

Colonisation by native shrubby species enhances the carbon storage capacity of exotic mangrove monocultures

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Mangrove plantation, carbon storage, mixed forest, Kandelia obovata, Sonneratia apetala

Abstract

Background

The exotic *Sonneratia apetala* and native *Kandelia obovata* have been widely planted in mangrove afforestation and reforestation programmes in China. However, their capacity for carbon sequestration is still controversial.

Results

The total vegetation biomass was highest in *K. obovata* monoculture, followed by the mixed forest and lowest in *S. apetala* monoculture. Such difference is attributed to the inconsistency by means of stem density of forests. This trend also applies to total vegetation and soil organic carbon storages.

Conclusions

Contrary to the original expectation, shrubby native *K. obovata* may be preferred to exotic *S. apetala* for mangrove carbon-based reforestation/afforestation programmes. It is recommended the carbon storage capacity of the existing *S. apetala* plantation may be enhanced by introducing native mangrove species. As an optional strategy of mangrove rehabilitation, the establishment of mixed plantations with different stem densities could improve the capacity of carbon storage for mono-specific plantations dominated by exotic species in Southern China.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed.

However, the manuscript can be downloaded and accessed as a PDF.

Figures

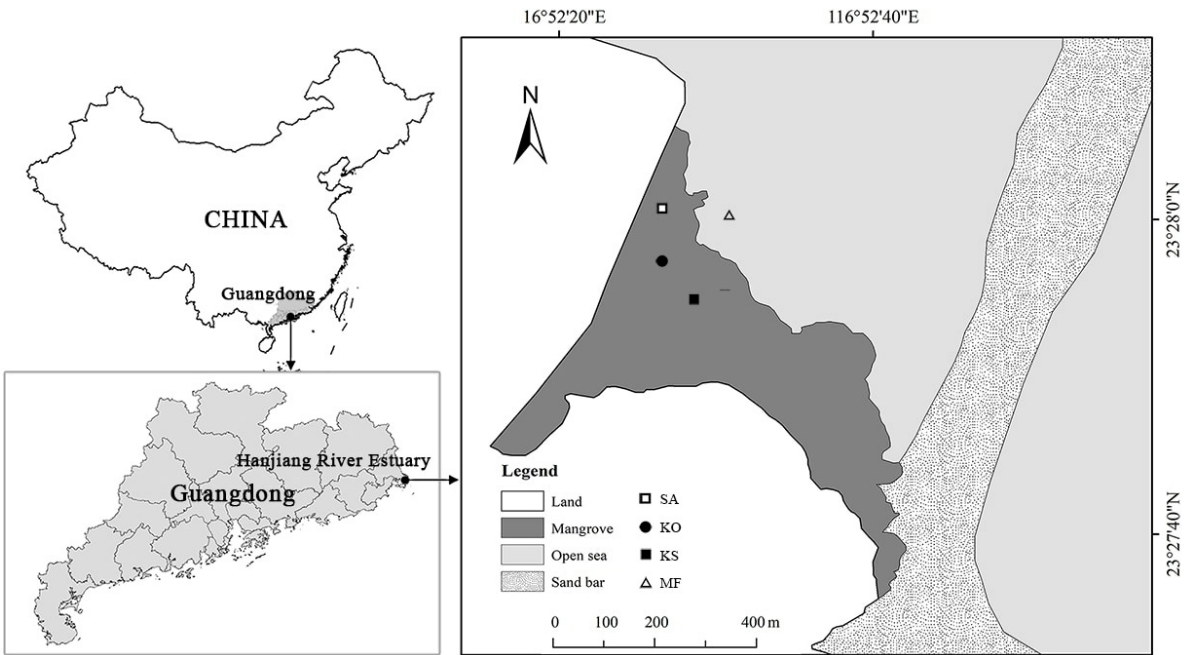


Figure 1

The location of sampling sites at Hanjiang River Estuary, Guangdong Province, southern China: *S. apetala* monoculture (SA), *K. obovata* monoculture (KO), mixed *K. obovata* and *S. apetala* (KS), and mudflat (MF). Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

