Effect of Dissolved Organic Carbon and Phenolic Acids on Denitrification in Subsurface Soil. (S03-moorman144846-Poster)

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Abstract:

Nitrate removal from groundwater has been attributed to denitrification, but the carbon sources driving microbial metabolism in subsurface soils have not been investigated. Dissolved organic carbon (DOC) leaching from the root zone to deeper sediments is a likely source of C for metabolism. Saturated subsoils (9.4 to 10 m depth) were amended with 50 mg of 15NO3-N per kg soil and treated with DOC extracted from shallow subsoil (1 to 2 m depth) or (ring-14C) ferulic, coumaric or benzoic acid, then incubated under anaerobic conditions. DOC addition caused significant reduction in nitrate compared to controls in two sediments. DOC half-lives ranged from 6 to 14 days. Nitrate concentrations remained constant in subsoils without added C substrates. Incorporation of 15N into microbial biomass or other organic forms accounted for 17 to 88% of the nitrate removal. Production of 14CO2 was least for ferulic acid and greatest for benzoic acid. DOC from soil can effectively support denitrification in subsoils below the root zone. Mineralization of benzoic and coumaric acids demonstrate that the microbial community can degrade aromatic components of DOC under denitrifying conditions.

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