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Root functional traits and microbial variations across a gradient of foliar disease incidence in agroforestry systems

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In tropical agroforestry systems, root functional traits are important indicators of ecosystem functioning, including nutrient cycling and soil trophic interactions. These trophic interactions are important for crop health, as they can assist plants via enhanced nutrient uptake, improved performance under drought conditions, and altered susceptibility to phytopathogen attacks. While previous research has investigated the response of root functional traits and soil-microbial processes to nutrient availability, little work has investigated root response to aboveground plant disease and the role that management plays in moderating these relationships. The main objective of this study is to determine variations in root functional traits and root endophytic fungal populations across a gradient of plant-level foliar disease incidence in a variety of amendment regimes. Using *Coffea arabica* (coffee) as a model species, we measured key coffee root functional traits and characterized root endophytic fungal populations across a gradient of coffee leaf rust (CLR) incidence – a fungal disease prominent in coffee systems – under contrasting but widespread management conditions in biodiverse agroforestry systems. Preliminary results suggest that both coffee root traits and fungal community composition expressed significant variability across three agroforestry management regimes, where fungal community composition was significantly related to select root functional traits and site conditions. However, variability in fungal communities and root functional trait expression were not different between different levels of CLR incidence. These results suggest that patterns in foliar disease incidence do not disrupt belowground resource acquisition strategies via root traits or microbial associations; rather, site conditions, including canopy openness and soil acidity, dictate variability in these belowground strategies.