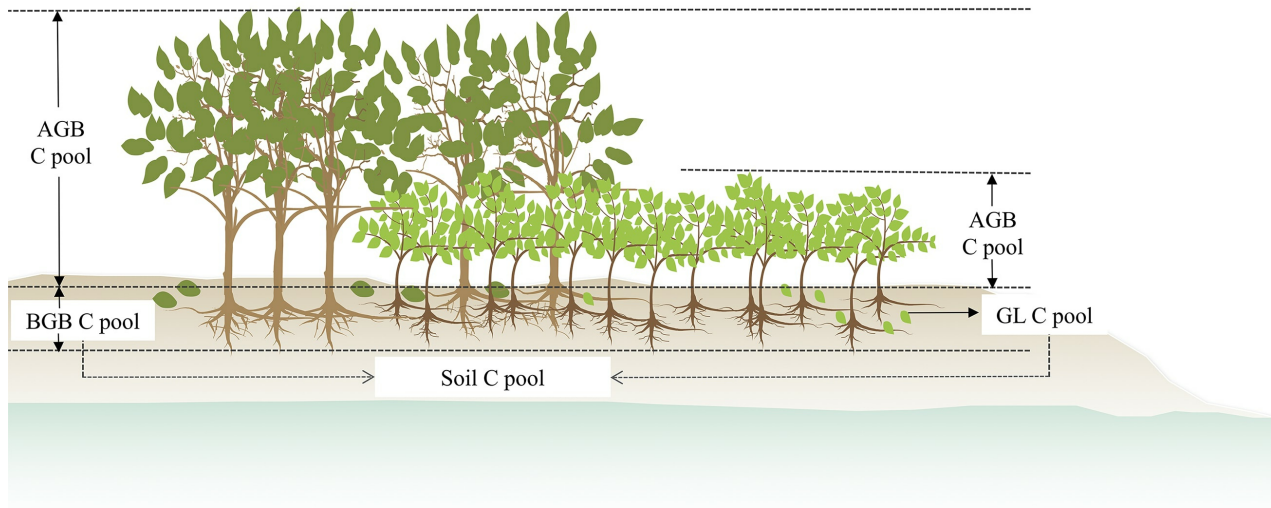


Figure 2

Schematic sketch of *S. apetala* monoculture, *K. obovata* monoculture, mixed *K. obovata* and *S. apetala* showing different carbon pool components. AGB, GL and BGB refer to aboveground biomass, ground layer and belowground biomass, respectively.

