

Tree species effects on soil macro and micro nutrients in Turkish forest ecosystems: In relation to aspects and soil depths

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Aim of the study: The effect of tree species on the ability of soils to supply nutrients to plants is more complex. It involves nutrient release through litter fall and organic matter decomposition, and depletion of nutrients through uptake by the plant. Soil properties also vary with topographic settings. One reason is the orientation of aspects on which soils develop; this affects the microclimate, such as north vs. south-facing slopes, and hence the soils. Aim of this study was to investigate the effects of tree species on soil nutrients using Scots pine and Black pine growing at the north and south aspects in Turkey.

Material and Methods: This study was carried out in the Kastamonu province, Daday Districts, north-west of Kastamonu, Turkey, (41°28'N 33°28'E). Soil samples of Black pine and Scots pine were collected from the altitudes of 1200 meter on the north- and south-aspect. The soil samples were taken randomly from 0-5cm, 5-10 cm, 10-15 cm, 15-20 cm, 20-25 cm and 20-30 cm soil depths by digging three soil pits at each sampling site. The soil samples were air-dried, ground and pass through 2 mm mesh-sized sieve. They placed into marked plastic bags and kept in a fridge until chemical analysis. The soil samples were then analyzed for soil pH, soil texture, and soil macro (N, P, K, Ca, Mg, and S) and micro ((Fe, Mn, Na, Cu, Zn, Cl, Al and Co) nutrient contents. Soil pH (H₂O) was measured in deionized H₂O using a glass calomel electrode, after equilibration for 1 h in a solution:soil paste ratio of 10:1. Soil texture (sand, silt and clay) was determined by Bouyoucos' Hydrometer method. Soil total nitrogen content was analyzed using Eurovector EA3000-Single CNH-S element analyzer and soil nutrients using Spectro-Xepos II model XRF at Kastamonu University Center Laboratory.

Results: Soil pH showed significant difference for black pine stands between the two aspects. Soil macro nutrients (Mg, P and S) from black pine stands were higher on the north aspect than the south aspect, whereas Ca and K contents were higher on the south aspect than the north aspect. For Scots pine stands, soil macro nutrients (Ca, Mg and P) were higher on the north aspect than the south aspect, whereas K content was higher on the south aspect than the north aspect. Soil S content was similar on each aspect. For Scots pine stands, soil micro nutrient, Fe content was higher on the north aspect than the south aspect, whereas other soil micro nutrients (Mn, Na, Cu, Zn, Cl and Al) were higher on the south aspect than the north aspect. For black pine stands, there were completely different trends with soil micronutrients. Soil micronutrients (Fe, Mn, Na, Zn and Cl) were higher on the north aspect than the south aspect, whereas Cu and Al contents were higher on the south aspect than the north aspect. Soil total nitrogen was higher on the north aspect than the south aspect for both tree species.

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Keywords: Soil nutrients, Black pine, Scots pine, Altitude, Soil depths, Kastamonu.