

Bacterial and Macro/Mesofauna Diversity of a Portuguese Mine Tailing

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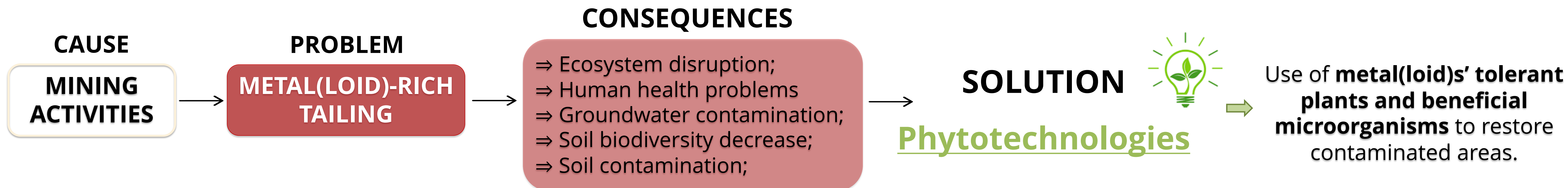
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INTRODUCTION



OBJECTIVE

The present study aimed to: i) assess the culturable metallophyte-associated bacterial strains and macro/mesofauna diversity in a Portuguese mine tailing (Borralha Mine) ii) characterize the plant-growth promoting traits (PGPT's) of the most metal- tolerant bacterial strains.

METHODS/ RESULTS

BORRALHA MINE

Deactivated tungsten mine located in Portugal (Montalegre, Vila Real district).



Fig.1- Borralha mine tailing.

Operational period: 1902-1986
Area: 1179 ha

Economic exploitation: wolframite, scheelite, chalcopyrite
Main contaminants: Cu, Fe, As, Pb, W, Cd, Zn, Mn

MACRO AND MESOFAUNA DIVERSITY

Pitfall traps were placed in the mine tailing and in a reference zone to assess the metal contamination effect on the diversity of meso/macrofauna.

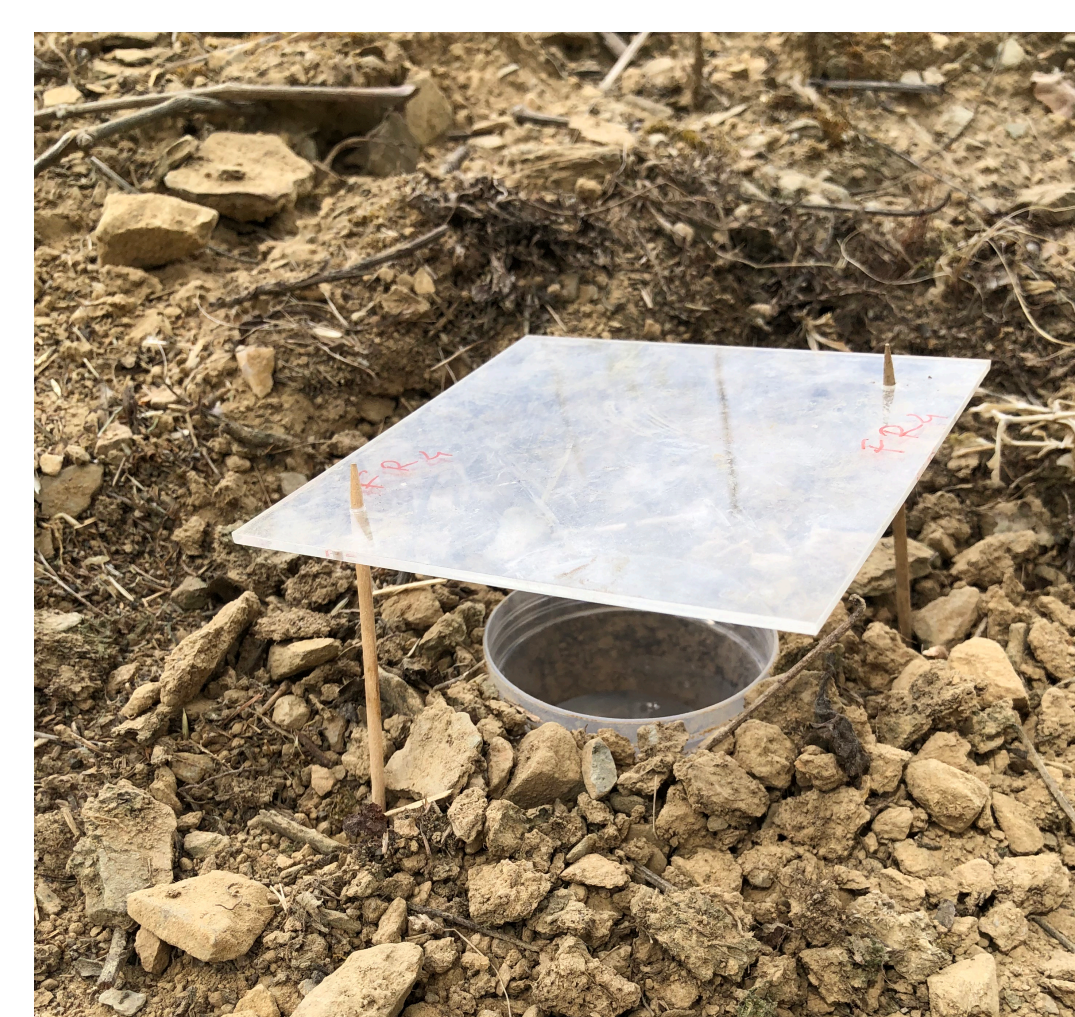


Fig. 4- Pitfalls traps.



