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Water repellency, plants, agriculture abandonment and fire in citrus plantations. The Canyoles river watershed study site

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Soil water repellency (SWR) is a key soil property that determine the soil and water losses, soil fertility and plant development. Although until the 90's the soil water repellency was seeing as an uncommon soil characteristic, now is considered a key soil property to understand the soil hydrology (Alanís et al., 2016; Hewelke et al., 2016; Keesstra et al., 2016; Jiménez-Morillo et al., 2016). The inspiring research of Leonard DeBano and Stefan H Doerr changed the fate of the science (DeBano, 2000; Doerr et al. 2000). Soil water repellency was associated to forest fire affected land due to the pioneer contribution of professor DeBano in the 70's and Professor Doerr in the 90's. The research during the last two decades demonstrate that fire affects the reallocation of the hydrophobic substances and can reduce or increase the severity of the soil water repellence at different soil depths and horizons. The SWR is usually measured by sampling to show the influence of key soil properties (texture, structure, plant cover, litter, season...) on the degree of soil water repellency. The sampling is applied usually with a few drops when the Water Drop Penetration Time method is applied, and this inform of the time of penetration, but few researches focussed in the spatial distribution of the water repellency, which is a key factor of the runoff generation, the water infiltration and the water redistribution such as demonstrate the wetting fronts. Our approach research the spatial distribution of the water repellency by means of an intense sampling of soil surface water repellency. One thousand drops were distributed in a square meter (100 lines separated 1 cm and 100 drops per each line of 100 cm, with a total od 1000 drops in 1m2) on 10 sampling points on 4 land managements: ploughing and herbicide agriculture fields treatment), abandoned 10 years, and burnt. The research was carried out in citrus plantations of the Canyoles river watershed. The results show that the agriculture soil managed with tillage is hydrophilic, that the use of herbicides trigger a patchy and slight presence of hydrophobicity, that the growth of vegetation reached the highest water repellency degree with a patch distribution of the water repellency, and finally the fire reduced the surface water repellency and changes the spatial pattern. This study aims to fulfil the gap of a sampling strategy that will help the scientist to characterize the soil water repellency with a uniform and standard procedure and protocol. The results show the importance of the management to control the soil repellency (Bodí et al., 2012a) and the importance of the fire and ash and the water repellency (Bodí et al., 2012b; Dlapa et al., 2013; Benito Rueda et al., 2016).

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