

TITLE: PROSPECTION OF POTENTIAL PLANT GROWTH PROMOTING BACTERIA ASSOCIATED WITH THE PHYLLOSHERE, RHIZOSPHERE AND LITTER OF TREE SPECIES OF THE AMAZON FOREST USING METAGENOME RECONSTRUCTION

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ABSTRACT:

A plethora of microorganisms has been shown to dwell in the phyllosphere, rhizosphere and litter of tropical forests. Among them, some species are important for promoting plant growth and may be used in agriculture. Plant growth promoting bacteria (PGPB) have specific traits such as biological nitrogen fixation (FBN), synthesis of indole-3-acetic acid (IAA), phosphatases, siderophores and antimicrobial compounds (e.g. chitinases and antibiotics) that may enhance plant growth or protect them against pathogens and herbivores. PGPBs may be used in agriculture and improve the sustainability of the agricultural systems. The aim of this study was to identify potential PGPB in the phyllosphere, litter and rhizosphere of tree species of the Amazon forest based on metagenome reconstruction. Samples from the phyllosphere, litter and rhizosphere of 6-14 individuals of nine tree species were collected in the Tapajós National Forest. The V4 region of the 16S rRNA gene was sequenced using the Illumina MiSeq platform. A total of 6,471,832 sequences for phyllosphere, 4,891,385 for litter and 5,817,395 for rhizosphere were analyzed and clustered into 9,645 OTUs in phyllosphere, 5,688 in litter and 6,796 in rhizosphere. Using PICRUST (Phylogenetic Investigation of Communities by Reconstruction of Unobserved States), a computational approach that predicts the composition of a metagenome from 16S rRNA gene information, it was possible to predict the number and identify the OTUs that exhibit PGPB traits. The phyllosphere presented a higher number of OTUs potentially able to fix nitrogen, synthesize siderophores and IAA. The number of OTUs potentially able to synthesize acidic phosphatases, antibiotics and chitinases was higher in the litter, than in the phyllosphere and rhizosphere. Most of the OTUs potentially able to fix nitrogen, synthesize chitinase, IAA and phosphatases are members of phylum Proteobacteria, Firmicutes, Verrucomicrobia. To determine the true ability of these bacteria to promote plant growth, these microorganisms must be isolated from the environment and evaluated using *in vivo* assays.

Keywords: PGPB, Forest Amazon, Microbiomes, 16S rRNA, PICRUST.

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