

Neotropical Ecosystems



WAVES

Water Availability, Vulnerability
of Ecosystems and Society
in the Northeast of Brazil

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Rainfall Distribution and Water Balance for Ten Day Periods in Igarapé-Açu, Eastern Amazônia, Brazil

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Aiming to offer support to the experimental studies carried out by the SHIFT project Env-25 (SHIFT-Capoeira) and to help agricultural planning, in this study, the Igarapé-Açu rainfall distribution and water balance for ten day period are described and compared with agroclimatic requirements for the following annual crops: cowpea, corn, rice and cassava that are rainfed cultures and the basic staples in the region. The study area is located in Northeastern of Pará State, one of the oldest region of agricultural exploitation in the Amazon basin, on soil of low fertility and where intensive agriculture settlement took place at the end of the nineteenth century. The studied agroclimatic variables/aspects include: 1- daily rainfall from 1981-1999, 2- frequency analysis of the rainfall at different probability levels, 3- determination of the climatic risk for crops sowing associated at low, medium and high climatic risk and 4- water balances simulations for the crops by combining: a) daily rainfall, b) reference evapotranspiration, c) duration of crop cycle, d) phenological phases associated to their crop coefficients, e) planting periods, f) crop variety and g) usable soil water reserves. Expected precipitation tables for periods of ten days at probability levels of 25%, 50% and 75% and the indication of the most suitable sowing period for each crop

are presented. It is also shown a brief description of the precipitation climatology related to the other climatological variables such as air temperature and humidity, solar radiation, wind velocity and other features of local rainfall of interest for agriculture including rainfall seasonal distribution and length of wet and dry periods. The results indicated that in the study area from January to July there is more available water for crop development than from August to December. During the first period, monthly rainfall is higher than 150 mm and there is 50% probability of occurring ten day rainfall higher than the crops water requirements, however care should be taken in relation to soil management because of the high water surplus that occurs during this period. During the second period monthly rainfall varies between 20 mm and 100 mm and there is 50% probability of occurring ten day rainfall less than the crop water requirements that are more concentrated between September and October. In order to reduce the climatic risk for the crop yields in relation to soil water availability, cowpea, corn and rice should be planted between January and June and cassava between April and June.

Continuous Transpiration Measurements of Tropical Plantation Trees Using Different Methods

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Measurements focussing on water relations of the species cupuacu (*Theobroma grandiflorum*), seringueira (*Hevea* spp.), and citrus (*Citrus sinensis*) were performed during three weeks of measurements. Xylem sap flux, leaf surface conductance, and porometer measurements were compared. The continuously recording leaf surface sensors allowed to judge on the humidity conditions in the leaf boundary layer. Stomatal conductance of citrus was about twice the values of cupuacu and seringueira. Sap flux measurements often

showed stronger coupling to atmospheric evaporative demand in the afternoon. Especially cupuacu sap flux was often decoupled from air humidity conditions, reflecting the thick boundary layers caused by the large leaves. Cupuacu tended to close stomata around noon, whereas this was not detected for citrus. This might reflect the provenience of the shadow tree cupuacu, and could correspond with the tightly closed nutrient cycles reported by Schroth and co-workers for cupuacu.