Adaptation of the MMF (Morgan-Morgan-Finney) model to Mediterranean forests subject to wildfire and post-fire rehabilitation measures

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1.- Introduction.

The negative hydrological effects of wildfire are very difficult to predict in Mediterranean forest ecosystems, due the intrinsic climate and soil characteristics of these areas. Among the hydrological models simulating surface runoff and soil erosion in these environmental contexts, the semi-empirical Morgan-Morgan-Finney (MMF) model can ensure the representation of the main physical processes, while offering ease of use and limiting the number of input parameters. However, literature reports very few modelling studies using MMF in burned areas of the Mediterranean environment with or without post-fire rehabilitation measures.

To fill this gap, the capacity of the MMF model to predict the seasonal surface runoff and soil loss in a Mediterranean forest was verified and improved for unburned plots and areas affected by a wildfire, with and without post-fire straw mulch treatment.
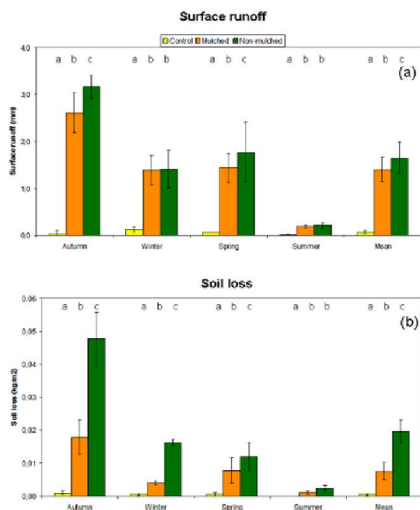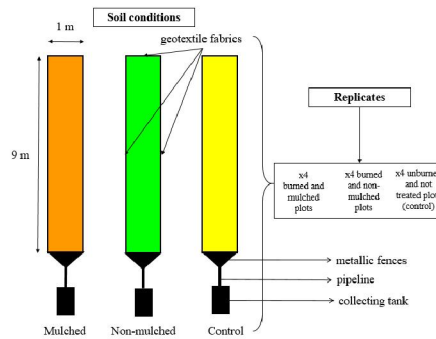
2.- Results and Discussion.

MMF was able to predict seasonal runoff volumes and soil loss with good reliability in all the experimented conditions.

This modelling experiment has shown the capacity of the MMF model to simulate the seasonal hydrological and erosion response of the experimental unburned and burned soils of Mediterranean semi-arid forests. Although more research is needed to validate the model's prediction capacity in these conditions, the use of MMF as a management tool may be suggested to predict the hydrogeological risk in these delicate ecosystems threatened by wildfire, as well as to evaluate the potential efficiency of soil treatments after fire.
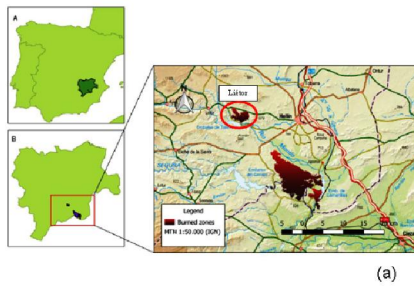
Location of the experimental plots (Liétor, Spain)