Fig. 5- Aerial image of the reference area and mine tailings.

BACTERIA ISOLATED FROM THE RHIZOSPHERE OF THE MOST ABUNDANT METALLOPHYTES IN MINE TAILING

The isolation process resulted in 65 isolates. 37 were chosen according to Cu, Cd, Zn and Pb tolerance and identified by 16S rRNA sequencing



Fig. 2- Examples of the bacteria isolated from the rhizosphere of metallophytes.

80% were Gram-positive, with 45% being Bacilli;

Predominant genera were *Pristia* sp., *Arthrobacter* sp., *Rhodococcus* sp. and *Burkholderia* sp.

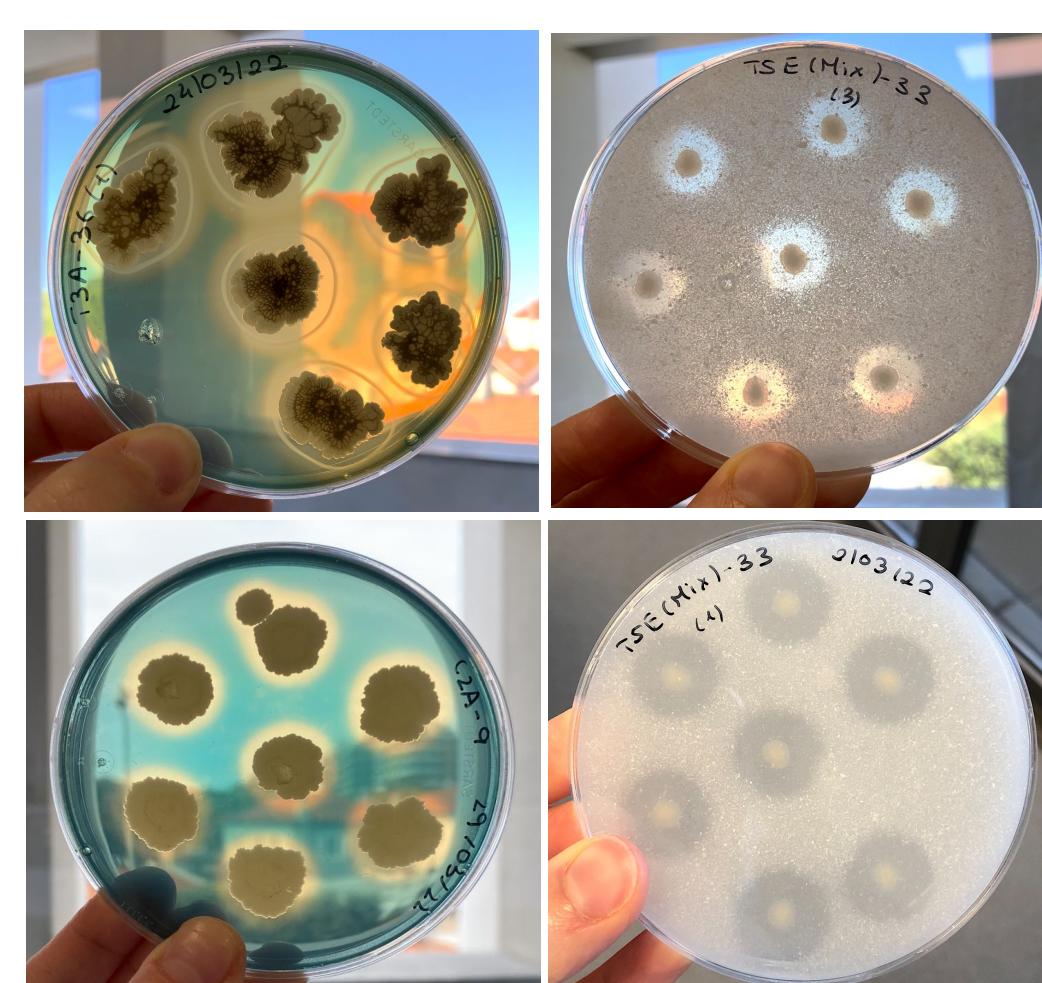
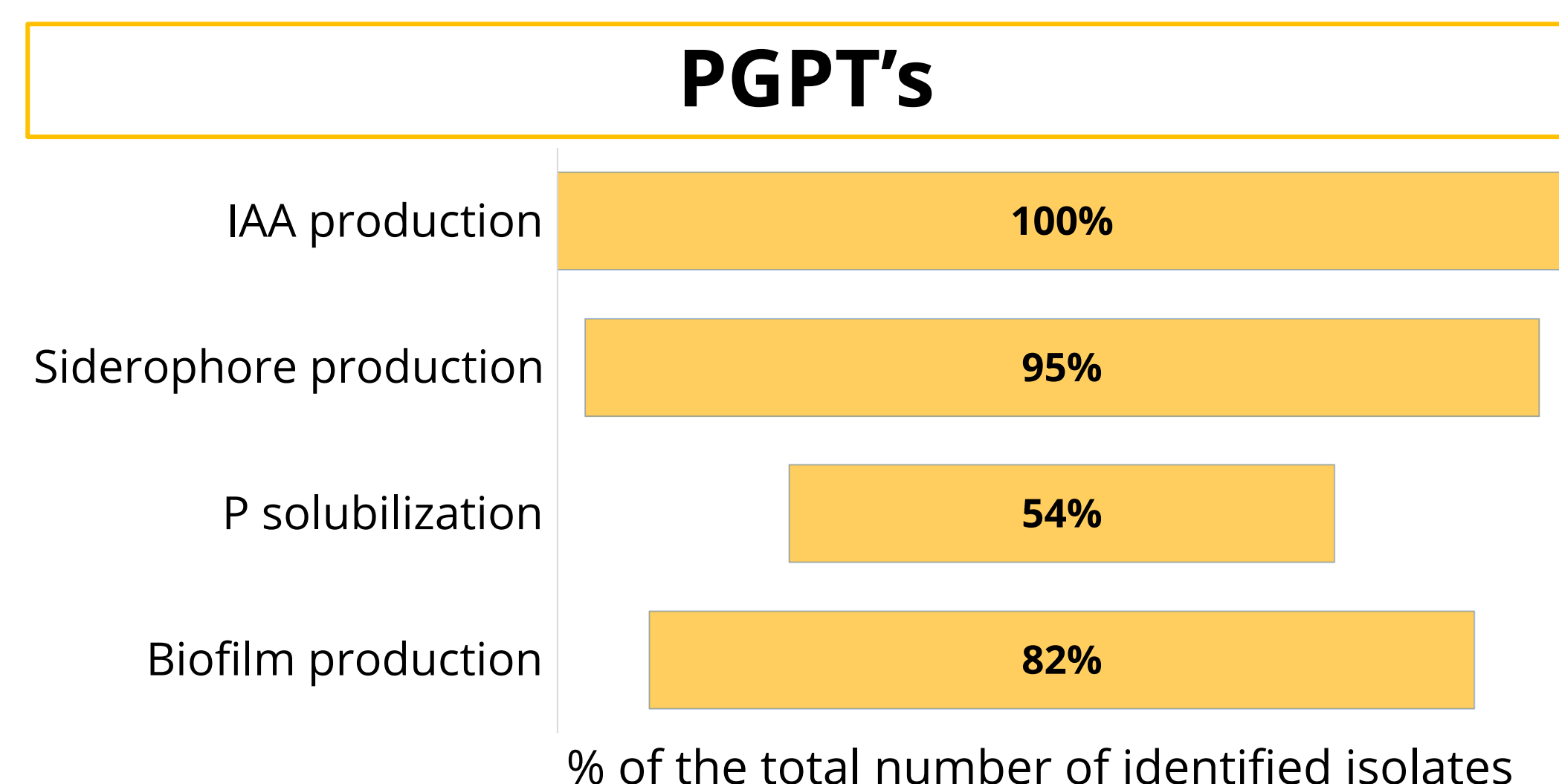


