



Rhizobacterial diversity of two priority species from Miombo
(*Brachystegia boehmii*) and Mopane (*Colophospermum
mopane*) woodlands

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Global Symposium on Soils for Nutrition | 26-29 July 2022



Miombo and Mopane biodiversity

- High biodiversity wilderness area.
- ≈ 1.9 million km² (1/3 lost over the last decade).
- Source of valuable woody and microbe species.
- Both ecosystems are dominant by legume tree species.



Rhizobacterial diversity



Article

The Nexus between Fire and Soil Bacterial Diversity in the African Miombo Woodlands of Niassa Special Reserve, Mozambique

Ivete Sandra Alberto Maquia ^{1,2,3}, Paula Fareleira ⁴, Isabel Videira e. Castro ⁴, Ricardo Soares ⁴, Denise R. A. Brito ³, Aires Afonso Mbanze ⁵, Aniceto Chaúque ⁶, Cristina Máguas ⁷, Obinna T. Ezeokoli ⁸, Natasha Sofia Ribeiro ⁶, Isabel Marques ^{1,*} and Ana I. Ribeiro-Barros ^{1,*}

Microorganisms 2021, 9, 1562. <https://doi.org/10.3390/microorganisms9081562>

IMPACT
FACTOR
4.128



Article

Mining the Microbiome of Key Species from African Savanna Woodlands: Potential for Soil Health Improvement and Plant Growth Promotion

Ivete Sandra Maquia ^{1,2,3}, Paula Fareleira ⁴, Isabel Videira e Castro ⁴, Denise R. A. Brito ³, Ricardo Soares ⁴, Aniceto Chaúque ⁵, M. Manuela Ferreira-Pinto ¹, Erica Lumini ⁶, Andrea Berruti ⁶, Natasha S. Ribeiro ⁵, Isabel Marques ^{1,*} and Ana I. Ribeiro-Barros ^{1,*}

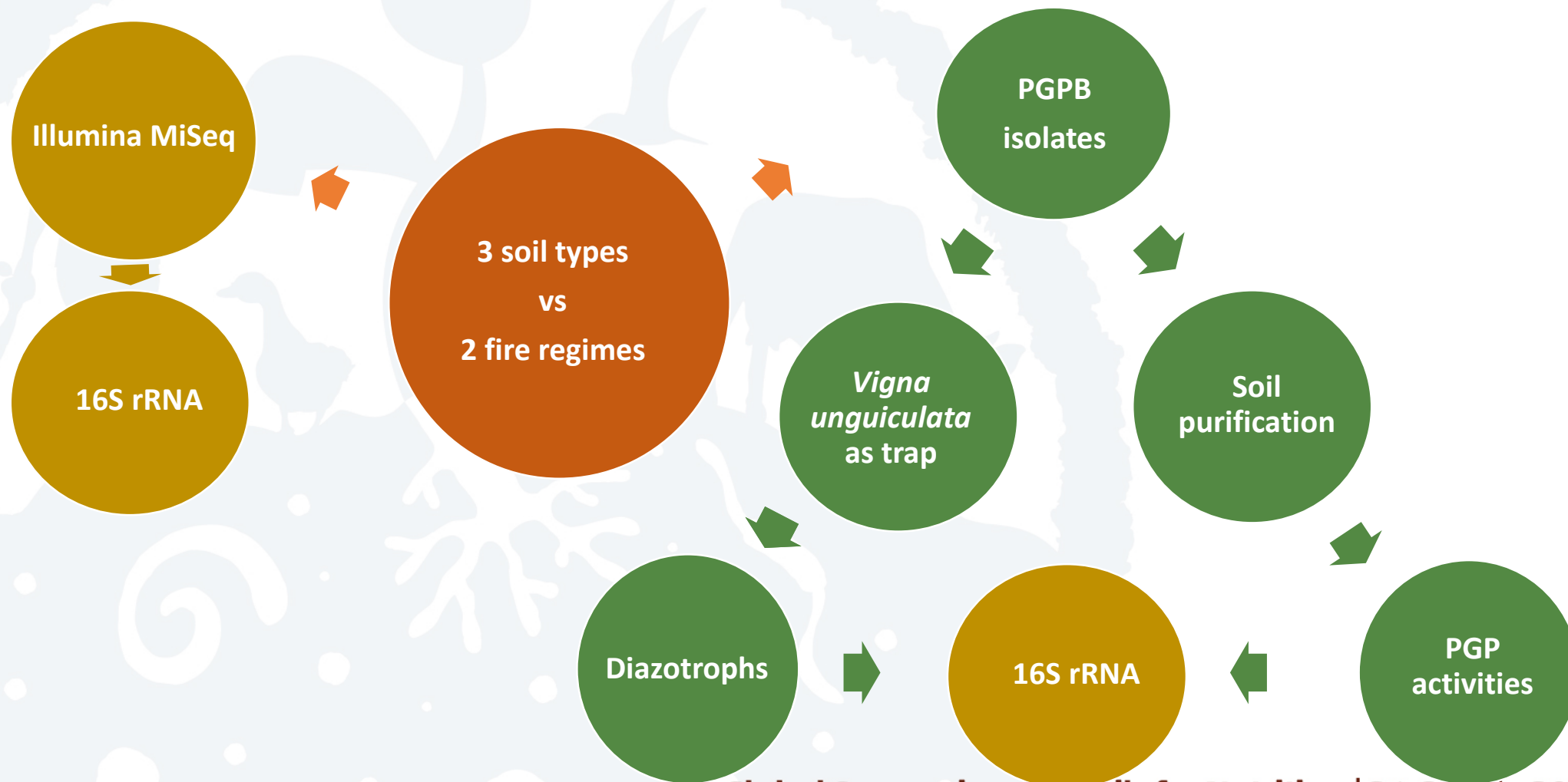
Microorganisms 2020, 8, 1291; doi:10.3390/microorganisms8091291

