Aquatic root epiphytic cyanobacterial community analysis revealed the pattern of colonization. The community pattern is mainly based on the physiochemical factors.

Totally 61 species of cyanobacteria belong to 15 genera were recorded in Pichavaram and Muthupet mangroves.

Totally 31 cyanobacterial species were isolated from the mangrove root samples.

Amplified ribosomal DNA restriction analysis was done for 31 cyanobacterial isolates revealed strain level differences. The 16S rRNA gene sequences (~650 bp) were amplified and digested separately with two different restriction endonucleases, EcoRI and PstI. The unique band pattern of the digest was useful in differentiating cyanobacterial isolates.

Plant growth promoting capabilities of cyanobacteria were studied in the aspects of Nitrogen fixation, Phosphate solubilization and IAA production.

*Phormidium* sp. MI405019 was found to be a better nitrogen fixer. It shown high nitrogen fixation rate of 1089.3±118 nmol C₂H₄·µg chlorophyll a⁻¹·24 hr⁻¹ which is higher than the earlier reports.

*Phormidium* sp. MI405019 was characterized for IAA production in various salinity and Tryptophan concentration. It exhibited very good IAA production with the addition of 50, 100 and 150 µg. mL⁻¹ Trp. in three different NaCl concentrations viz., 0%, 2% and 4%. The highest amount of IAA produced was 19.95±0.34 µg IAA. mg chlorophyll a⁻¹ in the media without NaCl after 24 hrs of the addition of 150 µg mL⁻¹ Tryptophan.

This is the first report that mangrove cyanobacterium *Phormidium* sp. MI405019 was shown to have phosphate solubilization. It was shown high rate of phosphate solubilization i.e., 2072.08±12.53 µmol of p-NP. hr⁻¹. g dry weight⁻¹.

The cyanobacterial consortium was prepared using selected two cyanobacteria *Oscillatoria* sp., MI405005 and *Phormidium* sp. MI405019. There is no antagonism against the test organisms was established.
• The consortium was treated on *A. marina* and it was shown that the treatment significantly (*p* ≤ 0.01) increased the shoot height, weight, number of leaves, root number and total biomass in the greenhouse study.

• The applied cyanobacteria were colonised the roots of *A. marina*. The scanning electron microscopic studies shown that the cyanobacteria firmly colonizing the root surface.

• Further, the effect of consortium treatment on endangered mangrove species *B. gymnorrhiza* at nursery level also shown significant (*p* ≤ 0.05) increase in the growth.

• The 16S rRNA gene of the cyanobacterial isolates *Oscillatoria sp.*, MI405005 and *Phormidium* sp. MI405019 were amplified by PCR and sequenced to confirm their identification by phylogenetic analysis.

• The sequences were submitted in NCBI GenBank. The accession numbers are 16S JF837332 for *Oscillatoria sp.*, MI405005 and 16S JF837333 for *Phormidium* sp. MI405019.

• The phylogenetic analysis using partial 16S rRNA gene sequences *Oscillatoria sp.*, MI405005 and *Phormidium* sp. MI405019 confirmed the microscopic identification of the isolates.