

TITLE: BENEFICIAL MICROORGANISMS FOR CORALS ISOLATED FROM THE BRAZILIAN ENDEMIC REEF-FORMING SPECIES *MUSSISMILIA HISPIDA*

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ABSTRACT:

Coral reefs are crucial ecosystems to the maintenance of marine biodiversity, protection of coastlines, control of the local climate, having also a great influence in the economy by supporting tourism and fishing activities. To minimize anthropogenic impacts damaging coralline environments, the manipulation of beneficial coral-associated microorganisms (BMCs, Beneficial Microorganisms for Corals) is considered a promising strategy. Therefore, the present work aims to develop a BMC consortium to protect the coral *Mussismilia hispida*, an important endemic reef builder in Brazil, against different stresses. To accomplish this, 133 bacterial strains were isolated from thermal resistant colonies of *M. hispida* collected in Maraú, Bahia, Brazil. The isolates were characterized by morphology, catalase production, and Gram staining. Molecular analyses were also performed. Genomic DNA was extracted and, using the polymerase chain reaction (PCR) assay, we investigated the presence of the taxonomic marker gene for the genus *Vibrio*, which contains several potentially pathogenic strains. Using the remaining isolates, we investigated the presence of genes conferring metabolic potentials that can benefit the host, such as the nitrate reductase subunit of the nitrogenase enzyme (*nifH* gene), nitrite reductase (*nirK* gene), and DMSP demethylase (*dmdA* gene). In addition, three approaches were used to investigate the inhibitory activity of the isolated bacteria against the following strains of known marine pathogens: 2 strains of *Vibrio coralliilyticus* P1, *V. coralliilyticus* BAA-450 and *V. alginolyticus* 40B. The final BMC candidates were then tested for antagonistic activity against each other, and their rRNA 16S genes were sequenced for taxonomic identification. Finally, 6 bacteria were selected as potential BMCs to compose the consortium: 1 *Planococcus rifietoensis*, 1 *Brackybacterium* sp., 2 *Bacillus lehensis*, 1 *Bacillus oshimensis* and 1 *Salinivibrio* sp. Next, we will apply the *M. hispida* BMC consortium to the coral animal in different stress situations to measure the BMC's effectiveness in mitigating coral damage. In parallel, we have already sequenced two *Vibrio* strains that presented strong antagonistic activity against the coral pathogen *Vibrio coralliilyticus* P1 and are annotating the genomes so we can better understand and use the traits identified in these genomes for developing new strategies to protect corals against bacteria-mediated diseases.

Keywords: beneficial microorganisms for corals, coral reefs, *Mussismilia hispida*, 16S rRNA sequencing, *Vibrio alginolyticus*, *Vibrio coralliilyticus*, antagonistic activity.

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