



Effect of biochar, clay substrate and manure application on water availability and tree-seedling performance in a sandy soil

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ABSTRACT

In order to develop a method for extensive pomiculture on marginal soils in semi-arid Brazil, a field experiment was conducted to study the impacts of the soil conditioners biochar, clay substrate and goat manure on soil physical parameters of a sandy soil and on seedling performance of *Spondias tuberosa* Arruda. Manure significantly increased total porosity, soil water content and reduced bulk density of the sandy soil. Water content at field capacity (θ_{fc}) and at permanent wilting point (θ_{pwp}) were increased due to manure application. Neither biochar nor clay substrate had a significant impact on the soil physical parameters. Biochar combined with clay substrate led to lower soil water content and significantly reduced the period of retaining atmospheric water. Due to a strong correlation ($R^2 = 0.75$) between θ_{fc} and θ_{pwp} , the available water capacity within all treatments remained unchanged. Amelioration and initial nutrient supplies had no effect on seedling survival and stem growth of *S. tuberosa* during the 23-month experiment. This underlines the nondomesticated character of the available plant material of *S. tuberosa*. The independence of the seedling performance of soil management makes *S. tuberosa* an interesting species for low-input orchards and for reforestation within the Caatinga.

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