

Ectomycorrhizal (dipterocarp) and arbuscular mycorrhizal (non-dipterocarp) tree hosts and their relative distribution in a tropical forest predict soil bacterial communities

ABSTRACT

The type of mycorrhizal associations (i.e. ectomycorrhizal [EM] or arbuscular mycorrhizal [AM]) formed by trees is of fundamental importance for a range of soil properties and processes in forests, yet their importance for the distribution of other important soil biota such as bacteria is largely unknown. We used an experimental common garden and amplicon sequencing to assess how abiotic and biotic variation differentially influenced bacterial communities associated with 13 climax tree species (8 EM members of the Dipterocarpaceae and 5 AM species from different families) planted into a secondary tropical forest in Borneo. Rhizosphere bacterial (RB) communities differed significantly between EM and AM trees but not among EM species and only marginally among AM species. RB communities were related to the density and size of neighbouring EM but not AM trees. Diversity of RB on AM trees responded positively to AM neighbours and negatively to EM neighbours but RB diversity associated with EM trees was unaffected by neighbourhood. Plant-growth-promoting taxa of RB assorted similarly to total RB but more strongly. Synthesis. Our results suggest that the distribution of RB communities is associated with plant mycorrhizal type and plant neighbourhood. Because rhizosphere bacteria alter nutrient cycling and influence plant species composition, their distributions are likely important for understanding ecosystem processes and plant demographics in forest ecosystems.