

# **Investment in Substrate Uptake by Leaf Litter Fungi is Affected by Nitrogen Availability**

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DOE Meeting

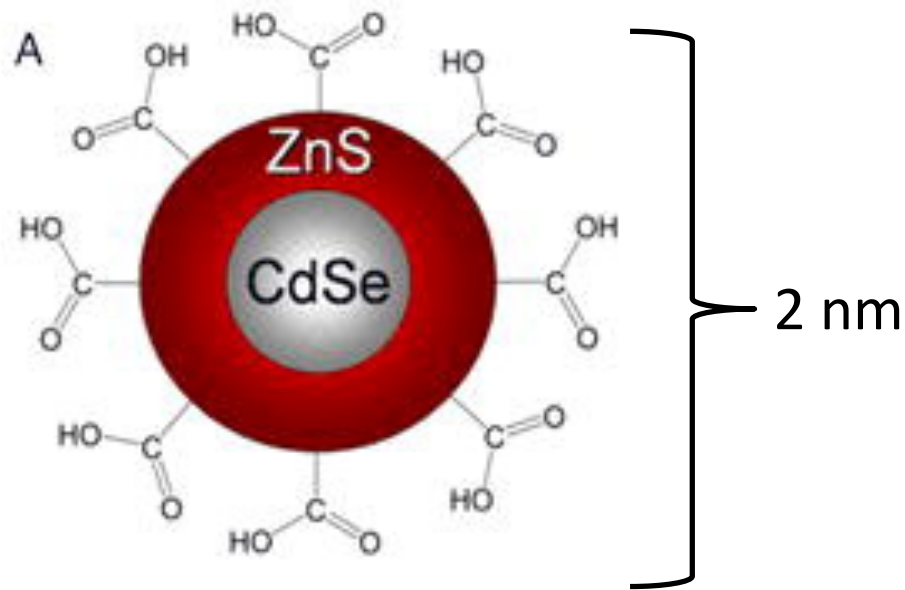
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# Hypotheses:

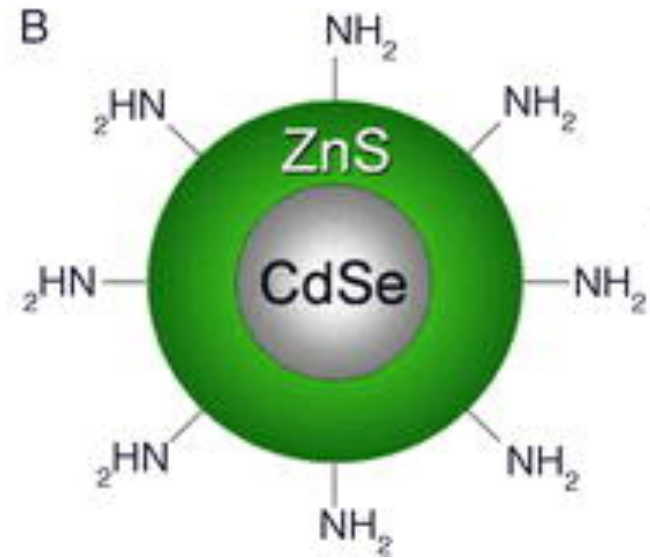
**H1:** Because fungi target specific compounds for growth and reproduction, we will find differences in the uptake of labeled substrates by leaf litter fungi.

