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A chronosequence approach to study stand age effects on total nitrogen as well as exchangeable K, Ca and Mg in the soils in view of increased energetic utilization of *Quercus* dominated forests in northeastern Austria

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The recent IUFRO World Congress Seoul Resolution of August 2010 lists bio-energy as one of the six key thematic areas of scientific research and international collaboration. In view of growing interest in woody biomass as a source of renewable and sustainable energy in northeastern Austria, a better understanding of soil properties is needed to assess the capacity of the soils for sustainable forest productivity for this region. This study focuses on exchangeable K, Ca and Mg pools of soils in order to learn more on the temporal dynamics of plant nutrients as a basis for sustainable biomass harvesting in *Quercus* dominated forests in northeastern Austria. We (i) quantified nitrogen and the exchangeable cations K, Ca, Mg as well as CEC in the soils of our study area, (ii) identified the effects of stand age on exchangeable cations and (iii) estimated macronutrients pool of N, K, Ca, and Mg in aboveground biomass. Three soil types (according to WRB: eutric cambisol, calcic chernozem and haplic luvisol) were considered representative for the area and sampled. Nine permanent *Quercus petraea* dominated plots were selected for our study. Soil pH, nitrogen and exchangeable K, Ca and Mg, were determined in five geometric soil horizons. Aboveground biomass was sampled by harvesting. In our study area, the nutrient pools in the top 50 cm of the soil were ($kg.ha^{-1}$): N 3640 – 7210, K 883 - 1510, Ca 1630 – 13630 and Mg 320 - 1850. The chronosequence approach was used to study how stand age influences the pools of exchangeable cations in cambisols and luvisols of *Quercus* dominated stands. Our study showed that the nutrient pools in the mineral soil are sufficient to support the tree growth; stand age had no significant influence on mineral nutrient levels in the soil. The levels of nutrients in particular exchangeable cations in our study areas are reasonably high and do not indicate the necessity for additional fertilization under current silvicultural practices and biomass extraction rates.

Key words: *Quercus*; biomass; chronosequence approach; soil properties; exchangeable cations