

ABSTRACT

Studies on the effects of biochar and phosphorus fertilizer on soil productivity and yield of cowpea (*Vigna unguiculata*) are scarce. Therefore, experiments were conducted in 2019 and 2020 to evaluate the effects of sole and combined application of biochar and phosphorus fertilizer on soil properties, nodulation, growth, and yield of cowpea. The treatments consisted of: biochar at 10 t ha⁻¹ (B10), biochar at 20 t ha⁻¹ (B20), triple super phosphate fertilizer at 60 kg P ha⁻¹ (P), biochar at 10 t ha⁻¹ + P (B10 + P), biochar at 20 t ha⁻¹ + P (B20 + P), and the control. The experimental design was a randomized complete block design with three replications. Results revealed that biochar and P fertilizer applied alone or in combination improved soil properties, growth, nodulation, and yield of cowpea compared with the control. Results also showed that combined applications of biochar with P fertilizer improved these properties most, especially at a higher rate of biochar (B20 + P). B20 + P increased grain yield of cowpea by 155%, 69%, 53%, 69%, and 21% respectively compared with the control, B10, B20, P fertilizer, and B10 + P. This was adduced to raise soil pH and reduced soil bulk density as a result of biochar application which induces P solubility and availability, increased N fixation, and enhanced root growth, increased nodulation leading to improved growth and yield of cowpea. Application of biochar with P fertilizer could therefore be used as a strategy for improving P availability in low pH soils of cowpea growing areas of the tropics.