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# The long-term effects on aggregate stability (AS) from a forest fire of varying intensity in a Mediterranean environment (1994-2012).

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Forest fires can affect many soil properties and this fact is deeply connected with fire severity, intensity, soil type and many others factors. Aggregate stability (AS) indicates the soil structure resilience in response to external mechanical forces. AS is one of the factors that strongly affect on soil erodibility and infiltration. This property can be used as an indicator of the state of the soil structure and physical stability. The aim of this study is to analyze the soil AS of a determined area that suffered a wildfire in 1994 and compare them with a control area with the same characteristics. The study area is located in the Cadiretes Massif, in the northernmost zone of the Catalan Coastal Ranges, northeast Spain, at an altitude of around 190 – 250 m.a.m.s.l. The Cadiretes Massif is predominantly granite, although soils developed over Paleozoic metamorphic rocks such as schist and slates can also be found. In some areas metamorphic features underlie this relief. The massif is covered by dense Mediterranean vegetation, e.g. Quercus suber, Arbutus unedo, Erica arborea, and in some places Pinus pinaster plantations are found. This area receives about 700 – 800 mm of annual rainfall, with a fairly marked seasonal variability. The maximum is registered in autumn. Summer temperatures often surpass 25ºC, while in winter temperatures are generally mild. The predominant soil type in Cadiretes is classified as a Lithic Xerept, with a 15 cm deep sandy-loam A horizon. In the control forest area, this horizon is protected by a 3 cm deep O horizon of moder humus. Three areas with different burnt intensity were identified in 1994 and they are the same plots that were chosen to sample in 2012. The 4 plots (Low intensity, Medium Intensity, High Intensity and Control) had the same orientation (S) and slope (5%). The TDI (Ten Drop Impact) test, that simulates rainfall impact on aggregates, was used to measure AS in the laboratory. Twenty samples were collected per plot. Ten aggregates for each plot, of 4 – 4.8 mm were selected and subjected to the impact of 10 drops from a burette fixed at a height of 1 m. the aggregates were placed on a 2.8 mm sieve to allow the disaggregated sample to flow away. The drops of distilled water weighed 0.1 $\pm$ 0.001 g and had a diameter of 5.8 mm. The statistical comparison between the four treatments (high, medium and low intensity and control area) in 2012 samples shows that the disintegration percentage is higher in the high intensity area (13.5%). Medium and low intensity areas showed less percentage of aggregate disintegration: 10.4 and 11.1 respectively but still higher than the control area's one (5.45%). This analysis has demonstrated that after 18 years there are still significant AS differences between the three areas with different burnt intensity and the control area.

Keywords: forest fire, aggregate stability, TDI test, Mediterranean area