

HEAVY METAL ACCUMULATION IN BLUE CRABS (*Callinectes bocourti*) FROM MACEIÓ, ALAGOAS

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ABSTRACT

In this work the elements Cd, Cu, Cr, Pb, Zn and Ni were analyzed in hepatopancreas samples of crabs (*Callinectes bocourti*) from the city of Marechal Deodoro and from the city of Coqueiro Seco, both in the state of Alagoas. The biometry of these crabs was performed, their hepatopancreas were extracted, and then lyophilized. Heavy metal analysis were performed by Grafite Furnace Atomic Absorption Spectrometry (GFAAS) Thirty seven crabs individuals, were collected. The crabs were adults with average mass of ~78g. The average values of the metals were measured, and for Pb and Cd, that the ANVISA establishes limits, these values are lower than the limits, even some individual concentration are higher than the recommended limits. The concentrations of Cu and Zn are higher than the other metals, suggesting that there is an influence of the industrial activities in surroundings of the sampled sites.

1. INTRODUCTION

Trace elements are found in natural water bodies at varying concentrations. The most potentially dangerous of these elements are heavy metals, viz., Pb and Cd. Body levels of essential metals such as copper, chromium, nickel and zinc can be regulated by some decapod crustacean at concentrations below a threshold level. Accumulation of these metals only begins after the organisms are faced with high concentration in the surrounding medium [1], but body levels of nonessential metals such as cadmium and lead were not found to be regulated by crustacean [2].

Besides natural sources, antropogenics activities can increase the natural trace metal concentration. The artificial sources of these metals include industrial and domestic wastes and other activities such as agriculture. This kind of contamination is an important source of pollution which is not biodegradable and could be accumulated in tissue of living organisms.

In this work, blue crabs (*Callinectes bocourti*) were used like a bio-indicator.. This species found in the occidental hemisphere of Atlantic Ocean, living in flat waters of estuaries and mouth of rivers and presenting low tolerance to polluted and high saline waters [3]. As far as

the crabs consume organic substances present in the bottom of sediments of aquatic systems, they are good biomonitors for pollutants presents in the ecosystems. It is also important the fact that this species represents both source of income and nourishment for the marginal populations effects. The concentration levels of Cd, Cu, Cr, Pb, Zn and Ni in hepatopancreas were determined.

2. MATERIALS AND METHODS

2.1. Locations

A total of thirty seven crabs, twenty from the city of Marechal Deodoro (site I) and seventeen from the city of Coqueiro Seco (site II), both in the state of Alagoas, were collected. All of them in adult age, with average mass of ~78g. The biometry of the crabs was performed with the determination of the length and width of the carapace and total wet weight. This measurements were made when they were still alive, and the data were presented in table 1.

Table 1. Biometry of the crabs

Site I: Marechal Deodoro					Site II: Coqueiro Seco				
Crab	Weigh (g)	Width*	Length*	Sex	Crab	Weigh	Width*	Length*	Sex
1	90.62	89.2	50.9	M	1	65.13	81.75	47.4	M
2	54.3	74.2	42.6	F	2	86.59	88.2	51.4	M
3	56.96	75.55	43.7	M	3	77.78	81.15	47.3	M
4	62.84	91.1	46	F	4	64.17	76.7	45.4	M
5	90.62	91.85	52.9	F	5	105.32	89.65	52	M
6	89.68	87.5	51.1	M	6	85.68	84.4	48.7	M
7	43.17	71.1	40.5	F	7	79.91	86.75	51.5	M
8	53.43	73	42.4	M	8	101.61	87.15	50.9	M
9	65.76	80.4	46.7	F	9	74.61	89.7	51.2	F
10	43.17	70.45	40.6	M	10	76.21	81.2	47.5	M
11	60.26	80.25	44.9	F	11	63.34	77	45.4	M
12	64.27	80.25	46.65	F	12	98.44	75.75	50.4	M
13	104.32	92.6	54.25	M	13	81.08	87.3	51.1	M
14	94.86	92.75	53.4	F	14	63	81.6	47.8	M
15	52.52	76.15	43.55	F	15	81.25	82.5	48.6	M
16	55.78	74.25	43.1	M	16	86.2	83.75	49.2	M
17	44.38	68.55	39.75	M	17	129.41	95.5	55.9	M
18	62.77	79.8	45.4	F					
19	119.07	98.9	57.9	F					
20	88.51	90.85	50.7	F					

* in centimeter

2.2. Method

After the biometry, the crabs were washed with double-distilled water, and then they were sacrificed and your hepatopancreas were extracted. In order to avoid contamination during dissection and analysis, all utensil and glassware used was washed with EXTRAN 5% (v/v) solution in ultrasonic system during 2 hours and then washed in nitric acid 10% (v/v) during 24 hour. To rinsed, was used triple-distilled water, and the drying was made in a laminar flow closet. The hepatopancreas was weighted and then lyophilized to finally measure the dry weight. To the sample digestion, 0.25g of dry sample was disposable in a vessel of Teflon PFA with HNO₃, and lead to microwave MARS 5. The microwave digestion method used was the same of indicate by the oven fabricant for oyster tissue, but with an increase of four times the potency and 5 minutes in the total time.

Metal analysis was carried out on the resultant digests using a Varian SpectrAA220 Zeeman Grafite Furnace Atomic Absorption Spectrometer (GTA100) equipped with deuterium background correction, that need small amount of samples and have detection limits lower than flame of AA. All samples were measured in duplicate. The elements chromium and nickel, were used chemical modifiers of palladium plus ascorbic acid. Each sample was measured in duplicate. Certified reference material (Mussel Tissue, NIST 2976) were used to check the percentage recovery of metals.

3. RESULTS

The results of trace metal data on the hepatopancreas of blue crabs from the two sites are presented in Table 2. The mean concentration and the range of values and the range of concentration found are presented for each metal, as well as the recovery of trace measurement.

Table 2. Mean concentrations and the range of trace metals ($\mu\text{g/g}$ dry weight), for each metal and the respective recovery (in %)

Metal	Pb	Cr	Zn	Cd	Cu	Ni
Site I						
Concent.	0.92±0.28	0.33±0.03	170 ± 14	0.43±0.02	125±6	0.45±0.06
Range	0.35-1.61	0.12-0.95	51.4-248.0	0.12- 1.44	32.2-552.5	0.24-1.04
Site II						
Concent.	1.15±0.14	0.60±0.06	149±9	0.59±0.11	99.7±20.5	0.95±0.15
Range	0.47-2.53	0.31-2.05	79.7-228.7	0.32-2.62	18.4-364.0	0.51-2.94
Recovery	99.2	94.5	88.2	98.8	94.3	95.4

The confidence limit is 69%

4. CONCLUSIONS

For metals which the ANVISA (ANVISA 685) establishes limits, like Pb ($2\mu\text{g/g}$) and Cd ($2\mu\text{g/g}$), the average concentrations had been lower than the limit, but in site II were observed some concentration values higher than the recommended value. The concentration

of Cu and Zn is higher than the other metals, suggesting that there is an influence of the industrial activities in surround of the sampled sites.

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