

TITLE	TROPICAL FOREST SOIL MICROBIOME MODULATES LEAF HEAT TOLERANCE MORE STRONGLY UNDER WARMING THAN AMBIENT CONDITIONS
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ABSTRACT	It is unclear how plants respond to increasing temperatures. Leaf heat tolerance (LHT) is often at its upper limit in tropical forests, suggesting that climate change might negatively impact these forests. We hypothesized that intraspecific variation in LHT might be associated with changes in the soil microbiome, which might also respond to climate. We hypothesized that warming would increase LHT through changes in the soil microbiome: we combined an in situ tropical warming experiment with a shade house experiment in Puerto Rico. The shade house experiment consisted of growing seedlings of <i>Guarea guidonia</i>, a dominant forest species, under different soil microbiome treatments (reduced arbuscular mycorrhizal fungi, reduced plant pathogens, reduced microbes, and unaltered) and soil inoculum from the field experiment. Heat tolerance was determined using chlorophyll fluorescence (F_v/F_m) on individual seedlings in the field and on groups of seedlings (per pot) in the shade house. We sequenced soil fungal DNA to analyze the impacts of the treatments on the soil microbiome. In the field, seedlings from ambient temperature plots showed higher F_v/F_m values under high temperatures (0.648 at 46°C and 0.067 at 52°C) than seedlings from the warming plots (0.535 at 46°C and 0.031 at 52°C). In the shade house, the soil microbiome treatments significantly influenced the fungal community composition and LHT (T_{crit} and F_v/F_m). Reduction in fungal pathogen abundance and diversity altered F_v/F_m before T_{50} for seedlings grown with soil inoculum from the warming plots but after T_{50} for seedlings grown with soil inoculum from the ambient plots. Our findings emphasize that the soil microbiome plays an important role in modulating the impacts of climate change on plants. Understanding and harnessing this relationship might be vital for mitigating the effects of warming on forests, emphasizing the need for further research on microbial responses to climate change.
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