

Seasonal changes of the infiltration rates in urban parks of Valencia City, Eastern Spain

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Infiltration is a key process of the hydrological cycle. Infiltration also controls the soil water resources, and the development of the vegetation, and moreover, in the Mediterranean, determines the runoff generation (Cerdà, 1996; 1997; 2001). In the Mediterranean, the infiltration in forest soils shows high spatial variability and seasonal and temporal changes (Cerdà, 1999; Bodí and Cerdà, 2009) and is being affected by forest fires (Cerdà, 1998), which introduce a new temporal change in the seasonality of the infiltration rates. Although the forest soils are well assessed, there is no information about the infiltration in urban areas in Mediterranean cities. The Mediterranean dense urban systems use to be treated as impermeable areas. However, the cities show areas covered by vegetation and with soils that allow the rainfall to infiltrate. Those areas are mainly the parks. In order to shed some light on the infiltration capacity of the soils of the urban area of Valencia city 30 rainfall simulations experiments (Cerdà, 1996) and 90 ring infiltrometer (10 cm diameter) measurements were carried out in January 2011, and they were repeated in July 2011, to compare wet (19.4 % of soil moisture) and dry (5.98 % of soil moisture) soils. The infiltration curves were fitted to the Horton (1933) equation and they lasted for 1 hour. The results show that the infiltration is 11 times higher when measured with ring infiltrometer than with the simulated rainfall at 55 mmh⁻¹, and that the infiltration rates were higher in summer than in winter: 2.01 higher for the ring infiltrometer, and 1.45 higher when measured with the rainfall simulator. In comparison to the soils from the forest areas, the infiltration rate in the gardens was lower, with values of 10.23 and 21.65 mm h⁻¹ in average for winter and summer when measured with the rainfall simulator. Similar results were found with the ring infiltrometer. It was also found a clear relationship between the vegetation cover and the infiltration, with high infiltration rates with the grass covers. This is due to the higher infiltration rates of the soils with roots and due to the impact of plant stems on the runoff generation (Wang et al., 2015; Zhao et al., 2015). The importance of the vegetation on the soil infiltration capacity in the gardens of Valencia is a key factor to reduce the runoff sediment concentration such as was found at different scales (Keesstra et al., 2007; Nanko et al., 2015; Pereira et al., 2015; Prosdocimi et al., 2016)

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