Effect of Temperature on Leaf Litter Consumption by Grapsid Crabs in a Subtropical Mangrove (Okinawa, Japan)

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Abstract

Litter consumption by grapsid crabs enhances detritus turnover and nutrient cycling in mangrove ecosystems. However, unlike tropical mangroves, subtropical mangroves are subjected to pronounced seasonal changes in weather; particularly, low winter temperatures may slow down important ecological processes such as litter decay. This study aimed at evaluating the effect of temperature (low winter and high summer temperatures) on leaf litter consumption by two grapsid crabs (*Parasesarma pictum* and*Helice leachi*) in a subtropical mangrove forest of Okinawa Island, south Japan. We also tested whether leaf litter consumption between the low winter and summer temperatures could be affected by leaf species type and quality. A leaf-tethering technique was used to conduct field feeding experiments in the high and low intertidal sites of the mangroves using leaves of *Bruguiera gymnorrhiza* and *Kandelia obovata*. Leaves of different stages of decay: fresh (green), yellow, brown, two and four weeks were used. Results showed significant differences in leaf consumption between seasons, leaf species and shore heights. More leaves were consumed during summer than winter. In both seasons and shore heights, crabs consumed significantly more leaves of *K. obovata* than *B. gymnorrhiza.* Consumption was higher in the high than low intertidal mangrove. Although crabs preferred aged leaves in summer, during the winter season they consumed significantly more green leaves of *K. obovata* than yellow and brown leaves of *B. gymnorrhiza*. The slow litter processing during winter was consistent with lower carbon contents and lower C/N ratios in the surface sediments, signifying low input of organic matter. Results of this study suggest that temperature affects mangrove litter processing in Oura Bay mangroves, and consequently the amounts of organic matter and nutrients conserved inside subtropical mangrove sediments.

Keywords

Mangrove;
Litter consumption;
Grapsid crabs;
Bruguiera gymnorrhiza;
Kandelia obovata;
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