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Effects of elevated atmospheric CO_2 and nitrogen fertilization on nitrogen cycling in experimental riparian wetlands

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Studies on the relationship between plant nitrogen content and soil nitrogen reduction under elevated CO2 conditions and with different nitrogen additions in wetland ecosystems are lacking. This study was meant to assess the effects of elevated CO2 concentrations and inorganic nitrogen additions on soil and plant nitrogen cycling. A cultured riparian wetland, alligator weeds, and two duplicated open top chambers (OTCs) with ambient (380 μmol/mol) and elevated (700 μmol/mol) CO2 concentrations at low (4 mg/L) and high (6 mg/L) nitrogen fertilization levels were used. The total plant biomass increased by 30.77% and 31.37% at low and high nitrogen fertilization levels, respectively, under elevated CO2 conditions. Plant nitrogen content decreased by 6.54% and 8.86% at low and high nitrogen fertilization levels, respectively. The coefi¬□cient of determination (R2) of soil nitrogen contents ranged from 0.81 to 0.96. Under elevated CO2 conditions, plants utilized the assimilated inorganic nitrogen (from the soil) for growth and other internal physiological transformations, which might explain the reduction in plant nitrogen content. A reduction in soil dissolved inorganic nitrogen (DIN) under elevated CO2 conditions might have also caused the reduction in plant nitrogen content. Reduced plant and soil nitrogen contents are to be expected due to the potential exhaustive use of inorganic nitrogen by soil microorganisms even before it can be made available to the soil and plants. The results from this study provide important information to help policy makers make informed decisions on sustainable management of wetlands. Larger-scale ï¬□eld work is recommended in future research.

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