

## Estimation of the nitrogen cycle and plant nitrogen source using nitrogen isotope analysis in dryland ecosystem, Northeast Asia.

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Nitrogen (N) is one of most restricted nutrient for plant growth in the dryland ecosystems; it is still unclear the mechanisms of plants nutrients absorption from the dry soil. The N isotope ratio ( $\delta^{15}\text{N}$ ) of organic and inorganic N reflects N cycle and it also used for estimation of plant N source by comparison with  $\delta^{15}\text{N}$  value in the plants. To better understand the N cycle and plant N uptake in the dryland ecosystem, we analyzed N content and  $\delta^{15}\text{N}$  value of soils and plant foliage in the Mongolian Gobi steppe. We established four typical vegetation plots based on the dominant plant species and topographical conditions; river bottom with halophyte species, riverbank with a large perennial grass community, the upper slope with an isolate grass communities and flat plain with annual forbs. We sampled soil from five depth of the vertical soil layer from the vegetation plots and measured extracted dissolved organic and inorganic N content and  $\delta^{15}\text{N}$  values. We also measured above- and belowground length, N content (N%) and  $\delta^{15}\text{N}$  values. The plants root mostly distributed in the 10-15 cm depth soil layer. The soil inorganic N concentration was extremely limited expect under the large grass communities. The  $\delta^{15}\text{N}$  values of soil nitrate were corresponded with the perennial grass species, while in the other species often had higher  $\delta^{15}\text{N}$  values than soil nitrogen source. From these results, indicated that N cycle in the dryland ecosystems significantly varied with aboveground vegetation and nitrate was one of N source of perennial grass species. For the other plant species dissolved organic N which had higher  $\delta^{15}\text{N}$  values may have some role for N source in the dryland ecosystem.

Keywords: Nitrogen isotope ratio, Nitrogen cycle, dryland ecosystem