**H2:** Nitrogen availability will affect the amount and type of substrates utilized by fungi.

# Quantum Dots (QDs) are versatile tracers



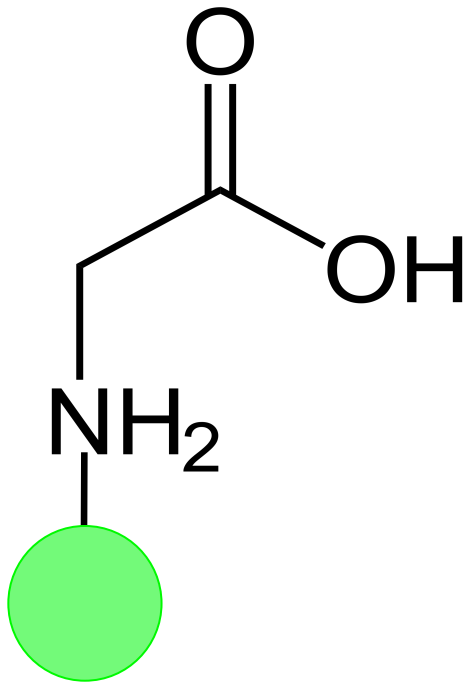
**Carboxyl terminals to form amide bonds**



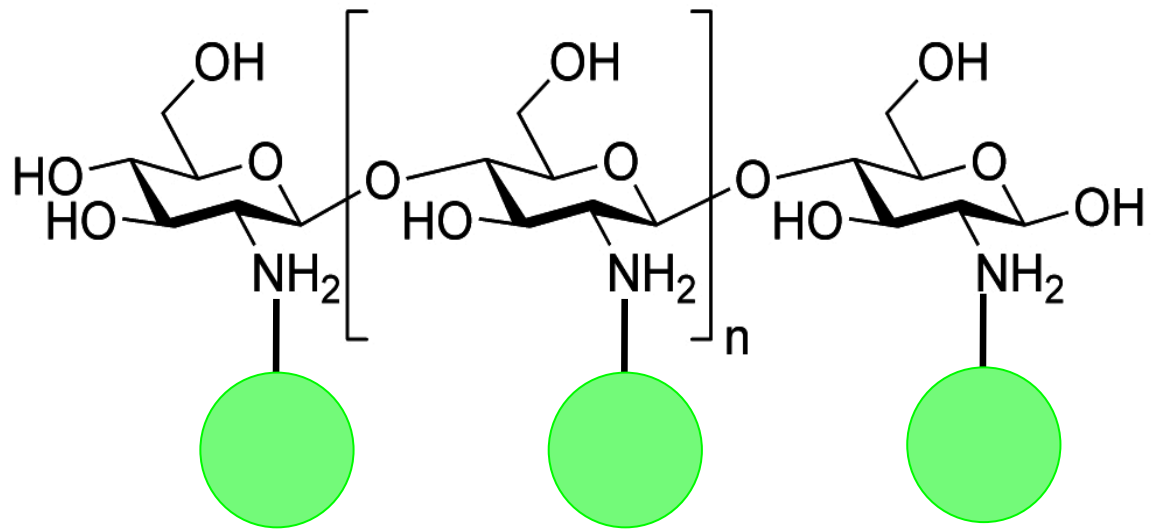
**Amino terminals to form carboxyl bonds**

