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Effect of Biochar and Legume Biomass on *Brachiaria brizantha* cv. *Xaraés* Growth Parameters in Benin

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Abstract

Climate change and soil degradation are negatively impacting productivity of food and forage crops which may hinder animal production in West Africa. It is crucial to improve forage production in Benin with locally available inputs to ensure high quality nutrition of livestock and maintain and improve soil quality. We tested the effects of organic amendments on *Brachiaria brizantha* cv. *Xaraés* productivity, including biochar produced from corn cob biomass and green manure from *Gliricidia sepium* and *Mucuna pruriens* and their combination. The trial was installed at the experimental site of the Faculty of Agronomy, University of Parakou in Benin under a tropical sub-humid climate. The experiment was set up as a randomised complete block design consisting of three blocks, each containing eight experimental treatments: T0: *Brachiaria* alone; T1: Biomass of *Mucuna* 2 t ha⁻¹; T2: Biomass of *Gliricidia* t ha⁻¹; T3: Mixture of the two legumes at 2 t ha⁻¹ (1 t ha⁻¹ *Mucuna* + 1 t ha⁻¹ *Gliricidia*); T4: 300 kg dry matter (DM)/ha biochar; T5: 60 kg DM ha⁻¹ biochar + 2 t ha⁻¹ *Mucuna*; T6: 60 kg DM ha⁻¹ biochar + 2 kg ha⁻¹ *Gliricidia*; T7: 60 kg DM ha⁻¹ biochar + 2 t ha⁻¹ (1 t ha⁻¹ *Mucuna* + 1 t ha⁻¹ *Gliricidia*). The growth parameters measured included plant height, leaf production, total biomass, leaf length and width, internodes, secondary roots, and tiller production, and were sampled on five randomly selected plants of *B. ruziziensis* per plot three months after planting. The results showed that the combination of biochar and green manure performed best (T7) with 57% higher plants (103.8 ± 17.12 cm) compared to the control plots (T0) ($p < 0.05$). Moreover, the average number of secondary roots (18.47 ± 5.72); leaf length (40.63 ± 6.16 cm); leaf width (2.27 ± 0.29 cm); number of internodes (7.47 ± 1.19); number of tillers (3.07 ± 1.44), and number of secondary roots (3.80 ± 1.57) and total biomass (20.3 ± 5.65 t DM/ha) were significantly higher for the T7 treatment than un-amended and sole treatments ($p < 0.05$). We conclude that locally available organic amendments such as biochar and legume biomass can increase productivity of forage *B. brizantha* cv. *Xaraés*. More research is needed to determine the potential contribution of improved forage crops including *Brachiaria* hybrids on smallholder milk production and soil quality.

Keywords: *Gliricidia sepium*, livestock feeds, livestock production, *Mucuna pruriens*, organic amendments, West Africa

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