EGU2020-11573, updated on 01 Mar 2021
https://doi.org/10.5194/egusphere-egu2020-11573
EGU General Assembly 2020

The role of vegetation in the redistribution of infiltration in a semi-arid zone

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The effect of vegetation on the volumes of water that infiltrates into the soil has been extensively studied, but not the redistribution that occurs radially from trees. This is especially important in arid and semi-arid areas where water volumes are scarce and water resources management must be more scrupulous. In the present study, the influence of native vegetation (huizache trees) on the redistribution of infiltration in a semi-arid zone in the central Mexican plateau was analyzed. Single ring infiltration tests were carried out with a radial distribution in 2 trees: 4 located inside the crown of the tree and 4 outside it, in 4 different axes, giving a total of 32 tests per tree. Likewise, particle size distribution and soil texture analysis were carried out in 4 orthogonal directions and dry bulk density and initial water content tests at each sampling point were performed. The results showed a zone of influence located between r / 2 and r of the tree canopy, where the infiltration is much greater compared to the other points. Based on these results, the methodology for a third tree was redesigned, in order to characterize various infiltration areas. So that 3 zones were established within the tree: near, intermediate and far, taking 2 tests in each zone, in orthogonal direction, and taking a test in each zone of 4 additional axes, a total of 36 tests. The results of the infiltration tests with this methodology showed similar results to the other two trees: low infiltration rates close to the tree trunk, high infiltration rates in the area between r / 2 and r of the canopy and again low rates of infiltration in the area outside the crown. Additionally, the particle size distribution analyzes showed the presence of 4 types of soil: loam, sandy-loam, clay-loam and silt-loam soil. On the other hand, the initial water content and dry bulk density do not seem to affect the infiltration process to a greater extent and they vary indiscriminately. The above suggests that the area between r / 2 and r is the one that captures the highest infiltration volumes, it may be due to the shadow effect produced by the treetops, although the soil texture has an influence on the infiltration rates, it does not influence the form of radial redistribution of tree infiltration.