

## **SOILCOMBAT - Engineering the sponge function of Portuguese pasture soils to sustainably combat desertification**

**ABSTRACT** | Desertification is a growing concern in Portugal as models predict decreasing annual precipitation, and higher intensity events especially in the winter season, and increased potential evapotranspiration. SOILCOMBAT's idea is to adapt the sponge function of pasture soils by engineering them with designer biochar to raise the organic matter saturation several times, without the need for regular inputs of organic matter because the turnover of biochar is 100-1000 times slower. The design aspect of biochar relates to the type and amount of biochar that optimises the sponge function without compromising other key desertification indicators, e.g. salinization and decline in biodiversity.

SOILCOMBAT aims to engineer the sponge function of Portuguese pasture soils to sustainably combat desertification. SOILCOMBAT's main innovative aspect is the focus on the sponge function of soil COMBINED with screening for potential trade-offs - such as germination, soil ecotoxicity – to maintain sustainability. Desertification is a crosscutting issue of the soil threats: i) erosion; ii) decline in SOC; iii) salinization; and iv) decline in soil biodiversity. Therefore, to study sustainability trade-offs, dose-responses of biochar treatments for these soil threats are paramount. The approach combines lab, lysimeter and field experiments with quantitative meta-analysis and development of carbon and water footprint methods.

SOILCOMBAT's results will: i) contribute to combating desertification, restoring and promoting sustainable use of terrestrial ecosystems (SDG15); ii) strengthen resilience and adaptive capacity to climate-related hazards, to strengthen capacity for adaptation to climate change, extreme weather, drought, flooding (SD13); ensure resilient agricultural practices that increase productivity and production, improving land/soil quality (SD2). Because SOILCOMBAT's field site is on the experimental farm of Terraprima, the outlook for continued monitoring after the project's lifetime is positive, either as part of a new competitively-funded project, continued funding from an institutional project, or by Terraprima's own resources. SOILCOMBAT will deepen the knowledge base of what tools are available to help combat desertification for regional and national policy development.

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