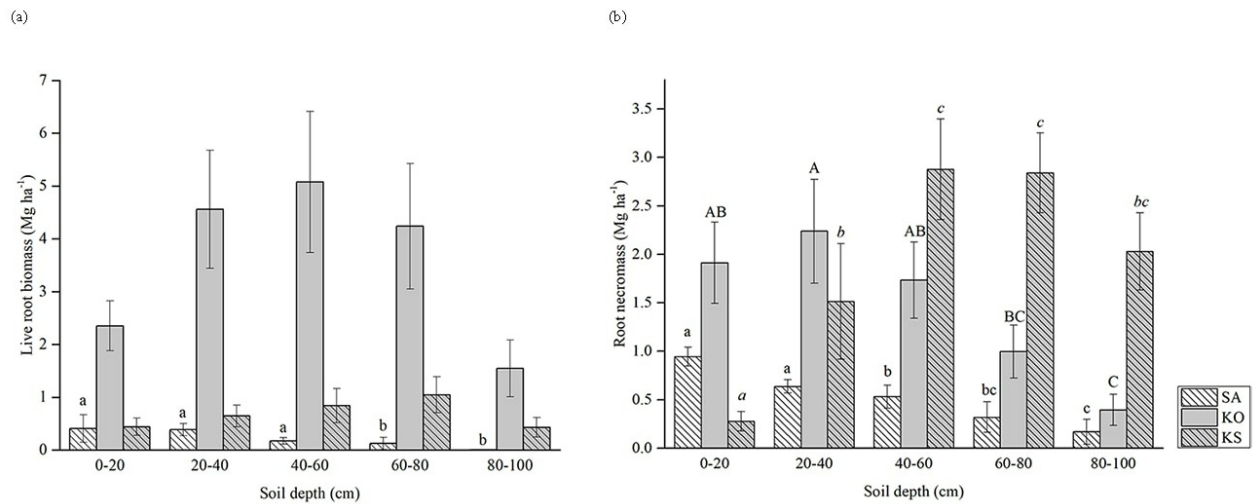
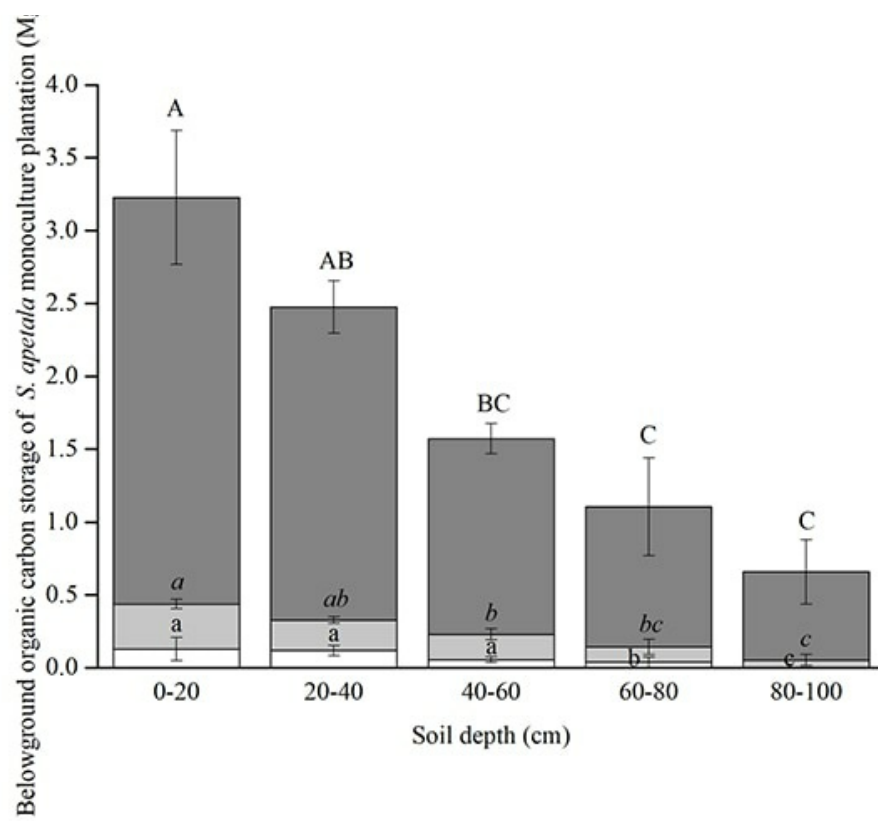


