

Carrying capacity for tree biomass of a subtropical mangrove along a river in Japan inferred from forest structural features.

A.T.M. Zinnatul Bassar¹, Rempei Suwa², Takashi Kanda³, and Masako Dannoura⁴

¹Kyoto University

²JIRCAS

³JIRCAS Tropical Agriculture Research Front

⁴Kyoto University Graduate School of Agriculture Faculty of Agriculture

February 27, 2023

Abstract

A subtropical mangrove along the Miyara River in Ishigaki Island, Japan was studied for evaluating the carrying capacity for biomass of the monospecific stands. *Rhizophora stylosa* and *Bruguiera gymnorrhiza* were dominant in the downstream area whereas *B. gymnorrhiza* in the upstream. The stem diameter *D*, stem height *H*, fine roots mass were measured and, aboveground biomass *AGB*, belowground coarse root biomass *BGBcoarse* were estimated. The *AGB*, *BGBcoarse* and fine root mass were estimated as 128.46 Mg ha⁻¹, 31.01 Mg ha⁻¹ and 12.75 Mg ha⁻¹ in the *R. stylosa*; 269.82 Mg ha⁻¹, 93.68 Mg ha⁻¹ and 11.13 Mg ha⁻¹ in the downstream *B. gymnorrhiza*; and, 227.94 Mg ha⁻¹, 81.05 Mg ha⁻¹ and 6.35 Mg ha⁻¹ in the upstream *B. gymnorrhiza* plots, respectively. The *AGB* did not differ among the plots, meanwhile *BGBcoarse* was significantly lower and fine root mass was significantly higher in the *R. stylosa* plots than in the downstream *B. gymnorrhiza* plots. Significantly lower mean individual phytomass wt specific to tree density ρ of *R. stylosa* plots than *B. gymnorrhiza* plots in the ρ – wt relationship was found, which denoted the lower carrying capacity for *AGB* of *R. stylosa* than that of *B. gymnorrhiza*. The results rejected our hypothesis that the stressful edaphic conditions, such as high soil salinity and low pH at the downstream, limit biomass and potential canopy height *H*_{max} of mangrove along a river gradient but partly supported another hypothesis that biomass and *H*_{max} differs between different mangrove species at the same edaphic environment.

Hosted file

Manuscript - (Main body).docx available at <https://authorea.com/users/590070/articles/626600-carrying-capacity-for-tree-biomass-of-a-subtropical-mangrove-along-a-river-in-japan-inferred-from-forest-structural-features>

Hosted file

Tables.docx available at <https://authorea.com/users/590070/articles/626600-carrying-capacity-for-tree-biomass-of-a-subtropical-mangrove-along-a-river-in-japan-inferred-from-forest-structural-features>

Hosted file

Figures.docx available at <https://authorea.com/users/590070/articles/626600-carrying-capacity-for-tree-biomass-of-a-subtropical-mangrove-along-a-river-in-japan-inferred-from-forest-structural-features>