# We labeled two organic nitrogen sources

Glycine

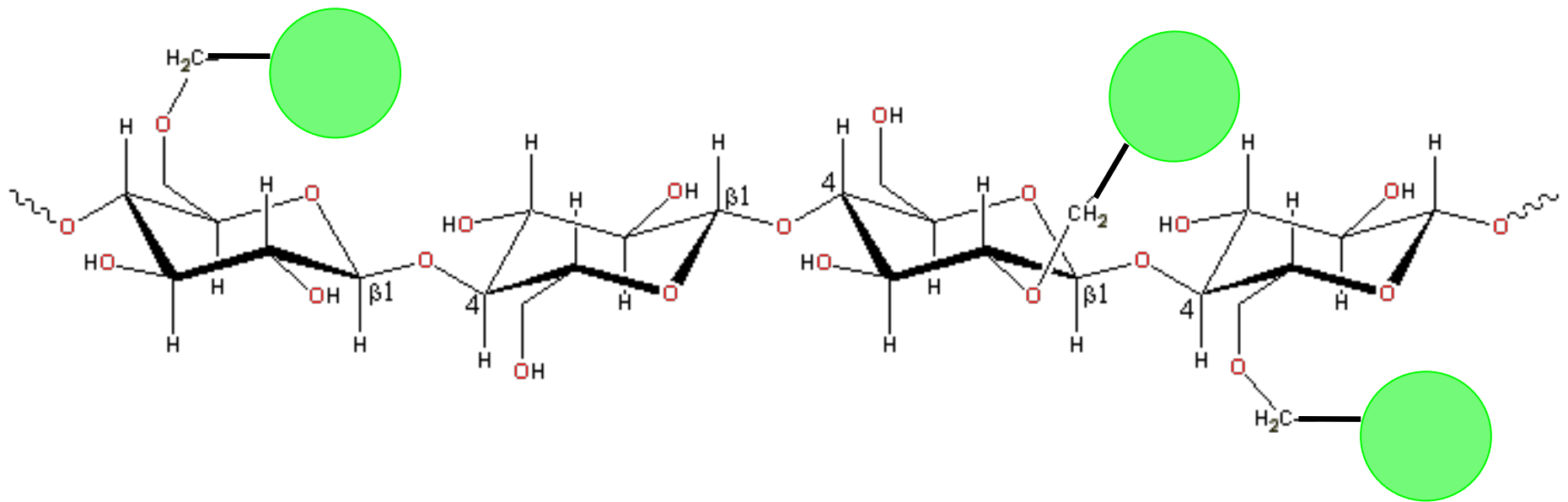


Chitosan



and one carbon source with green QDs

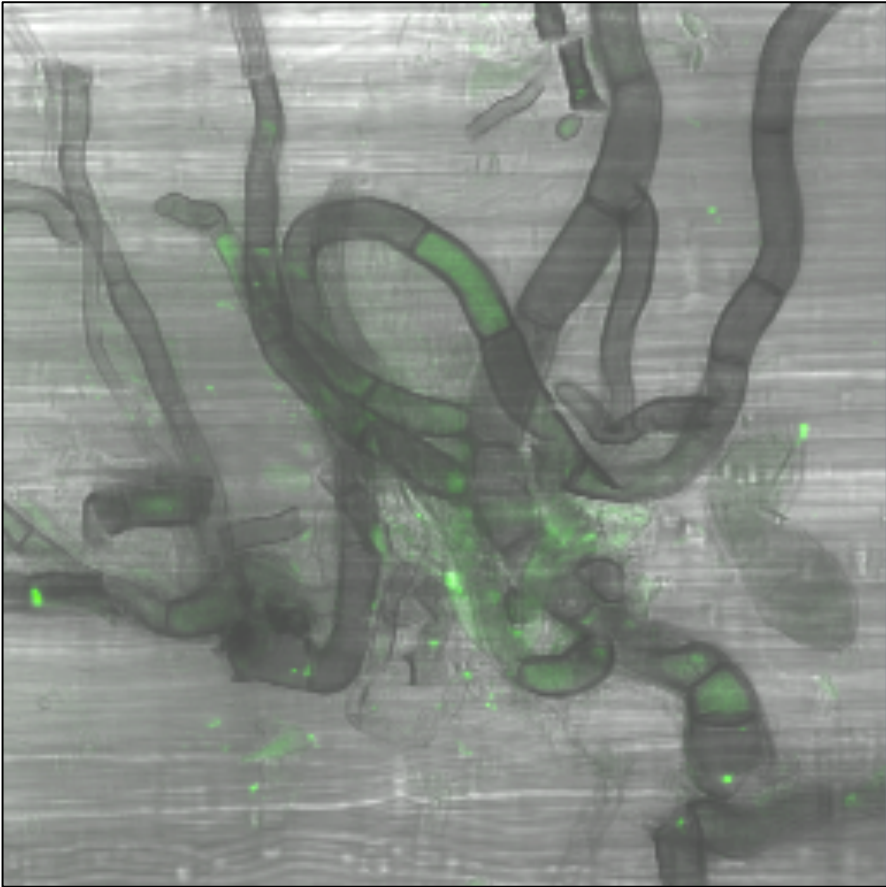
## Carboxymethyl cellulose (CMC)



