Effects of soil organic carbon, glomalin and aggregate stability in degraded soils of a semiarid Mediterranean region.

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ABSTRACT:

The first step to restoring degraded mine soils from limestone quarries in semiarid environments, usually without soil structure, consists mainly of creating a topsoil layer with minimum physical, chemical and biological properties. The aim of this presentation is to convey the effects of organic amendments and mulches on soil aggregate stability and aggregation-associated soil characteristics, five years after the beginning of an experimental restoration in Sierra de Gador (Almería, SE Spain). Nine plots 15 x 5 m were prepared to test two organic amendments (sludge, compost, control) and two mulches (gravel, wood chip, control). The variables under test were total organic C (TOC), total glomalin (TG), easily extracted glomalin (EEG) and water aggregate stability evaluated by both mean weight diameter (MWD) and water drop test (WDT). Moreover, the relationships among the measured parameters were determined in order to assess the best indicators in the evaluation of used restoration techniques. The results showed that organic amendments, especially compost, enhance glomalin content and soil aggregate stability. There was a high positive correlation between TG and TOC ($r = 0.67$; $p < 0.01$), EEG and TOC ($r = 0.78$; $p < 0.01$), as well as TG and WDT ($r = 0.52$; $p < 0.01$), suggesting that both glomalin and TOC can contribute to the formation of soil aggregates and thereby promote the buildup of soil aggregation. However, we only found a significant correlation between MWD and TOC, as well as TG and EEG where the TOC content was lower than 2%.