Fig. 3- Siderophore production (left) and P solubilization (right).



Reference Area		Mine Tailings	
Order	#individuals	Order	#individuals
Hymenoptera	346	Hymenoptera	5437
Araneida	328	Araneida	327
Coleoptera	88	Coleoptera	67
Thysanoptera	57	Hemiptera	46
Diptera	49	Diptera	44
Hemiptera	32	Trichoptera	39
Trichoptera	15	Opilione	14
Isoptera	9	Thysanoptera	10
Orthoptera	6	Orthoptera	6
Unidentified	5	Isopoda	1
Diplopoda	4	Pseudoscorpiones	1
Opilione	4	Phasmatodea	1
Isopoda	2		
Lepidoptera	2		
Dermaptera	1		
Total	948	Total	5993
Shannon (H') Index	1,61	Shannon (H') Index	0,44
H' max	3,33	H' max	3,33
J	0,48	J	0,13

The analysis of macro/mesofauna showed a less diverse community in mine tailings, but a higher number of individuals in Hymenoptera order.

CONCLUSIONS

Several bacterial strains with good plant-growth promoting traits were isolated from the rhizosphere of metallophytes present in Borrallas' mine tailing.

Macro and mesofauna diversity was affected by metal contamination, with the tailing presenting lower biodiversity.

ACKNOWLEDGEMENTS

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