

Title: THE MICROBIOME OF *EUCALYPTUS* ROOTS UNDER DIFFERENT MANAGEMENT CONDITIONS AND ITS POTENTIAL FOR BIOLOGICAL NITROGEN FIXATION

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ABSTRACT:

Forest plantations are defined as forests of introduced and/or native species established through planting or seeding either for productive or protective purposes. Forest plantations constitute approximately 264 million hectares of the global forest area. The planted forests represent a cheap and renewable source of raw material for industry, and *Eucalyptus* is the most important genus used for this purpose in Brazil. There is substantial interest in improving forestry production, especially through sustainable strategies such as the use of plant growth-promoting bacteria. In this context, endophytic bacteria represent an important source of biotechnological products. However, there are insufficient reports of *Eucalyptus* microbiome and the effect of the environment on its composition. In this study, endophytic bacterial community was assessed in *Eucalyptus urograndis* roots using culture-dependent and independent techniques. The effect of different environmental conditions were evaluated: *Eucalyptus*, *Eucalyptus*+N (Nitrogen addition by fertilizer) and *Eucalyptus*+A (intercropped with the legume tree *Acacia mangium*). Disinfected fragment roots were used for DNA extraction and subsequent 16S rDNA amplicon pyrosequencing. More than 1400 OTUs, classified into 359 different genera were found inside *Eucalyptus* root, but only six genera, *Mycobacterium*, *Bradyrhizobium*, *Streptomyces*, *Bacillus*, *Actinospica* and *Burkholderia*, accounted for more than 50% of the classified sequences. To all treatments, Actinobacteria, Proteobacteria and Firmicutes were the most abundant phyla. We observed significant influence of the environment over some genera, which culminates in significant change in bacterial community structure. The obtained data suggest that *Eucalyptus* may benefit from biological nitrogen fixation with many abundant genera being closely related to nitrogen fixing bacteria, with presence of bacterial isolates with *nifH* gene and able to maintain growth without any N source in the medium.

Keywords: endophytic bacterial, *eucalyptus*, diversity, mixed plantation, FBN

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