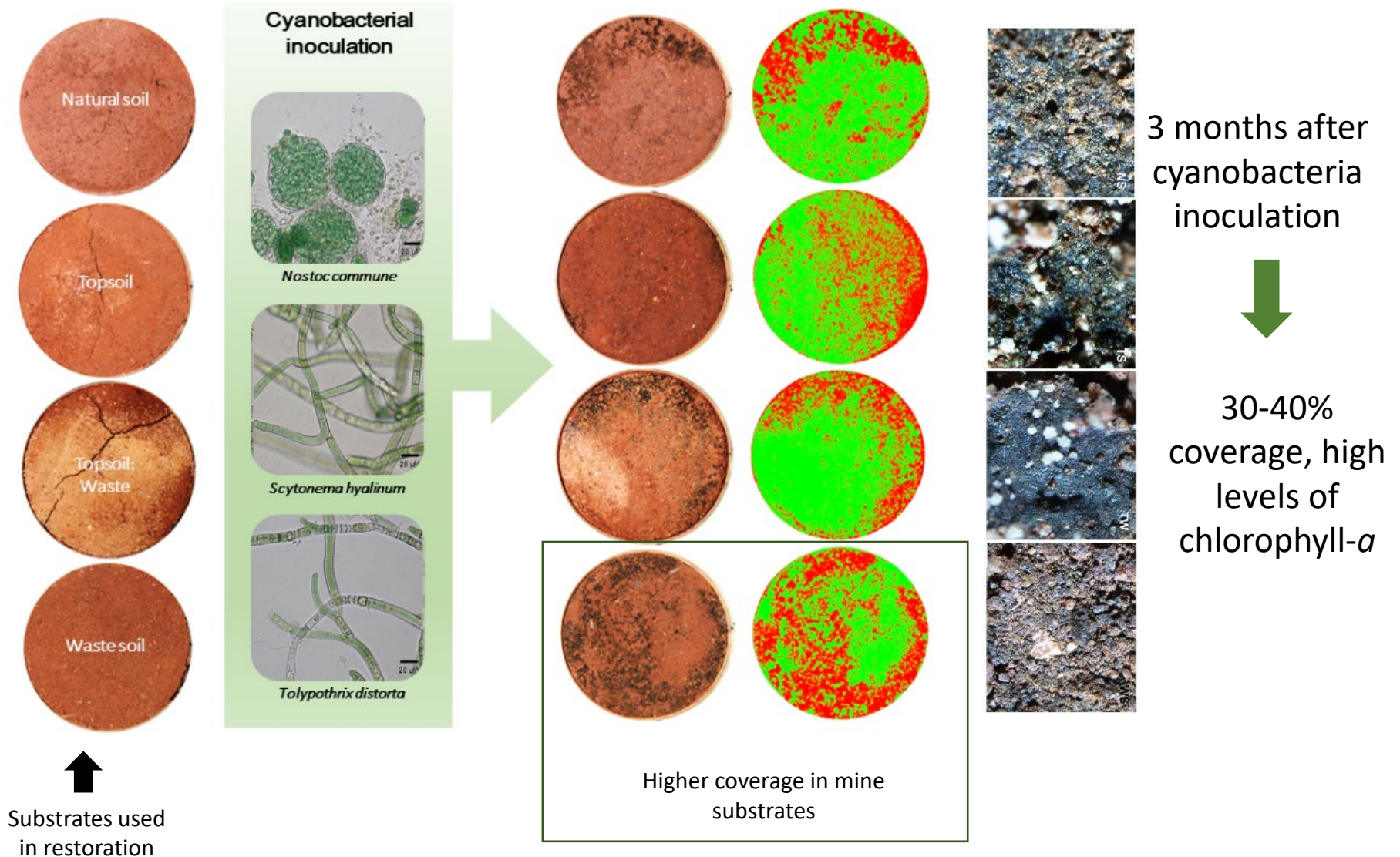
Seed bio-priming; soaking in inoculum

Leptolyngbya sp.,
Microcoleus sp.,
Nostoc sp.
Scytonema sp
Mix 25:25:25:25

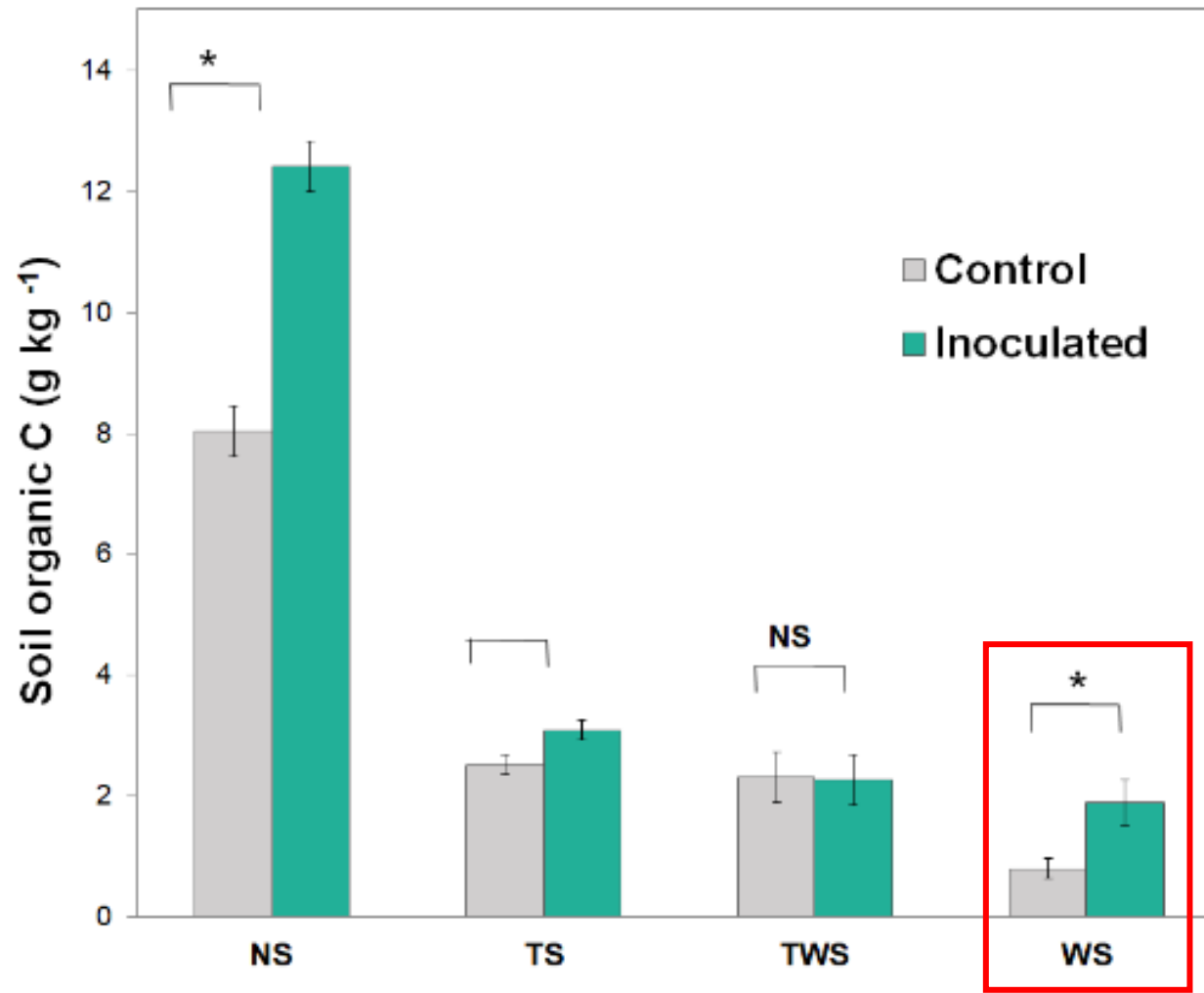


Seed bio-priming with cyanobacteria increases seedling size!

Cyanobacteria can be used as soil fertilizer of mine substrates



Cyanobacteria increases levels of organic carbon in mine waste



NS: Natural Soil; **TS:** Topsoil
TW: Topsoil:Waste; **WS:** Waste

Would you like to know more about multi-species planting and microbial inoculation in ecosystem restoration?

Check out the following displays:

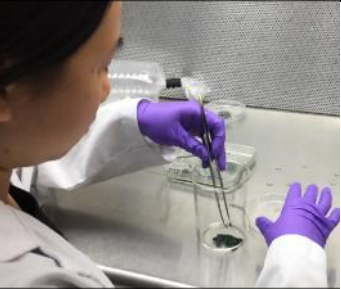
D2323 | EGU2020-11907. [Development of cyanobacterial application methods for soil protection and restoration: case studies in Australian drylands](#)

D2325 | EGU2020-13204. [Indigenous soil bacteria as bioinoculants for promoting seedling growth of native plants in arid land rehabilitation](#)

And our YouTube video!

<https://www.youtube.com/watch?v=5GyF82Vfh6Q>





Thank you

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