

# Unexplored mangrove soils harbour novel microbial groups with multiple functions

The mangrove microbiome drives the nutrient turn over in this pristine ecosystem

## Problem ●●●

Mangroves are highly productive unique ecosystems harbouring diverse unexplored microbial communities that play crucial roles in nutrient cycling as well as in maintaining ecosystem services. Research to uncover the microbe-mangrove interactions that maintain ecosystem services and resilience under changing conditions is urgently needed for successful conservation and rehabilitation of these fragile ecosystems as these communities play crucial roles in mangrove biogeochemistry and nutrient cycling.

## ●●● Intervention

This study explored the diversity and distribution of both the nitrogen fixers and denitrifiers, sulphur reducing bacteria associated with the rhizospheres of *Avicennia marina*, *Rhizophora mucronata*, *Suaeda maritima*, and *Salicornia brachiata* of the Pichavaram mangroves. Polyphasic taxonomic for the identification of unreported novel bacteria. A combination of both culturable (serial dilution and streaking) and unculturable (PCR-DGGE) approaches were adopted to explore the bacterial communities involved in nitrogen fixation by targeting the *nifH* genes, and the Denitrifiers were explored by targeting the *nirS* and *nosZ* genes.

2 Novel genus

5 Novel species

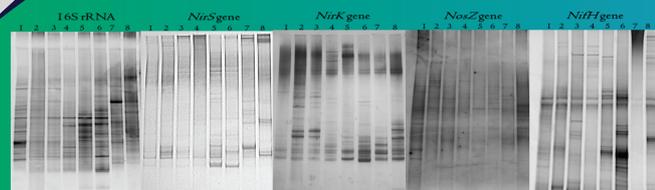
## Outputs ●●●

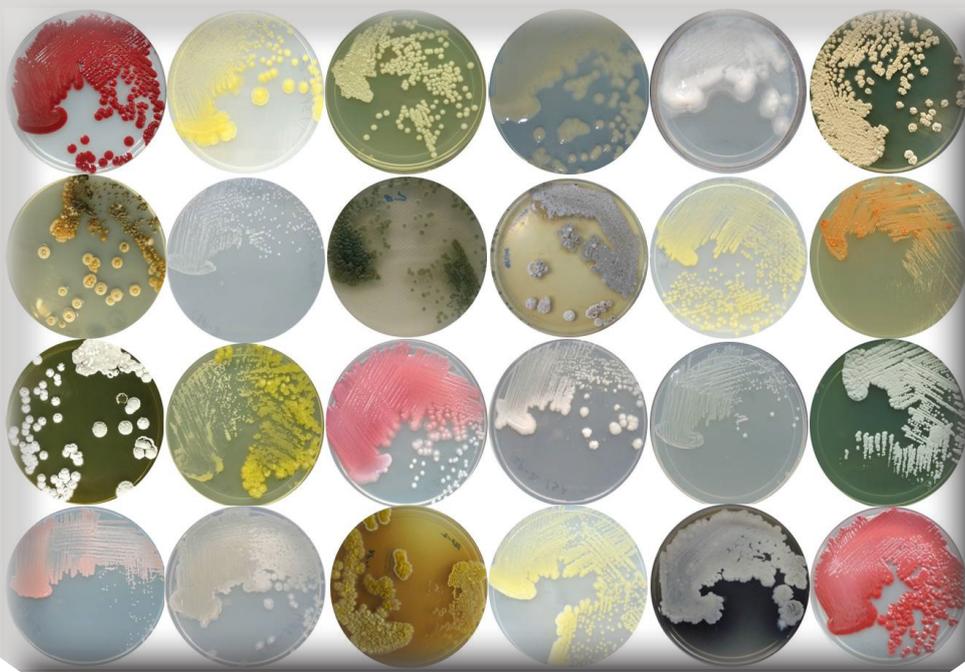
### Novel genus genus reported

- *Swaminathania salitolerans* gen. nov. sp. nov. MTCC3851<sup>T</sup>
- *Salinicola rhizosphaerae* sp. nov. MSSRFH1<sup>T</sup>

### Novel species reported from Mangroves

- *Mangroveibacter plantisponsor* gen. nov. sp. nov. MSSRF40<sup>T</sup>
- *Vibrio mangrovi* sp. nov. MSSRF38<sup>T</sup>
- *Vibrio plantisponsor* sp. nov. MSSRF60<sup>T</sup>
- *Vibrio porteresiae* sp. nov. MSSRF30<sup>T</sup>
- *Vibrio rhizosphaerae* sp. nov. MSSRF3<sup>T</sup>





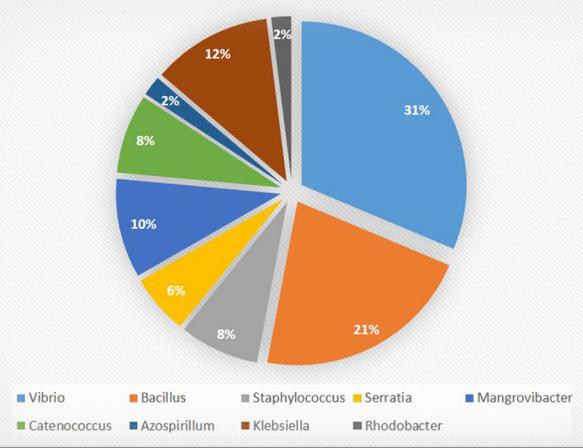
29 novel *nifH*



Nitrogen fixing groups - A total of 16 different culturable genera were isolated and characterised in this study. Other phyla like Firmicutes and Actinobacteria were also observed. The PCR-DGGE analysis also revealed the presence of 29 novel *nifH* sequences that were not reported earlier.

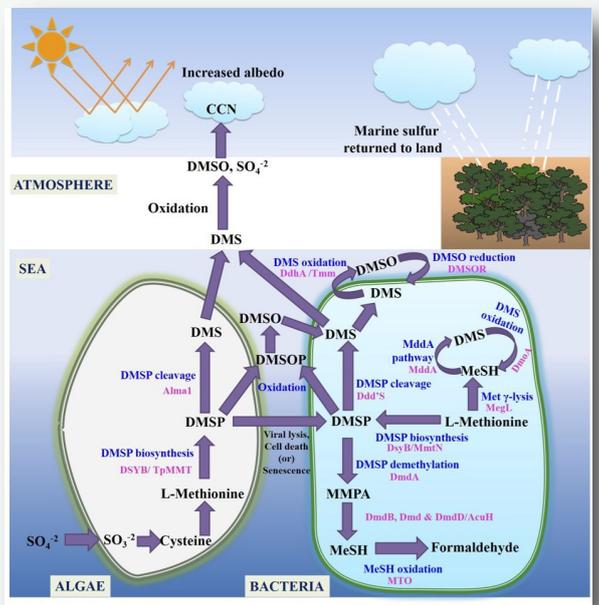
Sulphur cycling bacterial groups - Communities involved in sulphur cycling - dimethylsulfoniopropionate (DMSP) biosynthesis and catabolism has been characterised. More than 60 isolates hold genes responsible for the DMSP synthesis and catabolism process have been identified. Several Acyl homoserine lactone and ACC deaminase producing isolates have been reported.

Nitrogen fixing bacteria



## Outcomes

MSSRF has thus reported novel bacterial genus and species from the mangrove ecosystems with ecological niche particularly with salinity tolerance and plant growth promoting functions. This knowledge has been disseminated widely through publications to the scientific community. These scientific findings will form the basis to understand the diversity and function of the microbiome associated with the mangrove ecosystems.



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