Nitrogen isotope patterns of trees and soils in two different nitrogen deposition forests

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Anthropogenic nitrogen (N) deposition on forest site is concerning to modify plant species diversity and soil-to-plant N uptake. The N isotope ratio ($\delta^{15}N$) of soil and foliage reflects nitrogen cycle in the ecosystem and distinct plant N source. To better understand the effects of N deposition to soil N status and plant N uptake, we analyzed N content and $\delta^{15}N$ of soils and foliage in two different N deposition forests (Mt. Tsukuba: 11.5 kg N ha^{-1} $year^{-1}$, Katsura: 7.5 kg N ha^{-1} $year^{-1}$) in Kanto region. We sampled soil from upper and lower position of the two forest site respectively, and measured extracted inorganic N content and isotope ratio. We also analyzed leaf N content (N%) and $\delta^{15}N$ values of 30 woody species with different life forms (canopy and understory species). The soil nitrate concentration in Mt. Tsukuba was 25 fold higher than Katsura, and the $\delta^{15}N$ value was constant through the site (-2.6 ±0.1‰). While in Katsura, ammonium concentration in soil was high especially in upper slope, but in lower slope dominated nitrate. The foliage N% was high in Mt. Tsukuba than Katsura. The foliage $\delta^{15}N$ value differed significantly among species in Katsura but in Mt. Tsukuba foliage $\delta^{15}N$ value showed steady through species and the value corresponded with soil nitrate $\delta^{15}N$. From these results, N deposition may lead changing soil N status and alter plant N source and uptake.

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