

TITLE **EXPERIMENTAL WARMING ALTERS FREE-LIVING NITROGEN FIXATION IN A HUMID TROPICAL FOREST**

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SUMMARY	• Microbial nitrogen (N) fixation accounts for c. 97% of natural N inputs to terrestrial ecosystems. These microbes can be free-living in the soil and leaf litter (asymbiotic) or in symbiosis with plants. Warming is expected to increase N-fixation rates because warmer temperatures favor the growth and activity of N-fixing microbes. • We investigated the effects of warming on asymbiotic components of N fixation at a field warming experiment in Puerto Rico. We analyzed the function and composition of bacterial communities from surface soil and leaf litter samples. • Warming significantly increased asymbiotic N-fixation rates in soil by 55% (to 0.002 kg ha⁻¹ yr⁻¹) and by 525% in leaf litter (to 14.518 kg ha⁻¹ yr⁻¹). This increase in N fixation was associated with changes in the N-fixing bacterial community composition and soil nutrients. • Our findings suggest that warming increases the natural N inputs from the atmosphere into this tropical forest due to changes in microbial function and composition, especially in the leaf litter. Given the importance of leaf litter in nutrient cycling, future research should investigate other aspects of N cycles in the leaf litter under warming conditions.
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