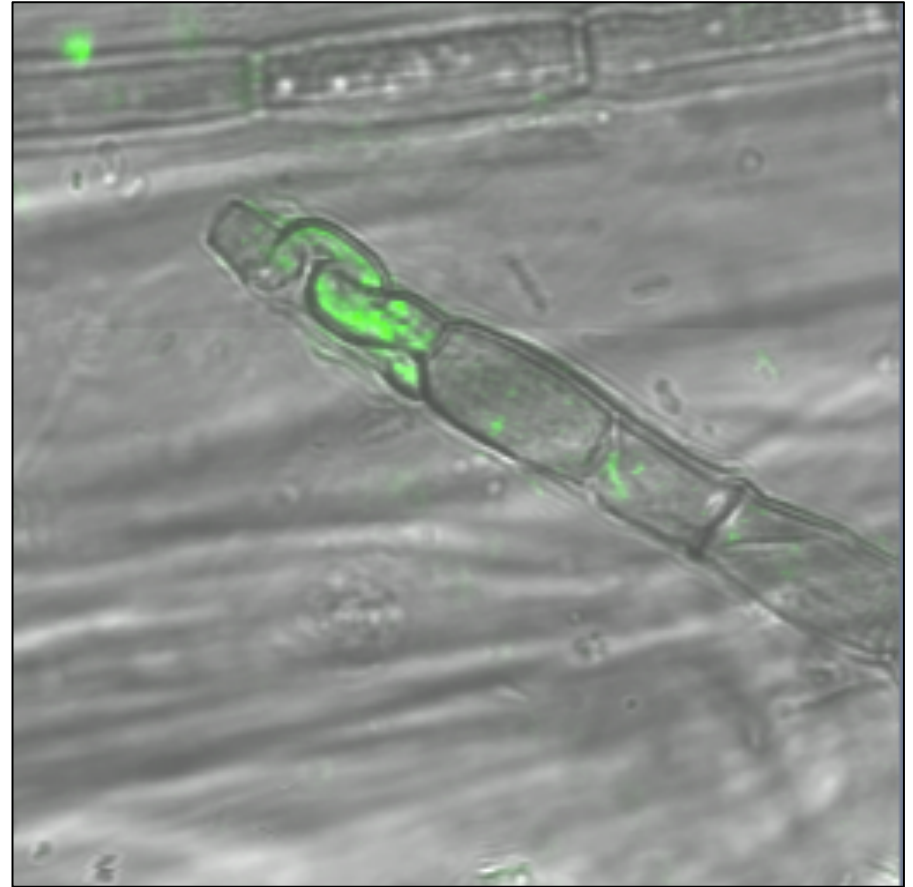
# Methods

- Litter treatments were incubated with each labeled substrate for 24 hrs.
- Measured QD uptake for every substrate from 5 replicate litter bags for each of the three nitrogen treatments to litter and microbes and controls.
- Used RICS (Raster Image Correlation Spectroscopy) to quantify uptake.
- Number of QDs per measurement were converted to concentration ( $\mu\text{mols}$ ).

