

Comparative studies on crown foliage dynamics of three mangrove species of the Family Rhizophoraceae in Okinawa Island, Japan

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Abstract

The leaf area available for photosynthesis plays a crucial role in biomass production. Therefore, it is necessary to investigate the dynamics of crown foliage to understand the productivity of mangroves, which play an important role in the subtropical and tropical coastlines of the world. The crown foliage dynamics such as leaf recruitment, survival and leaf area growth, of *Rhizophora stylosa* Griff., *Bruguiera gymnorhiza* (L.) Lamk. and *Kandelia obovata* (S., L.) Yong were investigated from April 2008 to March 2009. These studies have been done using both sample tree (direct observation) and litterfall (indirect observation) methods. Newly flushed leaves occurred successively throughout the year, with a maximum in summer and a minimum in winter for three species. The maximum leaf area was significantly the same in all seasons except for *B. gymnorhiza*. The half-expansion period and the intrinsic rate of increase were respectively longer and lower in winter than in other seasons for three species. Therefore, leaves flushed in summer grew faster at their initial stage and attained their maximum leaf area sooner than those flushed in winter. This most likely results from the difference in temperature between summer and winter. The crown foliage area was almost stable throughout the year for three species. The homeostatic control of the crown foliage area may be accompanied by the regulation of leaf recruitment and death. The mean leaf longevity was estimated to be 11 month for *R. stylosa*, 13 month for *B. gymnorhiza* and 9.0 month for *K. obovata*. Therefore, the present results suggest the existence of integrated mechanisms that maintain the crown foliage area of three species. Integrating crown foliage dynamics into forest models represents an important step towards incorporating physiological-mechanisms into the models for predicting growth responses to environmental changes and for understanding the complex responses of tree morphology, growth and production.

Keywords

crown leaf area, litterfall, leaf longevity, leaf survival