IMPACT
FACTOR
4.152

Global



Rhizobacterial diversity



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Rhizobacterial diversity (16S rRNA)

OTU
(abundance)

977 – 1391
(Miombo)

696 – 831
(Mopane)

Shannon
index
(diversity)

7.21 – 8.50
(Miombo)

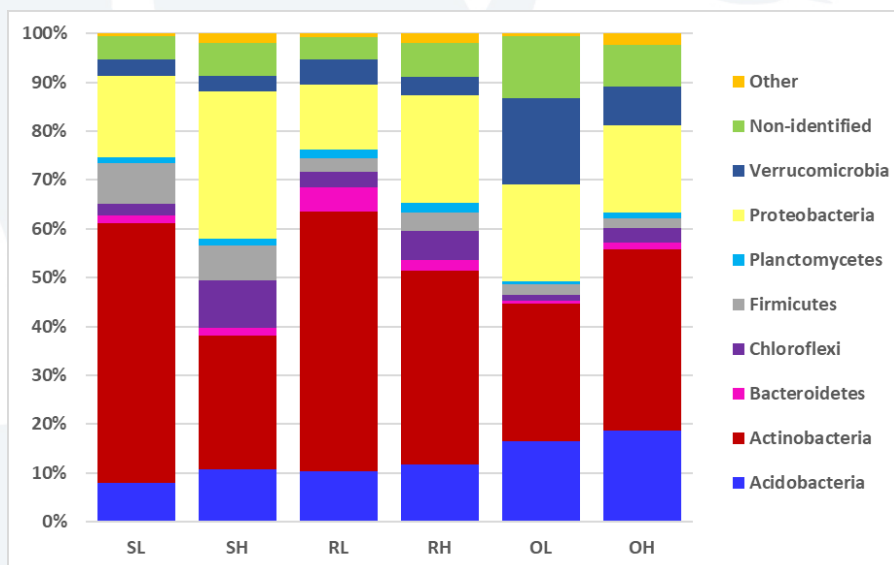
4.040 – 4.087
(Mopane)

