African Ocean Chemistry (Earth Science)

Impact Analysis of Biochar on Soil Fertility and Crop Yields in Ethiopian Highlands

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Abstract

{ "background": "Biochar is a solid carbonaceous material produced by pyrolysis of organic matter, which has been shown to enhance soil fertility and crop yields globally. In Ethiopia's Ethiopian Highlands, biochar application could be particularly beneficial in improving agricultural productivity due to the region’s arid conditions.", "purposeandobjectives": "The purpose of this study is to assess the impact of biochar application on soil fertility and crop yields over a six-week period in the northern Ethiopian Highlands. The objectives are to evaluate changes in soil organic matter content, nutrient availability, and crop yield response to biochar amendment.", "methodology": "Soil samples were collected from three different plots: one receiving no biochar (control), another with 50 kg/ha of biochar application, and a third with 100 kg/ha. Soil organic matter content was analysed using the Walkley-Black method, while nutrient availability was determined by pH measurements and colorimetric tests for nitrate nitrogen.", "findings": "Significant increases in soil organic matter (SOM) content were observed in plots receiving biochar applications, with a 20% increase at 50 kg/ha and a 30% increase at 100 kg/ha compared to the control. This trend suggests that biochar can enhance SOM, which is crucial for improving soil structure and water retention.", "conclusion": "The results indicate potential benefits of biochar application in enhancing soil fertility and crop yields in Ethiopian Highlands, supporting further research into optimised biochar dosages and their long-term impacts on agricultural productivity.", "recommendations": "Further studies are recommended to explore the optimal biochar dosage for different crops and environmental conditions within the Ethiopian Highlands.", "keywords": "Biochar, Soil Fertility, Crop Yields, Ethiopian Highlands", "contributionstatement": "This study provides concrete evidence of the impact of varying biochar dosages on soil organic matter content in Ethiopia's northern regions, contributing to a better understanding of its agr The empirical specification follows $Y = beta 0 + \beta^{\rightarrow} p X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Pyrolysis, Soil Fertility, Carbon Sequestration, Crop Productivity, Land Degradation, Sustainable Agriculture*

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This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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