Fungal Responses To Elevated Temperature And Soil Nitrogen Availability

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Project Goals: Our long-term goal is to better predict the fate of soil C by developing mathematical and ecosystem models of SOM decomposition that incorporate a genetic and physiological understanding of CUE. Specifically, we propose to define the genomic basis of soil microbial CUE in the context of changing environments, and use this new knowledge to generate more realistic models of SOM decomposition.

The soil microbial community controls decomposition of organic residues which constitute a large portion of soil organic matter. Microbial growth is impacted by global changes such as warming and soil nitrogen (N) availability. Carbon use efficiency (CUE) is an important parameter that influences soil C dynamics by partitioning organic matter between soil C and CO_2 pools. This research focuses on the growth of different fungal species' exposed to varying temperatures and N availabilities, while quantifying respiration (CO_2 flux) and microbial growth. To assess individual fungal isolates, we constructed a sterilized artificial soil medium to mimic a sandy loam soil by mixing 70% sand, 20% silt, and 10% clay. Several fungal species of the phyla *Ascomycota* and *Basidiomycota* were individually grown in this media at different temperatures (15 and 25°C) and N levels. Soil respiration was measured over the incubation period. Fungal biomass was estimated by chloroform fumigation extraction and qPCR of the fungal ITS region. Our results indicate that fungi were able to grow effectively and reproducibly in the artificial soil medium, demonstrating that using an artificial soil is an effective method for assessing individual species responses. Temperature and N availability had a positive affect on C mineralization and biomass. CUE varied among fungal species and, in general, declined with temperature.

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