**Abstract**

The effect of biochar on tree growth and soil physical properties as indicated in literature is still outstanding. Information on the effect of biochar on tree growth is limited, and the available literature has recorded conflicting results. Therefore, a field experiment using *Casuarina equisetifolia* (*Casuarina*) as the test crop under different biochar rates was conducted. Four biochar rates (0, 2.5, 5.0, and 7.5 t ha−1) were used as treatments, each replicated three times. Generally, biochar-amended plots recorded higher *Casuarina* height, collar diameter, and diameter at breast height (DBH). The application of biochar at 7.5 t ha−1 resulted in higher Casuarina height of up to 20.2% compared to the control. On the contrary, application of biochar at 2.5 t ha−1 recorded higher collar diameter of up to 30.2% compared to the control. Generally, there was a decrease in soil bulk density with biochar application. Bulk density decreased linearly with increasing biochar application rates with biochar application rate of 7.5 t ha−1 recording the lowest bulk density (0.99 g cm−3). There was a decrease in bulk density of up to 25% compared to the control with the biochar application rate of 7.5 t ha−1. Biochar application rate of 7.5 t ha−1 also recorded the highest soil moisture content across the assessment periods. Biochar-amended plots recorded higher soil moisture content than the untreated control. There was increase in soil moisture content following biochar application of up to 108% with the application of biochar at 7.5 t ha−1 compared to the untreated control. The increase in soil moisture content with biochar application can be attributed to biochar’s porous nature and large surface area. These results suggest that the use of biochar has the potential of enhancing *Casuarina* growth while enhancing soil physical properties by decreasing bulk density and enhancing soil moisture storage.