

Soil water extraction through secondary vegetation during the dry season in 1997 in Eastern Amazonia

R. Sommer*, E.J. Maklouf Carvalho, P.L.G. Vlek**, H. Fölster***

*EMBRAPA Amazonia Oriental Belém-Brazil, ** Institute of Agriculture in the Tropics, Göttingen, Germany, ***Institute of Soil Science and Forest Nutrition, Göttingen, Germany

During the dry season in 1997 tensiometer measurements of soil water potential in a 4yearold secondary vegetation in the Zona Bragantina near Igarapé-Açu (north-east of Pará) up to 7.35 m depth were conducted.

Former results had shown a capability of the evergreen vegetation to build an extensive root system to at least 6 m depth (SOMMER, 1996). In addition HÖLSCHER (1995) using a microclimatic approach calculated a water deficit (precipitation minus actual transpiration) of a 3yearold secondary vegetation in the same region between June and December 1992 that corresponded to a soil water use to at least 3.3 m depth.

It was/is intended to identify the effective rooting depth (i.e. maximum soil depth providing 80 % of water used by the vegetation) of the secondary vegetation and to put to the proof HÖLSCHER'S (1995) results with a soil water balance.

Beginning with wet soil conditions in July (tension 160-200 hPa in the hole profile) the matrix head corresponding to less precipitation increased constantly.

At 1st October after only 5 mm of precipitation in September matrix head down to 1.8 m depth had exceeded the measuring range of the tensiometer (850-900 hPa). Four weeks later without any precipitation in October the matrix head only measurable in 5, 6 and 7.35 m depth reached 528, 330 respectively 250 hPa. A "zero-evapo-transpiration profile" (3 m deep, free from vegetation and covered with a plastic tarpaulin) showed values of about 200 hPa tension at 3 m depth at the same time. Preliminary restrain estimations in comparison to the "zero conditions" show that the secondary vegetation is able to extract water from at least 5 m depth. In the mid of October the zero-flux plain reached the 6 m mark underlining above estimation.

Lack of soil water characteristic curves however for the considered soil profile makes it unable at the moment to calculate the quantity of water used by the secondary vegetation.

Mailing adress: *Trav. Dr. Eneas Pinheiro s/n, 66.095-100 Belém-PA, Brazil, E-mail: rsommer@ufpa.br

** Grisebachstr. 6, 37077 Göttingen, Germ., E-mail: gvlek@gwdg.de

***Büsgenweg 2, 37077 Göttingen, Germ.; E-mail: hfoelst@gwdg.de