Fruit size and predispersal herbivory by insects influence recruitment of the mangrove *Avicennia marina*

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Abstract

Seedling establishment and early growth are critical to mangrove forest regeneration, but this recruitment can be strongly dependent on factors that occur before the fruit abscises from the tree. Observations in mangrove forests of temperate Australia suggest that fruit size of the mangrove *Avicennia marina* varies among trees and forests and from year to year. In addition, developing fruit are commonly consumed by larvae oviposited into the fruit by insects, and this predispersal herbivory also appears to vary spatially and temporally. The objective of this study was to quantify spatial and temporal variation in fruit size and herbivory and to determine using field experiments how these factors might influence local and regional patterns of mangrove recruitment. Surveys of fruit in several forests over four years that varied in levels of rainfall revealed that fruit size varied substantially within and among trees and forests and that years of higher rainfall produced larger fruit. Insect herbivory was also spatially variable but did not vary among years and was independent of fruit size. Field experiments were done where I supplied propagules of different sizes and amounts of herbivore damage in an orthogonal design to mangrove forests and then monitored seedling establishment, growth and survivorship for one year. Seedling establishment, growth and mortality were dependent on propagule size and herbivory, with large, undamaged propagules establishing better, growing taller and surviving best. The influence of predispersal herbivory on seedling performance was, however, not dependent on propagule size, and propagule size appeared to have a greater influence on seedling performance than herbivore damage. These results show that conditions in the predispersal environment can strongly influence mangrove recruitment and that years of high rainfall and low herbivory are likely to be those that produce the strongest recruitment pulses that might drive forest regeneration.