# Chitosan uptake

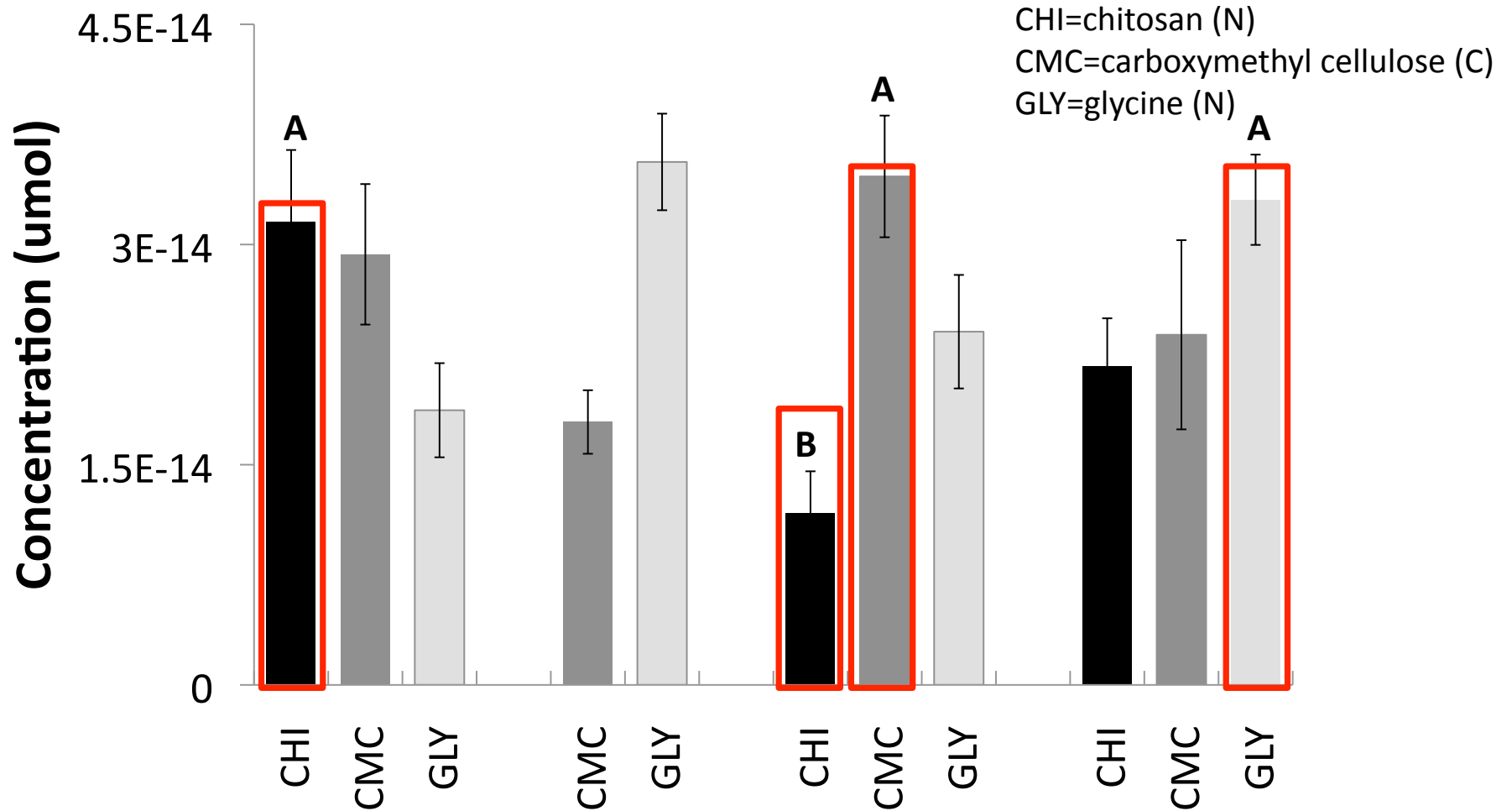


**Plus N Litter and Fungi**



**Ambient**

# Uptake is Substrate and Environment Dependent



**F=2.96 P=0.006**

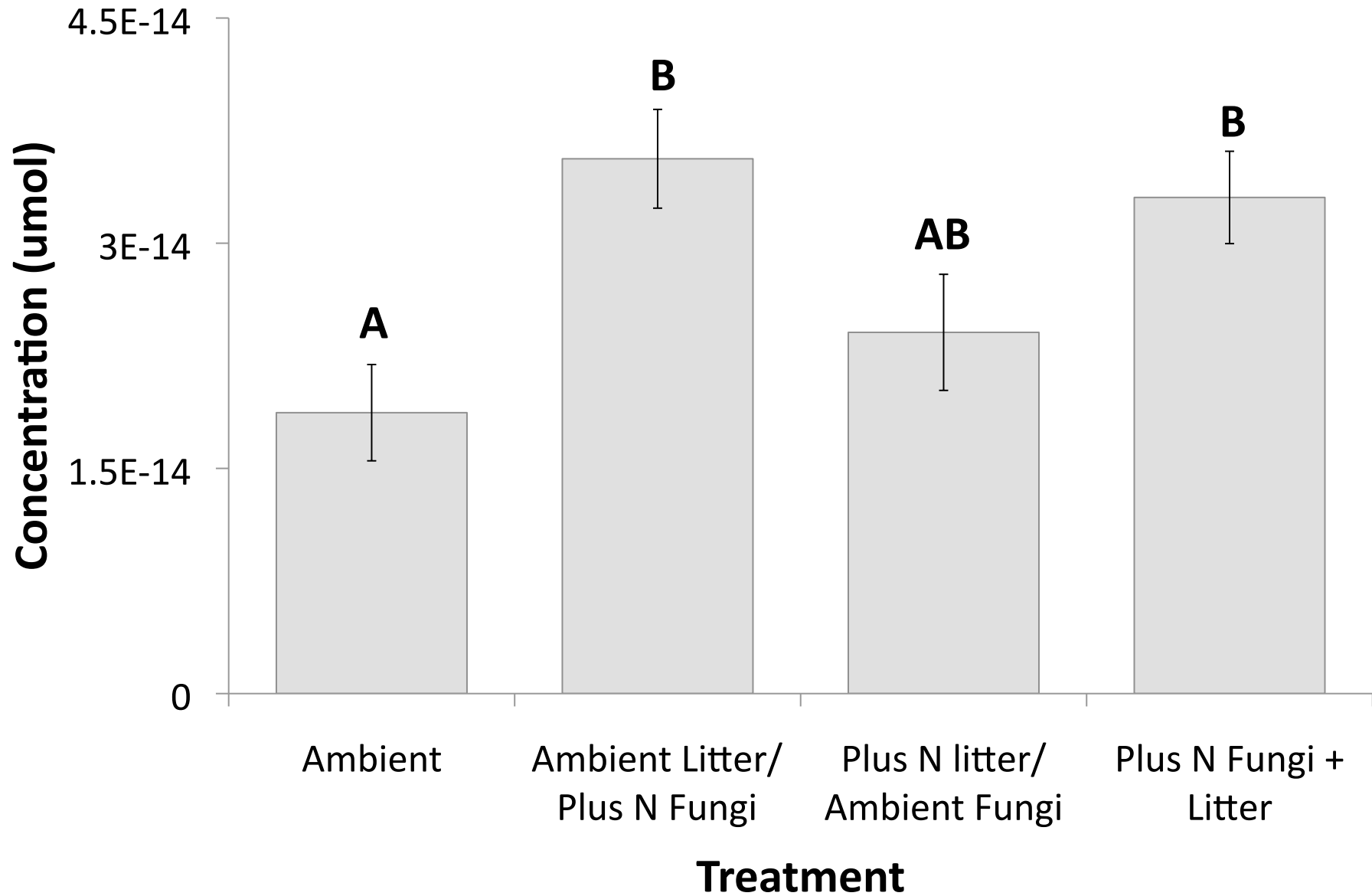
**Fungi x Substrate P=0.003**

**Litter x Substrate P=0.002**

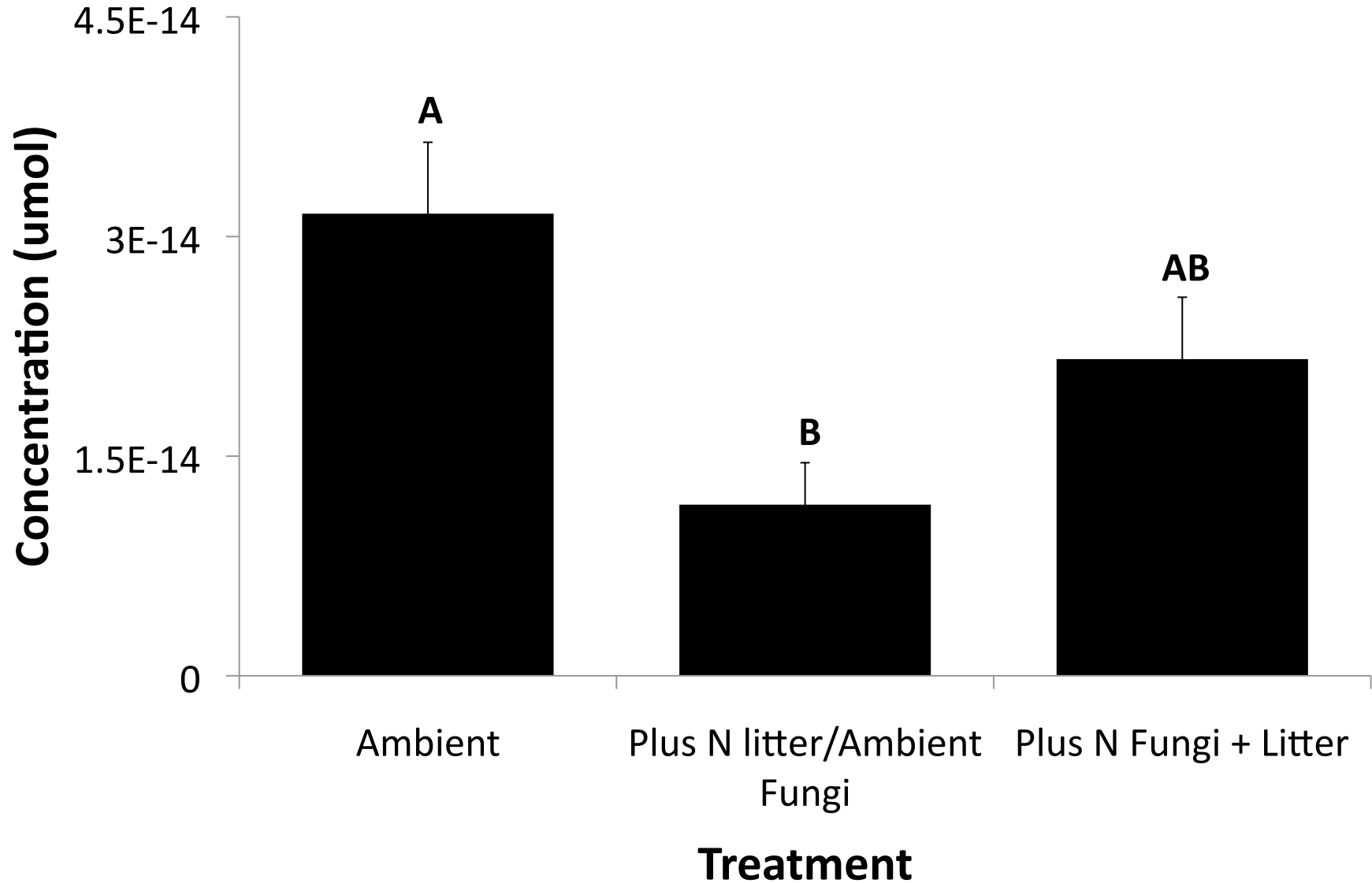
**Treatment and Substrate**



# Nitrogen Addition to Fungi Increases Glycine Uptake



# Nitrogen Addition to Litter Decreases Uptake of Chitosan



# Link to Other Experiments

- Community Assembly:
  - Fungi have different preferences for substrates.
  - Changes in the uptake of glycine and chitosan under increased N availability may be driven by changes in fungal community.
- Extracellular Enzymes:
  - +N to fungi increases the uptake of glycine, which may be mirrored in the production of extracellular enzymes such as NAG.
  - +N to the litter decreases the uptake of chitosan which may be reflected in the production of chitinase.
- Carbon Cycling Models:
  - +N does not increase the amount of carbon (cellulose) assimilated by fungi over a 24 hour time frame.