- Multi-specific nature of Miombo

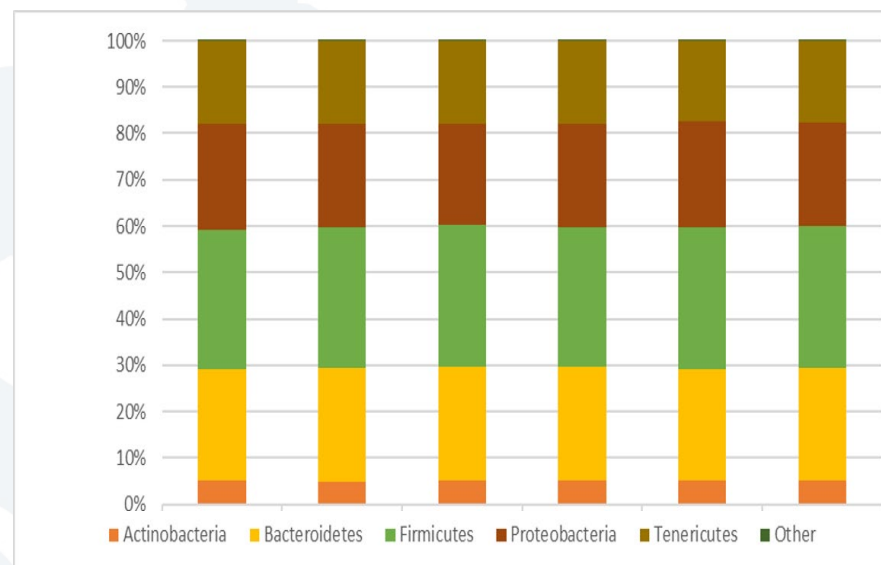
- Mono-specific nature of Mopane

Rhizobacterial diversity (16S rRNA)

Brachystegia bohemii



Colophospermum mopane



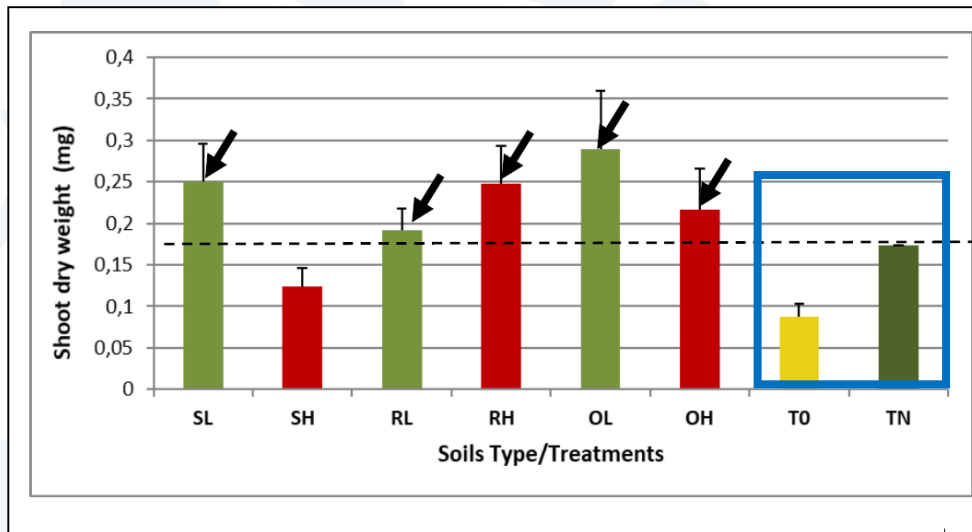
- This diversity is confirmed in terms of different microbial taxa.
- Resiliency to extreme environments, through fire tolerance and recovery strategies

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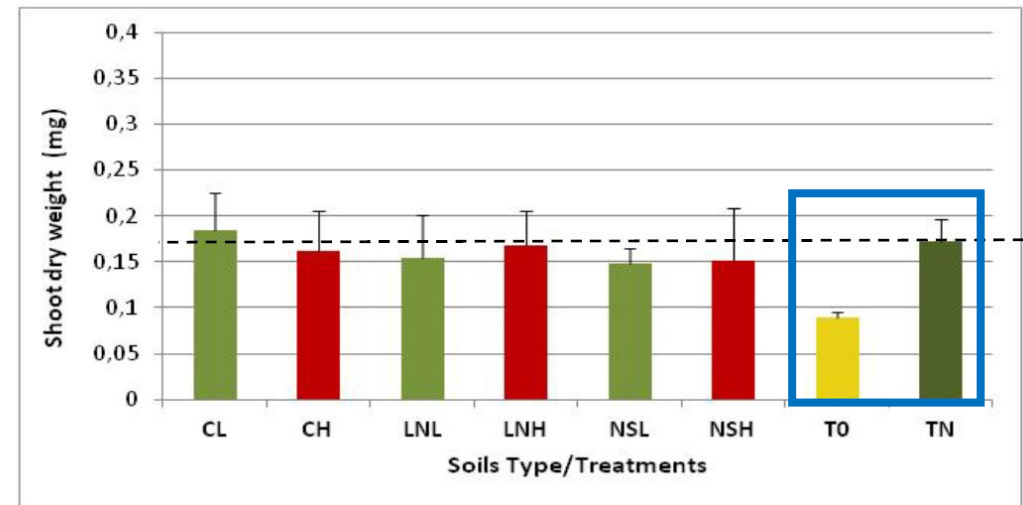


