Verh. Internat. Verein. Limnol.	26	2056–2057	Stuttgart, Mai 1998

Population dynamic of *Heleobia australis* (Gastropoda) in a coastal lagoon (Rio de Janeiro, Brazil)

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Introduction

The Imboacica Lagoon has been subject to many anthropogenic impacts (e.g. discharge of sewage, landfills and temporary man-made openings of the sand bar), due to the population increase of the Macaé district.

Heleobia australis was the numerically predominant species. The aim of this research was to study the population dynamics of *H. australis*. Considering the importance of this organism to the benthic community, density (ind/m^2), biomass (mg/m^2) and size frequency distribution were measured in two sampling stations in the Lagoon.

Study area

The Imboacica Lagoon is located in the district of Macaé (22° 50′ S–44° 42′ W), Rio de Janeiro state, Brazil. It has the following morphometric characteristics: area 3.26×10^6 m^2, volume 3.56×10^6 m^3, maximum and average depth, respectively 2.2 m and 1.1 m, perimeter 27.6 km, maximum length 5.3 km, and maximum width 1.3 km (FURTADO 1994).

The climate in the region is warm and humid, with minimum and maximum mean temperature respectively 18.7 and 27.4 °C. The greatest precipitation period is in summer (185 mm) and the lowest in winter (43.8 mm). Stronger winds come from the east and weaker ones from the north-east.

Methodology

Samples were collected monthly from March 1993 to December 1994 at two sampling stations: station 1 – limnetic zone, with a low influence of sewage in the lagoon, station 2 – littoral zone, near a sewage discharge. The top 10 cm of sediment was collected using a 0.25 m^2 corer. In the laboratory, sediment samples were washed through two 1 and 0.5 mm mesh sieves, and organisms sorted and preserved in 70 % ethanol.

Measures of size frequency distribution were obtained through shell maximum length and were divided into 17 sizes classes, with 0.5 mm intervals, varying from 0.5 to 9.0 mm. The biomass (mg/m^2) was estimated from ash free dry weight (AFDW).

Results and discussion

Table 1 shows *H. australis* biomass to decrease at station 1 during May 1994 (698 mg/m^2), after the Imboacica Lagoon sand bar was opened. However, on April 1994, a biomass peak (1470 mg/m^2) occurred, probably due to organisms carried in during the opening of the sand bar and subsequent lagoon draining.

At station 1, high densities of *H. australis* occurred in most months. However, proportionally lower biomass values were obtained for March, May, July, September and October 1993, whereas at station 2, low densities of *H.*

Table 1. *Heleobia australis*: Density, biomass and D/B (density/biomass) (ind/mg) relation in sampling stations 1 and 2, Imboacica lagoon.

	Station 1			Station 2		
Months	Density	Biomass	D/B	Density	Biomass	D/B
March 1993	4696	708	6.6	0	0	0
April	1032	461	2.2	40	45	0.9
May	4672	259	18	920	379	2.4
June	3480	1468	2.4	120	117	1.0
July	2296	299	7.7	400	477	0.8
August	968	477	2.0	200	269	0.7
September	3648	598	6.1	800	949	0.8
October	2464	488	5.0	280	636	0.4
November	32	21	1.5	960	1970	0.5
December	1256	475	2.6	48	263	0.2
January 1994	2024	1072	1.9	544	1039	0.5
February	2328	1212	1.9	208	428	0.5
March	2024	1213	1.7	984	1790	0.5
April	3360	1418	2.4	120	260	0.5
May	1312	698	1.9	144	327	0.4
June	2008	959	2.1	0	0	0
July	1200	1343	0.9	0	0	0
August	2512	931	2.7	328	572	0.6
September	1464	667	2.2	128	219	0.6
October	1840	754	2.4	16	24	0.7
November	2776	1312	2.1	0	0	0
December	1056	715	1.5	0	0	0

0368-0770/98/0026-2056 $ 0.50

australis were regularly associated to proportionally higher biomass values.

This pattern could be explained by the density/biomass ratio (D/B). At station 1, the values of D/B were high on March, April, June, September and October 1993 (6.6; 18.0; 7.7; 6.1; 5.0, respectively), suggesting that the gastropods found in this station are numerous and are small. Conversely, the values obtained to D/B ar station 2 were low, except in May and June 1993 (2.4, 1.0, respectively), suggesting that at this station the gastropods were less numerous and larger.

The results showed that *H. australis* body – size is different at both sampling stations in Imboacica Lagoon. This difference could be related to quality and quantity of food resources available ar these stations. Station 2 has a great input of organic matter from sewage, and there is a littoral zone highly colonized by the aquatic macrophyte *Typha domingensis.* This macrophyte bears a rich periphytic community where *H. australis* forages. At station 1, the macroalga *Chara* covers the sediment, with little periphyton, and there is slight, if any, sewage influence.

At station 2, we did not observe *H. australis* in June, July, November and December 1994. This absence could be attributed to the gastropods foraging in aquatic macrophytes in the littoral zone. Moreover, other factors at this station, such as low oxygen concentrations in the bottom layer of the water column and H_2S production, are unfavorable for this organisms. Thus, *H. australis* probably migrate from the sediment to aquatic macrophytes to feed on the periphytic community of *T. dominguensis* leaves.

The biomass values suggest high secondary production. Moreover, body-size variations could be related to the life-cycle. In future, *H. australis* studies will investigate its use as a bioindicator of different forms of anthropogenic impacts in Imboacica Lagoon.

Acknowledgements

This work was financed by S. A. Petrobrás we want to thank Miss Betina Suzuki, Dr. André Furtado for reviewing the manuscript and for their useful comments. Dr. Ricardo Absalaõ is thanked for identification of the species of gastropod.

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