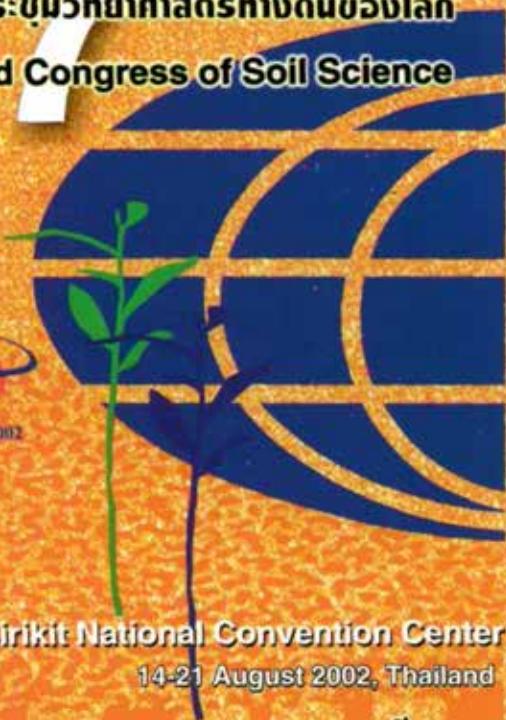


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ABSTRACTS

Volume I

Symposia 01-12





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ABSTRACTS

Volume I

Symposia 01-12

Land use effects on total porosity and pore size distribution in the Amazon

TEIXEIRA Wenceslau Gerales (1), SCHROTH Götz (2) and HUWE Bernd (3)

(1) Embrapa, Amazônia Ocidental, CP 319-69011-970-Manaus-AM, Brazil

(2) INPA, Manaus, Brazil

(3) University of Bayreuth, Bayreuth, Germany

Soil pores vary in size and shape and manifest an interconnected framework typical for each particular soil type, which, however, may change as a consequence of different land use systems. The porosity (ϕ) controls the storage, availability and transport of water and air in the soil. However, this control depends not only on the total volume occupied by pores, but also and specifically on how the porous space is distributed and connected. The equation proposed by van Genuchten (1980) is widely used to fit experimental water retention data. However, this equation has not the necessary flexibility to fit reasonably the well aggregated soil, which the pores size distribution has bi or tri modes. A better description of the SWRC of soils exhibiting bimodal pore-size distributions has been given by linearly overlapping two functions of VG. The objective of this study was to characterise ϕ and pore-size distribution for the clayey Ferralsol in the central Amazon under different land use systems. The discussion is focused on the consequences for the hydraulic properties of the soil and practical inferences about the pore size distribution relative to water availability and fluxes are also pointed out. Three agricultural land use systems were investigated: monocultures of peach palm (*Bactris gasipaes*) and cupuaçu (*Theobroma grandiflorum*) and a agroforestry system with peach palm, cupuaçu, Brazil nut (*Bertholletia excelsa*) and annatto (*Bixa orellana*). The soil was covered by *Pueraria phaseoloides* in all systems except the peach palm monoculture. Adjacent areas of primary and secondary forest were investigated for comparison. The study was carried out in Manaus, Brazil. The results show that using the VG-bimodal approach, excellent fits and resulting curves were obtained, relating θ and h for the soil surface for different land use systems and also for different depths in the soil profile. Agricultural land use and plant specific effects on total porosity and pore-size densities were assessed. The soil near the peach palms has a concentration of pores in the micropore range. The soil, which was not well covered by cover crops, shows a reduced total porosity and a pronounced reduction in the macropore range. Under primary forest, the soil has more than 30% of the total porosity in the macropore range. The pore-size distribution in the original conditions in the clayey Ferralsol seems to be very well adapted to the climatic conditions in the region. It allows a rapid drainage of large amounts of water, and avoids runoff and consequently erosion processes. Further, it also reduces nutrient leaching from the soil matrix bypassing the water to deep layers through the macropores.

Keywords: van Genuchten, bimodal, peach palm, hydraulic, agroforestry, land use system