

Biochar increases coffee yield and cherry weight in controlled trials

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Introduction

Biochar is a charcoal produced by heating organic biomass material like crop residues in a low oxygen environment and at a high temperature in a process called pyrolysis. In agriculture, biochar can be used as a soil amendment to improve soil moisture and nutrient retention. Various studies have observed an average increase in crop yield by 33% after biochar application [1]. However, the effect of biochar on yield has seldom been documented in producing coffee trees



Figure 1: Biochar product applied in Vietnam

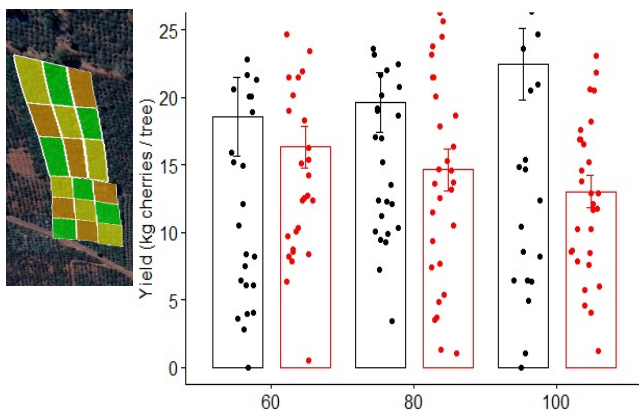


Figure 2: Design and results of NPK and biochar/organic fertilizer experiment

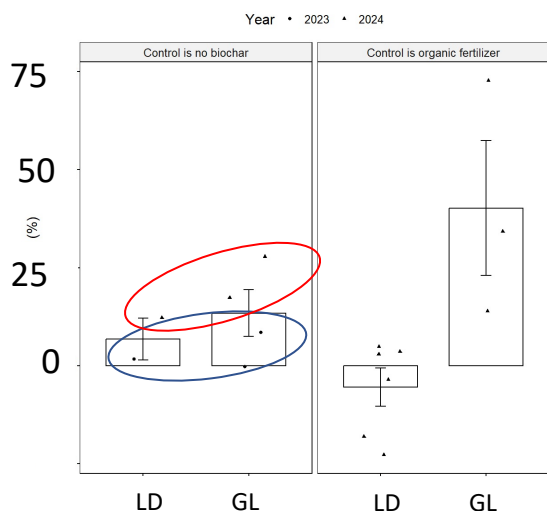


Figure 3: Summary of coffee yield increase (%) in biochar across 12 experiments and 2 years

Materials/Methods

The study was carried out in 6 controlled trials in Gia Lai (3) and Lam Dong (3), two provinces of Vietnam's Central Highlands where most of *Coffea canephora* is cultivated. In this area, average altitude was 900 m.a.s.l, annual rainfall was 2100 mm and average temperature 22.5°C. Trials compared biochar versus no biochar and biochar versus organic fertilizer, with each treatment being repeated 3 times per trial. Each tree received 1.3 kg of rice husk biochar or 1.3 kg of chicken based organic fertilizer in May while cherries were at the pea stage. NPK rate changed across trials but was the same in both controlled and treated plots. The trees were harvested in Octobre – Decembre 2024. Soil organic matter (SOM), pH and NPK content were analysed with a near infrared spectrophotometer. Tree average yield was measured by weighting cherries of 10 individual trees in each plot. After the harvest, the weight of 100 cherries, bean grades, defects and cup quality were also analyzed to assess the effect of biochar on cherry filling and bean quality.

Results/Discussion

On average, compared to the control, coffee cherry yield increased by 10.3% with a higher yield difference in Gia Lai than in Lam Dong. Plots with a higher NPK fertilizer input showed a higher cherry yield difference between biochar and control plots. Soil analysis did not show any significant differences in SOM, pH and NPK content between treatments. The weight of 100 cherries was higher in treatment with biochar, while bean grades defects and cup quality did not display significant differences between treatments.

Conclusion/Perspectives

Our network of experiments showed the potential of biochar to increase coffee yield in certain locations. Despite the absence of a significant effect on soil chemistry, other studies have shown that applying a high volume of biochar can raise pH and SOM [2]. Further studies should contribute to identifying locations with the best potential of biochar for yield improvement.

References:

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