Vigna unguiculata as a trap for root nodule bacteria

- Miombo

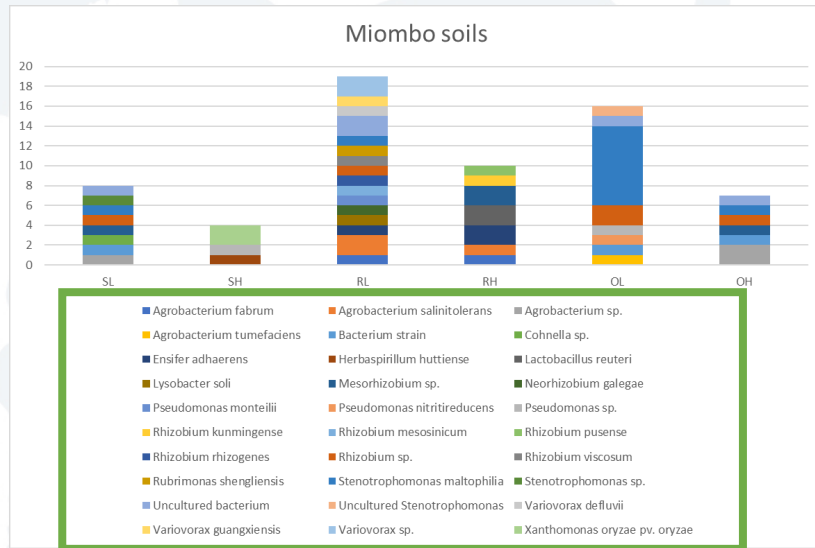


- Mopane



- Symbiosis with rhizobia was active

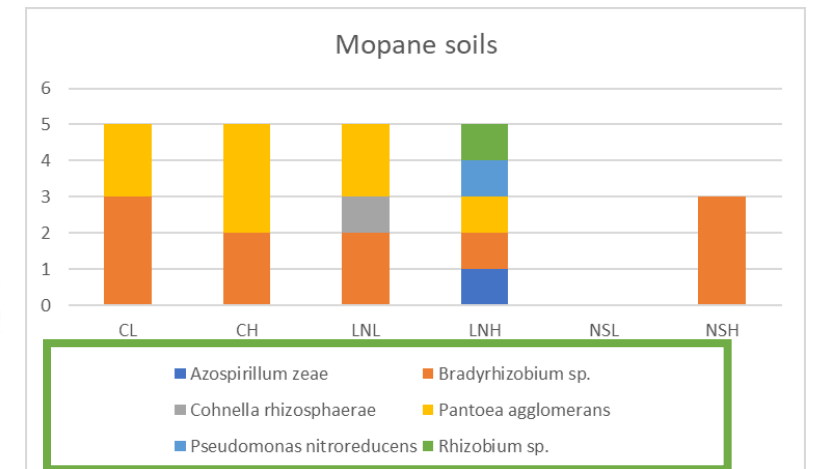
Vigna unguiculata as a trap for root nodule bacteria



Miombo

Rhizobium sp
Mesorhizobium sp.
Neorhizobium sp.
Enfiser
(Sinorhizobium)

