

# Size does matter, but not only size: two alternative dispersal strategies for viviparous mangrove propagules

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## Abstract

To the present day, it is much debated whether long-distance dispersal (LDD) of mangrove propagules is an epic, rather than a frequent event, next to more local dispersal. In general, there is a knowledge gap on the whereabouts of a propagule between the moment it releases from the parent tree and its establishment after a certain dispersal period through water. We addressed the fundamental need to understand the dispersal behaviour of viviparous mangrove propagules, in relation to their morphological characteristics, the differences between genera and the link with their different position in the intertidal zone.

We studied the propagules of two dominant mangrove species, *Ceriops tagal* and *Rhizophora mucronata*, that are similar in shape but differ in other morpho-anatomical features. We hypothesized the propagules of both species to have a different hydrodynamic behaviour, resulting in a different dispersal strategy. The dispersal strategies of *C. tagal* and *R. mucronata* propagules were elucidated through a combination of a propagule tracking, predation and root-growth experiment, carried out in the field. *C. tagal* and *R. mucronata* adopted two different dispersal strategies. *C. tagal* releases a large number of propagules, disperses fast (low density and slender morphology) and has a high agility (smaller size) when dispersing through dense root systems. *C. tagal* propagules have a theoretical advantage to disperse over longer distances over the denser, thicker and longer *R. mucronata* propagules. *C. tagal* propagules have, however, lower establishment chances due to slower root-growth, desiccation sensitivity and smaller size. In contrast to *Ceriops*' tactic of "few and fast" dispersal, *R. mucronata* has adopted a dispersal tactic of survival. Fewer propagules are released, but they are more resistant to predators due to their larger size and they can anchor themselves faster due to quicker root-growth. Overall, propagule characteristics of both species result in different and alternative dispersal strategies on a local scale. On a global scale, we hypothesize this might lead to a similar capacity for LDD, ending in successful establishment.

## Keywords

*Ceriops tagal*, *Rhizophora mucronata*, long-distance dispersal, propagule size, tracking