Geophysical Research Abstracts
Vol. 14, EGU2012-12891-1, 2012
EGU General Assembly 2012

Soil internal drainage: temporal stability and spatial variability in succession bean-black oat

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There are a variety of studies considering the soil water content, but those who consider the flow of water, which are translated by deep drainage and capillary rise are scarce, especially those who assess their spatio-temporal variability, due to its laborious obtaining. Large areas have been considered homogeneous, but show considerable spatial variability inherent in the soil, causing the appearance of zones of distinct physical properties. In deep, sandy soils where the groundwater level is far below the root zone of interference, internal drainage is one of the factors limiting the supply of water to the soil surface, and possibly one of the biggest factors that determines what kinds satisfactory development of plants present in a given landscape. The forms of relief may also be indicators of changes in soil properties, because this variability is caused by small changes that affect the slope of the pedogenetic processes and the transport and storage of water in the soil profile, i.e. the different trajectories of water flow in different forms of the landscape, is the cause of variability. The objectives of this research were: i) evaluate the spatial and temporal stability of internal soil water drainage in a place near and another distant from the root system in a bean-black-oat succession and ii) verify their spatial variability in relation to relief. With the hydraulic conductivity obtained by the instantaneous profile method and the total potential gradient obtained from the difference in readings of tensiometers installed at depths of 0.35 and 0.45 and 0.75 and 0.85 m in 60 sampling points totaling 1680 and 1200 observations during the cultivation of beans and oats, respectively, was obtained so the internal drainage / capillary rise through the Darcy-Buckingham equation. To evaluate the temporal stability the method used was the relative difference and Spearman correlation test and the spatial variability was analyzed as geostatistical methodology. During the period when the water flow in soil is higher, there is strong temporal stability in the depth of 0.40 m, which is the opposite for the periods of drying. The lowest relative difference and standard deviation for the internal drainage obtained during the cultivation of beans and depth of 0.40 m confirm the hypothesis that the research carried out during periods of soil water recharge have less variability than those in the drying period. Temporal stability was due to the topographic position of selected points, since the points chosen for the depth of 0.40 m in both growing seasons, are located on the lower portion of the relief, and the nominees for the depth of 0,80 m, the highest portion. There were differences in the spatial pattern of water flow in the soil along the crop succession, i.e. the seasonal demand for water by plants and evaporation from the soil at the time of drying, changed their distribution model with internal drainage phases and stages capillary rise.