



## Interception of rainfall and surface runoff in the Brazilian Cerrado

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The Brazilian Cerrado plays a fundamental role in water resources dynamics because it distributes fresh water to the largest basins in Brazil and South America. In recent decades, the native Cerrado vegetation has increasingly been replaced by agricultural crops and pasture. These land cover and land use changes have altered the hydrological processes. Meanwhile, little is known about the components of the water balance in the Brazilian Cerrado, mainly because the experimental field studies in this region are scarce or nonexistent. The objective of this study was to evaluate two hydrological processes under native Cerrado vegetation, the canopy interception (CI) and the surface runoff (R). The Cerrado physiognomy was classified as "cerrado sensu stricto denso" with an absolute density of 15,278 trees  $\text{ha}^{-1}$ , and a basal area of 11.44  $\text{m}^2 \text{ha}^{-1}$ . We measured the gross rainfall (P) from an automated tipping bucket rain gauge (model TB4) located in a tower with 11 m of height on the Cerrado. Throughfall (TF) was obtained from 15 automated tipping bucket rain gauges (model Davis) spread below the Cerrado vegetation and randomly relocated every month during the wet season. Stemflow (SF) was measured on 12 trees using a plastic hose wrapped around the trees trunks, sealed with neutral silicone sealant, and a bucket to store the water. The canopy interception was computed by the difference between P and the sum of TF and SF. Surface runoff under undisturbed Cerrado was collected in three plots of 100  $\text{m}^2$  (5 x 20 m) in size and slope steepness of approximately 0.09  $\text{m m}^{-1}$ . The experimental study was conducted between January 2012 and November 2013. We found TF of 81.0% of P and SF of 1.6% of P, i.e. the canopy interception was calculated at 17.4% of P. There was a statistically significant correlation ( $p < 0.05$ ) between gross rainfall and TF, SF, and CI with correlation coefficients  $r > 0.8$ . Our results suggest that the rainfall intensity, the characteristics of the trees trunks (crooked and twisted) and stand structure are the main factors that have influenced CI. The average surface runoff under undisturbed Cerrado was less than 1% of the P, and did not have significant correlation ( $p > 0.05$ ) with P, but had a significant correlation with maximum 30 minute rainfall intensity ( $I_{30}$ ). This low value for surface runoff indicates that the forest cover has a strong influence over surface runoff generation under undisturbed Cerrado. This process is poorly studied; however, we believe this can be a key to understanding the surface runoff generation under undisturbed Cerrado, and in other tropical vegetation, such as the Amazon rainforest.