

Fertilization effects on soil P, K, Ca and Mg contents in a mixed tree cropping system in Central Amazonia

Mota, Maria do Socorro ⁽¹⁾; Lehmann, Johannes ⁽²⁾ and Schroth, Götz ⁽³⁾

⁽¹⁾ Embrapa Amazonia Ocidental, Amazonas, Brazil, ⁽²⁾ University of Bayreuth, Federal Research Institute for Forestry, Germany, ⁽³⁾ University of Hamburg, Germany

This study was carried out on a Xanthic Ferrasol north-east of Manaus, Amazonas, Brazil. The main objective was to study the fertilizer effects on P, K, Ca e Mg contents in mixed tree cropping system with Brazil nut (*Bertholletia excelsa*), cupuaçu (*Theobroma grandiflorum*), peach palm (*Bactris gasipaes*), annatto (*Bixa orellana*) and pueraria (*Pueraria phaseoloides*). Fertilizer at four different levels (30%, 100%, 100%+P and 30%-N-lime) of the recommended fertilization, Embrapa Manaus) was applied in December 97. The soil samples were taken from 0-5, 5-10, 10-15, 15-20 and 20-40 cm depths in October 97, January, March and May 98. The soil P, K, Ca and Mg were extracted using the Mehlich III method and were measured colorimetrically (AutoAnalyzer) for P and spectrophotometrically (atomic absorption spectrometer) for K, Ca and Mg.

With a fertilization of 100%+P, soil P contents were highest at 0-5 and 10-15 cm depths. Soils under annatto and peach palm had highest P contents at all depths, and showed a rapid increase from October to May as a result of fertilization. Soil K contents increased up to 15 cm depths for all levels of fertilization, in 15-20 and 20-40 cm only with 100% and 100%+P fertilization. Soils under peach palm and annatto had highest K contents at 15-20 and 20-40 cm. The soil Ca contents were highest under peach palm and cupuaçu and lowest under pueraria. At 15-20 and 20-40 cm depths, K contents were highest in October and decreased until May. The Mg contents showed large variation with depths and species and no consistent trend could be identified. At 15-20 and 20-40 cm, Mg contents were highest in October and January.

The high soil nutrient contents under peach palm indicated that this species does not need the large amounts of fertilizer applied. For annatto the P and K fertilization could be reduced. Generally, the species effect was more clearly visible below 15 cm depth, whereas the effect of fertilization dominated the nutrient differences at the topsoil.