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Biomass and secondary production of the three dominant amphipods (Crustacea) in a temperate sandy shore, southern Korea

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Introduction

In sand beaches the benthic macrofauna feeding on primary food sources such as detritus and phytoplankton and being prey in turn for top predators such as fishes occupies a key position in the center of food chains. Amphipods are the most productive bentho-pelagic animals (Barnard, 1963) and are commonly consumed by fishes and larger crustaceans (Vetter, 1995). Consequently, amphipods play an important role in energy flow as a trophic link from primary producers to higher consumers (Chiaravalle et al., 1997). The aim of the present study is to determine and compare the annual biomass and production of three dominant amphipods such as *Synchelidium trioostegitum*, *Gitanopsis japonica* and *Pontogeneia rostrata* in a temperate sandy shore.

Materials and Methods

Benthic amphipods were sampled monthly from July 1996 to June 1997, at a depth of 1 m below the spring tide low water mark in Dolsando (34°37′39″ N, 127° 47′44″ E), southern Korea. Five replicate samples were taken by hand with a sledge net (12 x 30 cm mouth, 0.3 mm mesh size) over a distance of 20 m parallel to the shoreline at a speed of approximately 1 m s^{-1}.

Additional samples were collected from January to March 1999 for biomass estimation. After collection, live individuals of amphipods were sorted out immediately under a dissecting microscope and placed separately in a vial filled with the filtered seawater. Then they were transported to the laboratory where room temperature had been adjusted to match the water temperature. To clear the gut, live amphipods were incubated for 48 hr without food. Live animals were then rinsed with distilled water and measured for body length. Since the breeding of amphipods occurred continuously through the year and cohorts were hardly separable, secondary production of amphipods was estimated using the size-frequency method (Hynes and Coleman, 1968). The equation for estimating production is:

$$P = i\sum_{j=1}^{i}(\overline{N}_j - \overline{N}_{j+1})(W_j W_{j+1})^{1/2}$$

Results and Discussion

Biomass structure of *Synchelidium trioostegitum* showed one peak from February to March, with maximum biomass in March. In contrast, biomass of *Gitanopsis japonica* and *Pontogeneia rostrata* was very low in summer and fall, but dramatically increased in winter. *G. japonica* showed the peak of biomass in December and then biomass decreased after peak, but increased again after April. On the other hand, biomass of *P. rostrata* showed one peak in spring (March to April).

The annual secondary production of *Synchelidium trioostegitum, Gitanopsis japonica* and *Pontogeneia rostrata* were 0.08, 0.08 and 0.57 g DW m^{-2} yr^{-1}, respectively. The annual P/B ratios of S. *trioostegitum, G. japonica* and *P. rostrata* were 2.82, 1.91 and 6.97, respectively. Secondary productions and P/B ratios of *S. trioostegitum* and *G. japonica* were lower than those of the co-exist amphipod *P. rostrata* in an intertidal sandy shore. This suggests that *P. rostrata* plays an important role in a sandy shore ecosystem as a trophic link from primary producers to higher consumers.

Literature cited

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