

The Effect of Biochar with Different Content on Soil Hydraulic Conductivity

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Abstract

This study aims to explore the influences of biochar with different content on corresponding hydraulic conductivity and soil physical structure of sand and loam. Indoor laboratory test was conducted to measure and analysis the variation of soil accumulative infiltration amount, saturated hydraulic conductivity and soil water characteristic curve under conditions of different ratios of biochar content (0%?1%?3%?5%?8%?10%) being added to sand and loam, which revealing the correlations between biochar content and soil water dynamic parameters of two kinds of soils. Results indicate that when the bulk density remains unchanged, the effect of different ratios of biochar on sand and loam was different. Once biochar was mixed into sand soil, related infiltration rate and cumulative infiltration amount decreased with the enhanced amount of biochar, reaching to mean values of 60.3% and 48.5% separately in relation to the control group. The valid soil water holding capacity was enlarged by 66.3%, and the variation of saturated hydraulic conductivity tended to be a positive parabola. For loam, associated infiltration rate and cumulative infiltration amount were decreased by 40.4% and 32.5% comparatively to the control group, whereas the valid soil water holding capacity was increased by 23.2% when the mixed percentage of biochar was increased, the inclination of saturated hydraulic conductivity appeared to be a negative parabola. Significant differences were observed for the influences of different biochar ratios on the soil structures of these two types of soil, those impacts were more visual on sand soil structure but, been less obvious in terms of the loam soil structure. Those sandy soil involved hydraulic conductivities were more sensitive to the biochar with different content. Corresponding results are capable of providing theoretical basis in promoting the improvement effect of biochar on soil.

Keywords: biochar, soil, saturated hydraulic conductivity, specific water capacity, characteristic curve of soil moisture