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Nitrogen availability influences natural abundance 15N of Aspergillus oryzae

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Nitrogen availability controls nitrogen mineralization and nitrification which are important reaction for nitrogen cycle in the soil (Schimel and Bennet. 2004). To evaluate nitrogen availability, soil C/N ratio and net nitrogen mineralization are usually used. However, difficulty in extracting the nitrogen source pools for soil microbes and getting the field circumstance information by using laboratory culture experiment create the difficulty in evaluating the nitrogen availability accurately. Then, the natural abundance of 15N (d15N) has been used for evaluating the nitrogen availability as a tool of getting the field circumstance information. Dijkstra et al. (2008) showed negative correlation between D15N which means the difference between d15N of SMB (Soil Microbial Biomass) and d15N of microbial substrate (K2SO4 extractable nitrogen from soil) and microbial substrate C/N, and this result suggested D15N could be a good indicator for nitrogen availability. They explained this phenomenon that mineralization is the dominant process for soil microbes at the high nitrogen availability sites, and SMB becomes enriched in 15N because microbes release NH4+ which is depleted in 15N. However, previous study about the relationship between d15N-biomass and d15N-NH4+ in C/N controlled pure culture is conducted only by Collins et al. (2008) who used E. coli, and they could not detect d15N-NH4+ in a low concentration. Thus, the relationship between nitrogen availability and d15N-biomass is unclear. The purpose of our study is to reevaluate if biomass becomes enriched in 15N when microbes release NH4+ which is depleted in 15N. In this study, we cultured Fungi (Aspergillus oryzae) who has large biomass in the forest soil in C/N controlled pure culture (C/N5, 10, 30, 50, 100) for 4 days. We used glycine and glucose as a nitrogen and carbon source. And we measured mainly changes in d15N-biomass, NH4+ concentration and d15N-NH4+. In C/N5 and 10 where NH4+ concentration increased over time, we found that biomass was strongly enriched in 15N and NH4+ is depleted in 15N. Conversely, in C/N 30, 50 and 100 where microbes hardly released NH4+, we found that d15N-biomass got the almost same value of initial d15N-glycine. In the presentation, we will discuss more detail about the carbon and nitrogen mass balance during our experiment.