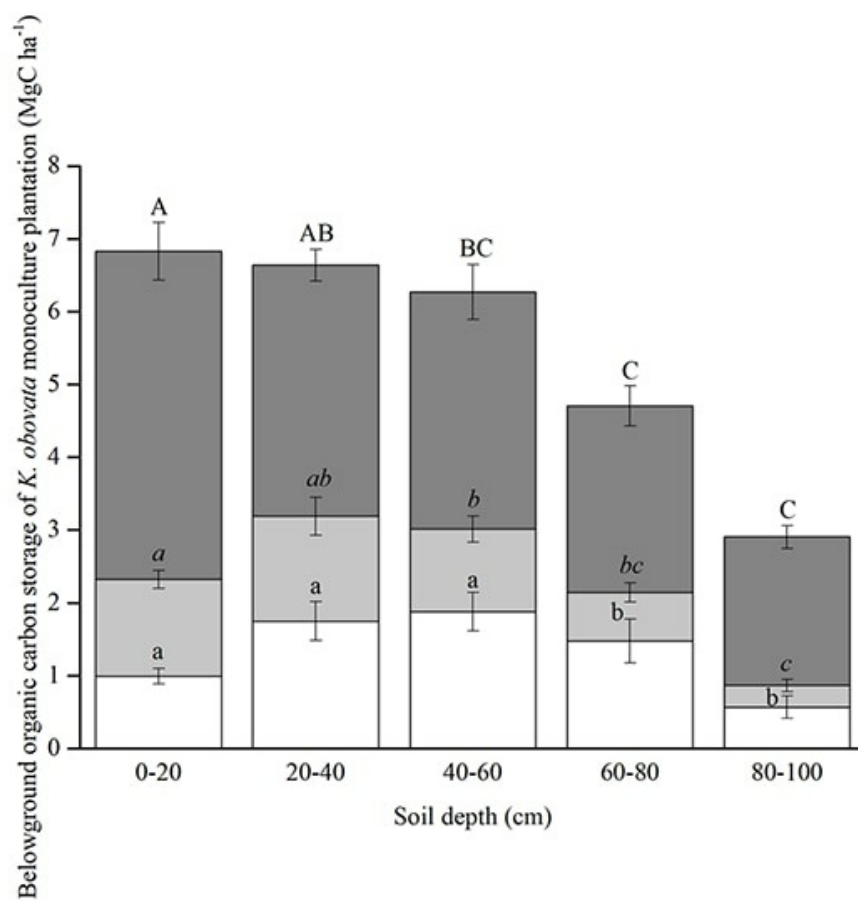
Figure 3

Vertical distributional patterns of live root biomass (a) and root necromass (b) (mean $\pm$ 1SE) in *S. apetala* (SA) and *K. obovata* (KO) monocultures and mixed forest (KS) at Hanjiang River Estuary, south China. Different letters indicate significant differences among different soil depths within the forests ($p < 0.05$).

(a)
gC ha⁻¹)



(b)



(c)

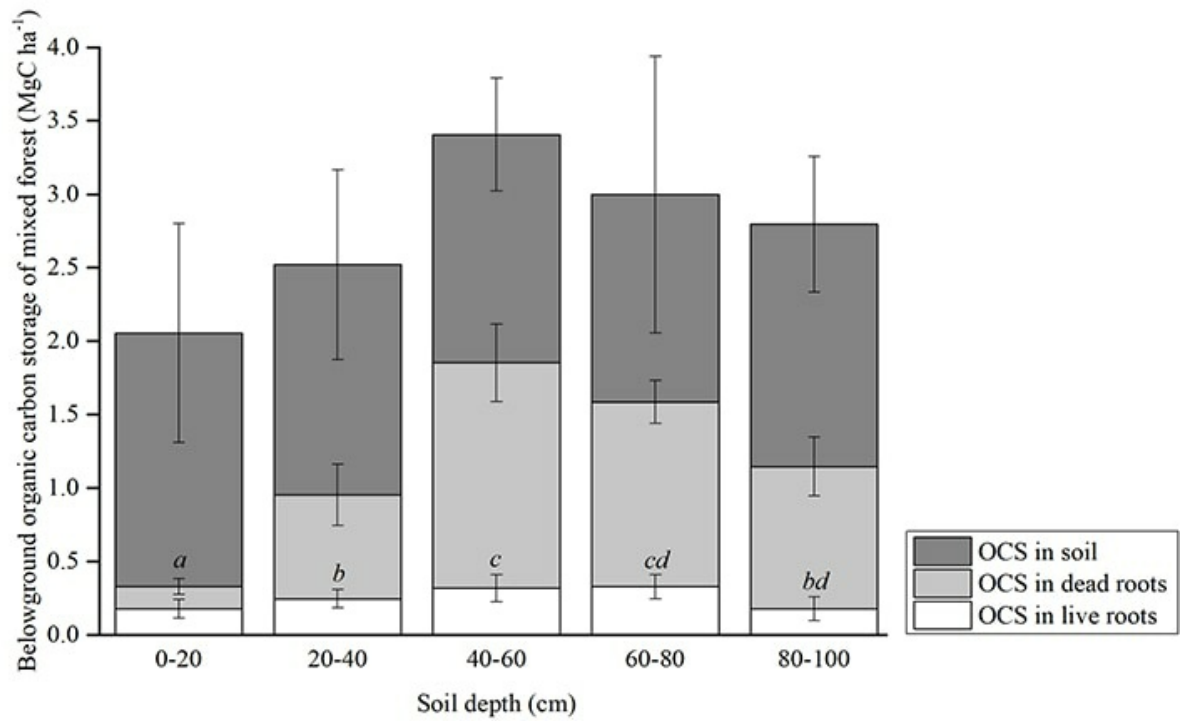


Figure 4

Belowground organic carbon storage of *S. apetala* (a), *K. obovata* (b) monocultures and mixed forest (c) (mean $\pm$ 1SE) at Hanjiang River Estuary, south China. Different letters in of the same front indicated significant differences among the different soil depths ($p < 0.05$)