

## Effects of climate conditions on surface soil properties and nitrogen use by hinoki cypress

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Temperature and rainfall can affect soil organic matter decomposition, soil carbon sequestration and nutrient mineralization. Comparisons of forests with single dominant species across wide range of climate conditions may give us important insights about the climatic effects on soil processes. In this study, the effects of climate conditions on soil organic layer, surface soil and plant nitrogen concentration were evaluated for hinoki cypress forests under different climatic conditions in Shikoku Island and Kinki District of Japan.

Thirty two forests were selected in Kochi, Ehime, Kagawa and Kyoto Prefecture. Mean annual temperate of the studied forests ranged from 9.6 to 16.3oC and mean annual precipitation ranged from 1350 to 3964 mm. Soil organic matter and surface soil with 0-5 cm depth was collected. Fresh leaves of hinoki cypress were collected by using a slingshot. Carbon and nitrogen concentration in collected samples were measured. For surface soil, volumetric water content and pH in water were measured.

Mean annual temperature was negatively correlated with carbon and nitrogen concentration in surface soil while positively correlated with soil C/N ratio. Mean annual precipitation was negatively correlated with carbon and nitrogen content of soil organic layer and was positively with pH of surface soil. In areas with high precipitation, the rate of decomposition would be rapid because of low acidity of soils. In additions, leaves of hinoki cypress are scale-like shape and may easily be removed by raindrops where mean annual precipitation is higher.

Nitrogen concentration of hinoki cypress was predicted by soil C/N ratio and mean annual precipitation by multiple regression analysis. At a given soil C/N ratio, leaf nitrogen concentration was lower where mean annual precipitation is lower. This pattern can be explained by rapid decomposition in the organic layer and accumulation of well decomposed organic matter with lower C/N ratio. Previous studies in areas with higher mean annual precipitation have shown that the soil nitrogen mineralization rate is very low although soil C/N ratio is low. From these findings hinoki cypress may utilize nitrogen released from organic layer rather than surface soil. The results suggest that hinoki cypress utilizes nitrogen from different layer in soil along a precipitation gradient. Hinoki cypress would mainly utilize nitrogen of organic layer in high precipitation areas and that of surface soil in low precipitation areas.

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