Bradyrhizobium sp.,
Rhizobium sp



Mopane

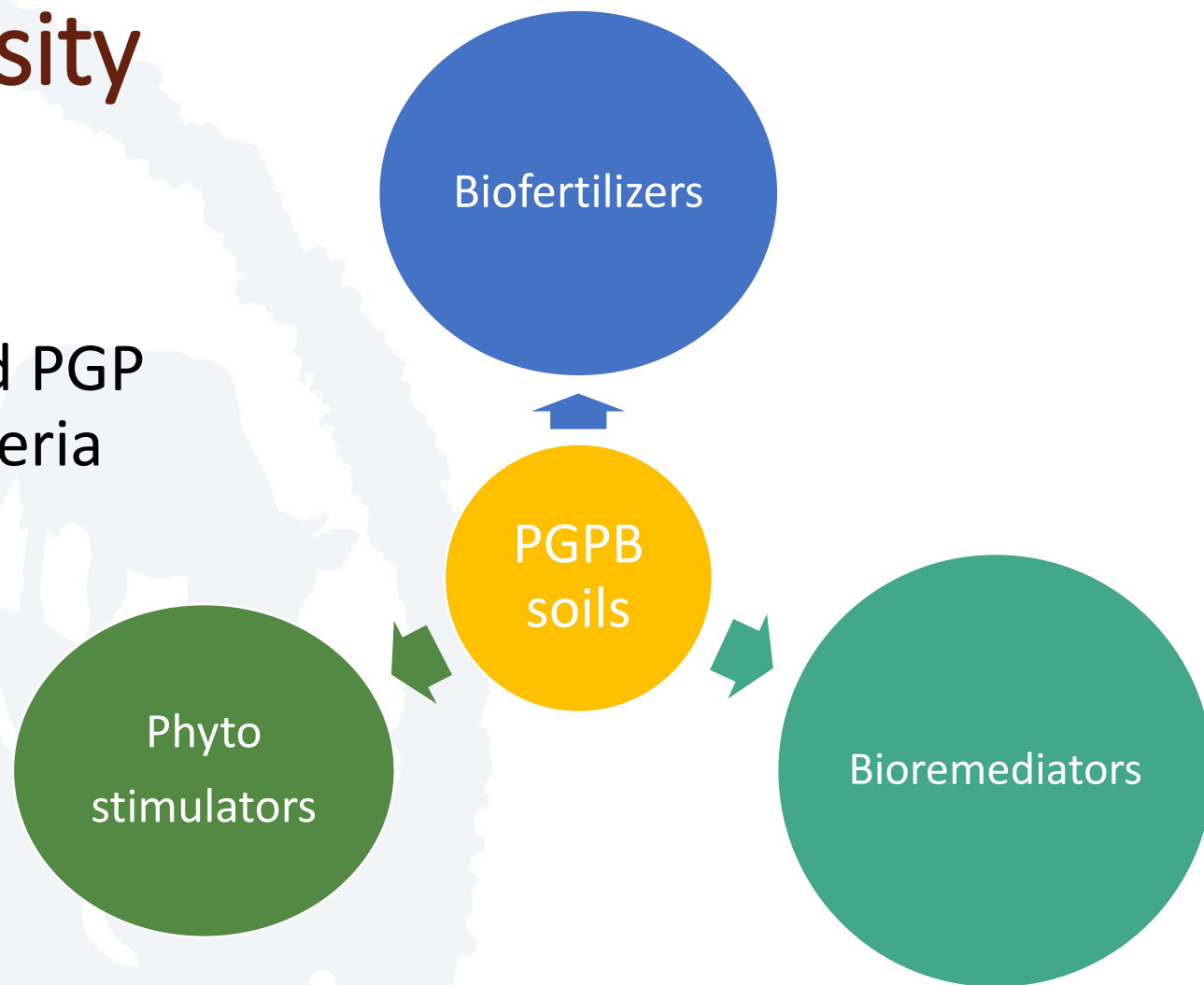
In vitro PGP activities

- *In vitro* plant growth promoting activities evaluated in soil isolates

Rhizosphere	Growth N-free	Phosphate solubilization	IIA production	Siderophore production	Hydrolysis cellulase
<i>B. boehmii</i>	+	-	+	+	+
<i>C. mopane</i>	+	+	+	+	-

Rhizobacterial diversity

- Based on the taxonomy and PGP activities of the rhizobacteria



Miombo and Mopane rhizosphere

- Both rhizosphere have high bacterial diversity.
- Pyrodiversity effect seems to be an important evolutionary driver towards high – temperature tolerance in both cases (similar to the tree species).
- Rhizosphere bacteria is driven by soil type and fire frequency in Miombo.
- Many unknown species with potential to develop bio – economic potential.



Thank you !

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