

Seasonal leaf nitrogen recycling and Isotope composition in plant tissues of Japanese Cedar (*Cryptomeria japonica*)

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Approximately 68% of land in Japan is covered by forests in mountainous areas of which 30% are covered by plantations (10 million hectares). Of these plantations 44 % are made of Japanese cedar (*Cryptomeria japonica*), which are found all over Japan except Hokkaido Island and thus a change in nitrogen supply anthropogenically or naturally induced will impact on their growth and possibly the areas where they distribute. The purpose of this study is to determine the pattern of nitrogen storage and reallocation into new organ tissues of Japanese cedar by means of nitrogen isotope ratio analysis. The study site is located in northeastern Japan along the Japanese Sea side in Yamagata Prefecture with a climate dominated by heavy precipitation (~3000mm/a) with approximately 50% of it falling as snow. We measure nitrogen content and $\delta^{15}\text{N}$ of soil, fine roots, perennial roots, stem, leaves separated by age (as they remain for 3 years on the tree) and litter in different seasons as well as the amino acid content in leaves. The results showed that nitrogen content significantly changed among leaves of different age during the growing season. Nitrogen content significantly increased from spring to summer and decreased significantly from summer to winter with younger leaves storing significantly more nitrogen than older leaves. During abscission, one-third of leaf nitrogen is withdrawn (in relation to the summer N content) and stored in older leaves. There was neither a significant difference in leaf $\delta^{15}\text{N}$ throughout the season nor any difference among leaf age, which suggests that there was no nitrogen fractionation during N resorption. Supplementary analysis is underway to determine the proportion of stored N that is used as one source of nitrogen for initial growth of new leaves. Further, roots and stem will be analysed to discard that these tissues are the storage of reabsorbed nitrogen. The results of this study will provide insights into the nitrogen dynamics of this evergreen tree species which will allow us in turn to improve the management of these plantations in times of climate change and increasing anthropogenic nitrogen deposition.

Keywords: Nitrogen recycling, *Cryptomeria japonica*, Nitrogen Isotopes, Reabsorption, Leaf age