

How different are effects of vinasse biochar on soil erosion in Loess and Marl soils?

Complementary information

Seyed Hamizedra Sadeghi¹, Mahboobeh Kiani-Harchegani², Zeinab Hazbavi³, Habibollah Younesi⁴, Padideh Sadat Sadeghi⁵, Rafael Angulo-Jaramillo⁶, and Laurent Lassabatere⁶

1. Department of Watershed Management Engineering, Faculty of Natural Resources, Tarbiat Modares University, Noor, Iran
2. Department of Watershed Management Engineering, Faculty of Natural Resources, Yazd University, Iran
3. Department of Natural Resources, Faculty of Agriculture and Natural Resources, University of Mohaghegh Ardabili, Ardabil, Iran
4. Department of Environment, Faculty of Natural Resources, Tarbiat Modares University, Noor, Iran
5. Department of Watershed Management Engineering, Faculty of Natural Resources, Tarbiat Modares University, Noor, Iran
6. University of Lyon, Université Claude Bernard Lyon 1, CNRS, ENTPE, UMR5023 LEHNA, Vaulx-en-Velin, France (angulo@entpe.fr)

Abstract

Nowadays soil erosion control using different amendments has grown up worldwide. However, the application of transformed materials like biochar has not been adequately studied. In the same vein, the application of biochars produced from waste materials that harm nature, and impose cost to managers and producers is a valuable approach for optimal utilization of the resources.

Towards this, the performance of biochar produced from deleterious raw vinasse as the main by-product of sugarcane industries in controlling soil splash and interrill erosions on two marl and loess soils from Iran was investigated.

The study was performed in 0.5 m×0.5 m plots in three replicates installed in the field with a slope steepness of 25% subjected to a simulated rainfall with an intensity of 50 mm h⁻¹ and 0.5 h duration. Analysis of the results obtained from the splash and interrill erosions during the rainfall-runoff process showed that biochar decreased soil loss compared to the control plot on Marl soil but to a small extent ($p > 0.05$). However, the plot treated with biochar on the loess soil revealed significant ($p < 0.05$) reduction in soil loss in comparison with that of the control plot.

That study clearly demonstrates the addition of biochar may promote stability and limit both runoff and soil erosion. However, such effects strongly depend on the type of soils.

Locations of the Marzan-Abad (marl soil) and Maraveh-Tapeh (loess soil) sites in Iran.



Maraveh-Tapeh

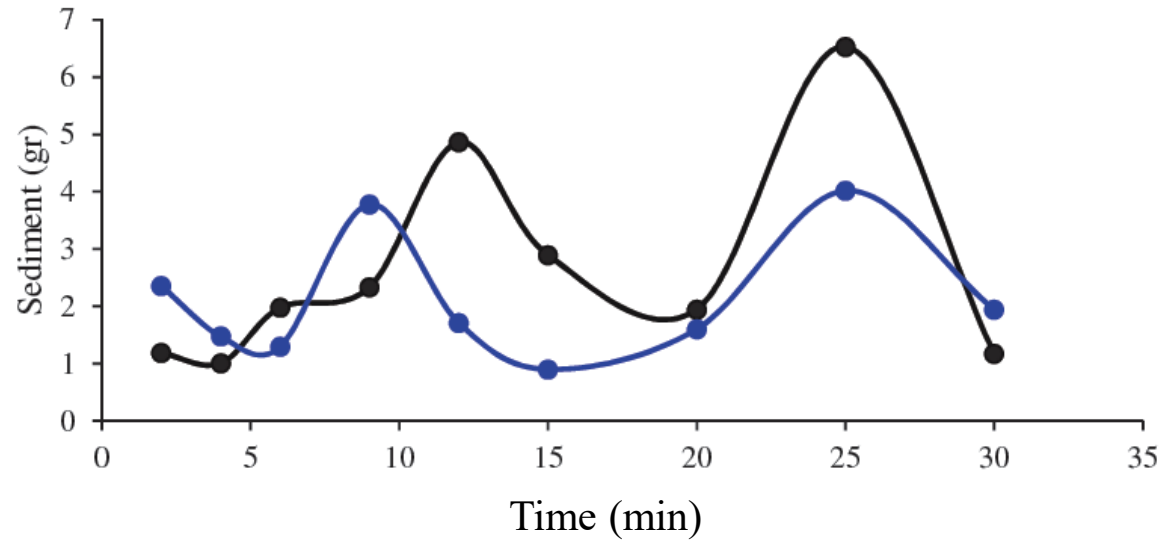


Marzan-Abad



Marzan-Abad

Cont BC

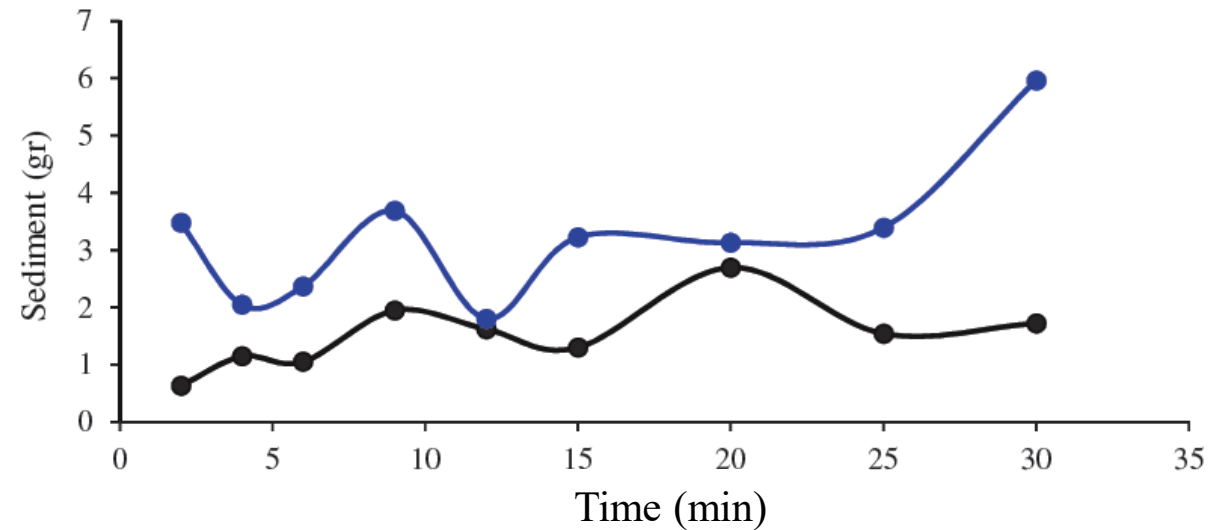


Marl soil

Loess soil

Maraveh-Tapeh

Cont BC



Sediment
yield

Outdoor Experiments

