STOICHIOMETRY AND HOMEOSTASIS OF TERRESTRIAL FUNGAL ISOLATES ACQUIRED NEAR IRVINE, CALIFORNIA, AND COMPARISON WITH THE REDFIELD RATIO AND GLOBAL SOIL MICROBIAL BIOMASS

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ABSTRACT

The carbon, nitrogen, and phosphorus (C:N:P) ratios of 42 terrestrial fungal isolates acquired near Irvine, California, were analyzed and compared to the Redfield ratio (106:16:1) and global soil microbial biomass (60:7:1). To evaluate level of homeostasis or plasticity (non-homeostasis), we grew three of the isolates (Davidiella, Mucor flavus, Helotiales) in liquid malt-yeast extract treatments with modified nutrient ratios. Carbon and nitrogen levels were measured using combustion analysis. Soluble organic phosphorus was extracted using heated HCl and analyzed with a molybdenum reagent indicator using a photospectrometer. The average C:N:P of the 42 fungal strains was 153:31:1. The three isolates grown in nutrient-modified liquid media exhibited weak homeostasis with respect to C:N, weak plasticity with respect to N:P, and strong plasticity with respect to C:P. These results suggest that these local terrestrial fungi around Irvine are controlled by environmental conditions, and their growth is both nitrogen- and phosphorus-limited. Possible future research includes continued gathering of nutrient ratios and homeostasis data for terrestrial heterotrophs, and comparing data between agricultural and non-agricultural soils.