



The Roots of Blue Carbon: Effects of soil BD on root growth and soil carbon sequestration in mangrove forests.

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Mangroves store large amounts of organic carbon (C) in their soils and are important in the global C cycle. These C stocks have been attributed to slow decomposition rates and high below-ground productivity, yet there is limited knowledge about the environmental factors that influence mangrove root growth. A pot-experiment was performed to assess the plant growth responses of seedlings of four species grown in soil bulk density (BD) ranging from 0.2 to 1.2 g cm⁻³. Nine functional above- and below-ground plant traits were measured. Additionally, a litter-bag study was conducted to assess the decomposition of the roots produced in the pot experiment. It was found that above- and below-ground traits of mangroves are strongly influenced by variation in soil BD, but the effect was species specific. Generally, dense soils reduced root lengths and increased total root biomass, as well as root diameters. However, decomposition rates were found to decrease with increases in soil BD in which the roots were grown, possibly due to the effect of BD on the development of such root structural features. Decomposition rates also differed among mangrove species. The pattern was largely reflected in N levels, C:N ratios and lignin content. Hence, soil BD likely has major implications for the C sequestration potential of mangrove forests, as BD not only influences the quantity of the soil organic matter inputs, but also their quality, hence decomposability.