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Molecular characterisation of soil organic matter under different burned vegetation canopies

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Forest fires are a recurrent ecological phenomenon in the Mediterranean basin. They induce molecular changes in soil organic matter (SOM) leading to immediate and long-term environmental consequences [1]. The SOM is of paramount importance as indicator of soil health [2]. Fire-induced changes in SOM include the alteration of biogenic chemical structures and the accumulation of newly formed ones, enhancing dynamics in the complex balance between the different C-types [2,3]. Therefore, understanding SOM molecular composition, before and after fire, is fundamental to monitor changes in soil health, as well as its natural or man-mediated recovery [3,4]. Our aim was to assess the molecular composition of organic matter in fire-affected leptosols, at two depths (0–2 and 2–5 cm) under different vegetation types located in the southwestern of Portugal (Aljezur, Algarve). The SOM characterization was conducted by analytical pyrolysis (Py-GC/MS), a technique based on the thermochemical breakdown of organic compounds in the absence of oxygen at elevated temperatures [5]. The Py-GC/MS has been found suitable for the structural characterization of complex organic matrices [4], providing detailed structural information of individual compounds considered fingerprinting of SOM. However, due to the relative high number of molecular compounds released by analytical pyrolysis, the use of graphical-statistical methods, such as van Krevelen diagrams, are usually applied to help monitoring SOM molecular changes produced by fire [3,4]. This work represents the first attempt to evaluate the fire effects in SOM using a detailed molecular characterisation of SOM under different vegetation canopies, recently affected by wildfire, in southern Portugal.

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